

Pennsylvania Chesapeake Watershed Implementation Plan

**Prepared by the
Pennsylvania Department of Environmental Protection**

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Pennsylvania Chesapeake Watershed Implementation Plan

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Pennsylvania Chesapeake Watershed Implementation Plan

Section 2. **Executive Summary**

Background

Pennsylvania's Chesapeake Watershed Implementation Plan (WIP) – Phase 1 was prepared to address the U.S. Environmental Protection Agency's (EPA's) expectations for the Chesapeake Bay Total Maximum Daily Load (TMDL), scheduled for publication in December 2010. For Pennsylvania and other headwater states, the TMDL will include an aggregate Wasteload and Load allocation for each of the major basins. For the tidal water states, the TMDL will include individual wasteload allocations for individual NPDES permitted facilities.

EPA Region III outlined their expectations for state WIP's in November 4, 2009 correspondence. EPA expects the states to have controls in place by 2017 that would achieve at least 60 percent of the necessary reductions (interim target level), and to have all the controls in place by 2025 (final target level). In its correspondence, EPA established a three phase planning process to develop and refine the WIP.

EPA established a September 1, 2010 deadline for submission of the Draft Phase 1 WIP, and a November 29 deadline for the final plan. The Phase 1 WIP will divide nutrient and sediment loads by source sector (e.g. agriculture, stormwater, wastewater treatment plants, etc.), NPDES permit loads, and major drainage basin. Pennsylvania has five drainage basins in the Chesapeake watershed. They include the Susquehanna, Potomac, Northeast, Elk and Gunpowder Rivers. The nutrient and sediment loads were generated by EPA's Phase 5.3 watershed model.

EPA also directed the states to develop a Phase 2 WIP which will further subdivide the loads by local area (county). It established a June 1, 2011 deadline for submission of the Draft Phase 2 WIP, and a November 1 deadline for the final plan. These will not be regulatory allocations to the county. Rather, they are to inform local implementers (e.g. municipal elected officials and planning agency personnel, county conservation districts and planning commissions) of the nutrient and sediment loads generated by their geographical area so they can help implement or plan appropriate actions to reduce the loads. Local implementation efforts should focus on compliance with existing rules and regulations, as well as seeking opportunities for additional management actions. EPA expects the Phase 2 WIP to contain greater detail about the first stage of implementation, which will last from when EPA establishes the TMDL in December 2010 until 2017. EPA expects to modify the Bay TMDL, if necessary, by December 15, 2011.

The second stage of implementation will extend from 2018 to 2025, when controls are implemented to reduce loads from the interim to final target levels. EPA established a June 1, 2017 deadline for submission of the Draft Phase 3 WIP, and a November 1 deadline for the final plan. Similar to the Phase 2 WIP, the Phase 3 plan will subdivide the loads by county level. EPA expects to modify the Bay TMDL, if necessary, by December 15, 2017.

EPA issued nitrogen and phosphorous draft allocations to the states on July 1, 2010. Sediment draft allocations were issued on August 15, 2010. The draft allocation represents the maximum amount of pollutant loading permitted by the Chesapeake Bay TMDL. EPA proposed a range of sediment allocations. The range represents loads expected to be achievable through full implementation of nutrient management practices necessary to attain the draft nitrogen and phosphorous allocations. Pennsylvania draft allocations are described in the below Table.

Phase 5.3 Watershed Model			
Nitrogen and Phosphorus in Millions Pounds per Year			
Sediment in Million Tons per Year			
	Nitrogen	Phosphorous	Sediment
2009 Progress	106.4	3.96	1.28
Draft Allocation	76.77	2.74	0.95 – 1.05
Remaining Reductions	29.53	1.21	0.23 – 0.33

Pennsylvania is committed to protecting and enhancing our streams and watersheds. The efforts here at home will in turn help in further restoring the Chesapeake Bay by 2025. Over the years, significant progress has been made to reduce nitrogen and phosphorus pollution of the local waters in the Pennsylvania watershed. According to EPA’s current watershed model, when compared to 1985 Pennsylvania has achieved 28 percent of the nitrogen reductions, 46 percent of the phosphorus reductions, and 38 to 46 percent of the sediment reductions needed to reach its allocations. This is real progress, but more needs to be done. When compared to current 2009 progress, Pennsylvania needs to achieve an additional 29.53 million pound reduction in nitrogen, 1.21 million pound reduction in phosphorous, and 472 to 662 million pound reduction in sediment by 2025.

All sectors have been contributing to the progress made in Pennsylvania. For example, agriculture has played a major role in achieving Pennsylvania’s nutrient reductions. According to EPA’s model, agriculture land uses contribute 56 percent of Pennsylvania’s nitrogen loadings to the Bay, yet they account for 80 percent of the nitrogen reductions. Agriculture Best Management Practices (BMPs) are among the most cost effective tools to restore water quality. EPA’s most recent calculations show Pennsylvania farmers can proudly lay claim to 41 percent of all the nitrogen reductions made by agriculture in the multi-state watershed. This leadership derives from the Commonwealth’s set of agricultural stewardship firsts, including:

- o The first mandatory farm nutrient management plans;
- o The first nutrient management program to regulate nitrogen and phosphorus;
- o The first EPA-approved regulatory program for concentrated animal feeding operations;
- o The first Bay state to permanently preserve 20 percent (more than 3 million acres) of land in the watershed.
- o The first Bay state to meet its goal to plant 3,736 miles of forest buffers by the year 2010. The state has planted a total of 3,894 miles of forest buffers along waterways since 2002; and
- o Pennsylvania is home to the largest Conservation Resource Enhancement Program (CREP) in the entire nation. The CREP program delivers more than \$50 million in state and federal assistance and targets key edge-of-stream BMPs to maximize water quality.

To meet the 2025 goal, our approach is based on three core elements. Those elements are: 1) milestone implementation and tracking; 2) supporting the implementation of advanced technologies and nutrient trading; and 3) enhancing common sense compliance efforts. These elements will provide the foundation for the development of Pennsylvania's Chesapeake Watershed Implementation Plan as required by the EPA.

To guide the development of the plan, The Department of Environmental Protection (DEP) is engaging stakeholders in a process similar to that undertaken in 2006 to refine our Chesapeake Bay Tributary Strategy. A Watershed Implementation Plan Management Team has been convened, and is supported by three workgroups focused on wastewater, agriculture and urban/suburban/rural topics. Stakeholders include representatives from wastewater treatment facilities, agriculture, land development, municipal officials, environmental and conservation groups, and the legislature.

Milestone Implementation and Tracking

The first key element of our strategy for reaching Pennsylvania's nutrient reduction goals involves the development of challenging, but attainable 2-year milestones. These milestones will help focus program efforts and provide for short-term accountability for meeting our goals. Simply put, these milestones are our means to measure incremental improvement and they provide a roadmap of changes needed to be made in this process.

The first milestone period is actually three years, 2009 through 2011. It is estimated that the management practices targeted for implementation during this period will reduce nitrogen loads to Chesapeake Bay by 7.3 million pounds per year and phosphorus loads by 300,000 pounds per year. Attainment of the reductions will require a collective effort of agriculture, land development, and wastewater treatment facilities. We will use these 2-year milestones through 2025 as part of our required Watershed Implementation Plan.

Again, some significant progress has already been made. As previously mentioned, as of 2009, Pennsylvania agriculture has generated about 41 percent of all the nitrogen reductions credited to agriculture for all of the states in the Chesapeake watershed. Similarly by 2011, 40 wastewater treatment facilities are scheduled to have completed nutrient reduction upgrades. Bottom line, we are making progress.

An important component of demonstrating to EPA that we are reaching the TMDL allocations will be accounting for all best management practices that are implemented within Pennsylvania's Chesapeake Bay watershed. Nearly all reported BMPs to date are associated primarily with a federal or state grant program.

Currently, information on BMP implementation is acquired from 13 state programs, four federal programs and one advocacy group (American Farmland Trust). There is no established mechanism for reporting privately funded BMPs. Privately funded BMPs could represent a potentially significant source of unaccounted practices, particularly for agriculture. What this

means to Pennsylvania is that the Chesapeake Bay Model may only be reflecting a portion of what is happening on the ground.

At this time, DEP has funded BMP tracking pilot projects with Lancaster and Bradford County Conservations Districts to explore the possibility of doing county “sweeps” for BMP information. Methods to increase BMP tracking include: on-the-job farm visits; targeted farm visits; distributing questionnaires at agriculture events; phone surveys; and aerial surveys. It is anticipated that results of these pilot projects will be transferable to the other conservation districts in Pennsylvania.

The DEP and the State Conservation Commission are also working with the United States Department of Agriculture’s National Agricultural Statistics Service (NASS) to better account for cover crops and no-tillage farming within Pennsylvania. Efforts are focused on adding additional questions to NASS’ county estimates yearly questionnaire. NASS’ statistical accuracy and creditability will add to the validity of the results.

DEP has developed a non-point source BMP repository to store all the non-point source BMP information that will be collected. This repository will include all information on agricultural and development BMPs not associated with wastewater treatment facilities. DEP is in the process of populating the repository with information from state programs. The repository has been structured so that individuals or environmental groups will be able to enter BMP information which they privately implement apart from state or federal programs. The repository is connected to an internet node that will allow BMP implementation data to be electronically transferred to EPA. The EPA has indicated that it will only accept electronically transferred data starting with the 2010 data call in November.

To summarize, our Watershed Implementation Plan must fully account for what Pennsylvanians are achieving on the ground. We will be working with our Pennsylvania partners to find solutions to track and report our activities beyond the federal and state cost share dollars.

New Technology and Nutrient Trading

The second key element of our strategy for reaching Pennsylvania’s nutrient reduction goals involves the implementation of new technologies, and supporting these efforts to implement both new technologies and established BMPs through the sale of environmental credits and energy products.

DEP is working with the Pennsylvania Department of Agriculture and a number of companies looking to install various technologies such as methane digesters and *electrical co-generation* on dairy, poultry and hog operations. Many of these technologies can produce electricity and marketable soil amendments; reduce methane emissions; and generate renewable energy, nutrient reduction and carbon credits that can then be sold. Projects of this nature can support three priorities in the Chesapeake Bay region: maintaining a vibrant farming economy; restoring and protecting the water quality of Pennsylvania streams and the Chesapeake Bay; and providing crucial economic development benefits to rural businesses and communities.

DEP is promoting the establishment of enhanced regional digesters that digest manure, produce electricity and substantially reduce nutrients reaching Pennsylvania waters and the Chesapeake Bay. While digesters alone will not substantially change the nutrient content of manure, Pennsylvania is looking more closely at the versions with enhanced technology and supplemental systems (solids separation, flocculation, etc.) to help ensure overall nutrient reductions.

Implementing these types of technologies has the promise to significantly reduce nutrients. DEP has estimated, based on information reviewed for proposed projects, that if 42 enhanced digesters were built in 40 counties, about 27 million pounds of nitrogen load could be reduced with the added benefit of carbon-free renewable energy.

Regardless of the many benefits these advanced technologies can produce, there is one limiting factor for all, financing. Depending on the facility, some estimates indicate that up to approximately \$50 million in construction costs could be needed for a single facility, with operational expenses being paid mostly by the revenue generated from the sale of multiple environmental credits and other activities such as biosolids collection. The federal government must play a constructive role in advancing these new technologies and tools. The DEP has recommended that an EPA Technology Development Fund be created to support development of regional enhanced methane digesters, septic system de-nitrification technologies, and other innovative technologies. The suggested amount for this fund is \$2 billion.

Concurrently, we continue to work with Pennsylvania stakeholders to enhance our own Nutrient Trading program. With the assistance of the DEP's partners, we have been able to build a model program that has generated interest across the country. The DEP has been receiving calls from federal legislative and executive branch staff that are interested in using the Pennsylvania program as a model for a regional interstate trading program. A regional program would have the potential to further open the trading market, which would be of great interest to the commonwealth.

To help facilitate the nutrient trading market, we are working with the Pennsylvania Infrastructure Investment Authority (PENNVEST) to create an Exchange that would buy and sell nutrient reduction credits. The DEP has also proposed regulations (Chapter 96) that will codify the DEP's existing policy and provide clear and certain standards for the program. It is anticipated that this will be adopted as a final rulemaking in December 2010.

There has been on-going participation in the program, with nine contracts having been signed. While these are excellent examples of the effectiveness of the Nutrient Trading program, DEP is interested in continuing to promote its utilization and increasing participation in the program.

Compliance

DEP is developing a nonpoint source compliance effort focused on two major sectors: agriculture and stormwater. DEP is addressing agriculture first through development of an agricultural water quality initiative that is composed of four elements:

-
- o Expand outreach and technical assistance: An objective of this initiative is to bring farmers into baseline regulatory compliance through the enhancement of efforts to better inform farmers of their regulatory obligations and the ramifications of noncompliance.
 - o Continue Existing Regulatory Programs: This piece continues the identification, permitting and inspections of Concentrated Animal Feeding Operations (CAFOs) and the inspection of concentrated animal operations (CAOs) and the necessary follow-up to ensure compliance. In addition, the DEP and county conservations districts will continue to respond to complaints, spills and accidents, as appropriate.
 - o Evaluate and modify regulatory or administrative tools as needed: DEP will continue to look for ways to fill agricultural compliance gaps if needed. Two key examples of this are the revisions to our Chapter 102 Erosion and Sedimentation Control regulations and revisions to the Manure Management Manual. Another may be the development of an offsetting-trading program for stormwater under which agricultural operations may receive funding from other affected stakeholders to implement BMPs that would generate the nutrient reductions necessary to achieve overall compliance.
 - o Targeted Watershed Approach to achieve agricultural compliance: This component consists of identification of small manageable sized watersheds that are impaired by agriculture. The approach will utilize an individual farm assessment protocol to identify the current status of operations on that farm, as well as gaps in compliance with regulatory requirements and other water quality degrading conditions. DEP and other partners such as EPA, State Conservation Commission and County Conservation Districts will evaluate these assessments and implement the most appropriate course of action to achieve compliance in a timely manner. Financial assistance as well as compliance and technical assistance resources will be prioritized by DEP and partner agencies to achieve compliance.

An example of this effort has been conducted in the Watson Run watershed in Lancaster County. EPA has conducted the farm assessments and now the DEP, EPA, and the Lancaster County Conservation District are working to implement the next steps to achieve compliance.

As for stormwater, DEP is moving on several fronts to strengthen compliance. First, construction and post-construction stormwater management is being addressed in the recently adopted revisions to Chapter 102, erosion and sedimentation regulations. The DEP is also developing the next-generation general permit for Municipal Separate Storm Sewer System (MS4) communities. The permit will have enhanced BMP requirements for MS4 communities that discharge to impaired waters covered under a TMDL.

On the point source side of the equation, Pennsylvania's Chesapeake Bay Tributary Strategy, published in December 2004, called for the majority of reductions to be achieved by the implementation of nonpoint source BMPs. The strategy called for 86 percent of the nitrogen and 78 percent of the phosphorus reductions to be achieved through agricultural and urban BMPs. Point sources, such as municipal wastewater treatment plants and industrial facilities, generated 14 percent of the nitrogen load and 22 percent of the phosphorous load. The strategy assigned the point sources to be responsible for achieving reductions based on their contribution to the overall load going to the Chesapeake Bay.

To achieve targeted point source reductions to the Bay, DEP formed a Point Source Workgroup with the Pennsylvania Municipal Authorities Association as the co-chairman. The workgroup proposed an allocation strategy to determine individual cap loads for the 183 largest point source sewage discharges in the Bay watershed.

DEP ultimately adopted this allocation and permitting strategy. The primary concept in the strategy was to create a level playing field for all of the municipalities. This was done by having most facilities meet cap loads based on their design flow with a total nitrogen concentration of 6 milligrams per liter (mg/L) and total phosphorus concentration of 0.8 mg/L. There have been some concerns raised on Pennsylvania being forced to the limit of technology with our sewage treatment plants. We will stand behind the strategy we agreed to in the past. We think it is the most cost effective and reasonable approach.

A Compliance Plan for Industrial Waste Discharges to the Chesapeake Bay was developed in January, 2010 after DEP held three meetings with the 30 significant industrial dischargers from October 2007 through February 2008. The plan for these facilities was to keep them at their current load plus a 10 percent margin for future growth.

Next steps

This WIP was drafted with input from a variety of stakeholders. In particular, over 125 individuals representing a broad range of organizations volunteered to participate on workgroups that provided on-going input throughout the development of the draft WIP. The hours of effort from these workgroup members demonstrate the commitment of Pennsylvanians to help protect and restore the Chesapeake Bay. The short timeframe allotted for development of the WIP did not allow for full analysis of all the comments provided by the workgroups, so it is the intent of DEP to continue to work with these groups, and all interested individuals, on further analysis of ideas and suggestions.

Following publication of the EPA Chesapeake Bay TMDL in December 2010, states are expected to develop their Phase 2 WIP which will further subdivide the loads by local area (county). This work cannot be initiated until EPA completes revisions to the phase 5.3 Chesapeake Bay watershed model. EPA expects to complete this work in January 2011. Upon completion of the phase 5.3 model, DEP will re-convene the Chesapeake Watershed Implementation Plan Management Team and its workgroups to develop the Phase 2 WIP. EPA established a June 1, 2011 deadline for submission of the Draft Phase 2 WIP, and a November 1 deadline for the final plan. EPA expects the Phase 2 WIP to contain greater detail about the first stage of implementation, which would last from when EPA established the TMDL until 2017.

While DEP is engaging with the WIP Management Team to develop the Phase 2 WIP, it also will focus on milestone implementation. These activities will include funding a "Million Pound Project." DEP is interested in funding projects located within the Chesapeake Bay watershed that result in documented quantitative load reductions of nitrogen, phosphorus and sediment. The goal is to achieve 1 million pounds of reduction through funding sources such as the nonpoint

source funding program operated by PENNVEST and the Growing Greener Grant Program operated by DEP.

DEP intends to utilize innovative approaches that demonstrate improvements in stormwater management and resulting water quality. These approaches include watershed permitting, integrated stormwater management planning and the development of trading/offsetting program that include stormwater components.

And finally, DEP will continue to implement its *Chesapeake Bay Point Source Compliance Plan*. The 183 significant domestic wastewater facilities and 30 industrial facilities are expected to comply by 2017.

Conclusion

The Pennsylvania's commitment and investments are paying off. With funding assistance from DEP, the Susquehanna River Basin Commission has been monitoring nutrient and sediment loads at sites within the Susquehanna River basin. Flow adjusted trend analysis of the data collected between 1985 and 2008 generally indicate significant decreases in nutrients and sediment at these sites. Here are two examples:

- o Susquehanna River at Marietta: This station includes 95 percent of the Susquehanna River Basin. Nitrogen is down an average of 28 percent, phosphorous is down an average of 23 percent and sediment is down an average of 40 percent.
- o Conestoga River: Nitrogen is down an average of 20 percent, phosphorus is down an average of 50 percent and sediment is down an average of 70 percent.

These results demonstrate the commonwealth's commitment to restore Pennsylvania's waters and, consequently, the Chesapeake Bay.

Although EPA deadlines for the completion of the Chesapeake Bay TMDL and state Watershed Implementation Plans are aggressive, DEP is committed to engage with Pennsylvania stakeholders to develop a plan that equitably distributes the responsibility for meeting our cap load allocations. Ultimately, it is up to all of us to take those actions necessary to protect and restore Pennsylvania streams and rivers and the Chesapeake Bay.

Section 3.

Introduction

EPA's Legal Framework for the Chesapeake Bay TMDL

The source for information in this Legal Framework section is drawn directly from the Draft Chesapeake Bay Total Maximum Daily Load, August 2010, U.S. Environmental Protection Agency and Draft Federal Register Public Notice. This section summarizes the statements by EPA regarding its legal authority.

EPA is establishing the Chesapeake Bay TMDL pursuant to a number of authorities, including the Clean Water Act (CWA), and Consent Decrees requiring EPA to address certain impaired Bay and tidal tributary waters in Virginia and the District of Columbia.

The establishment of the Chesapeake Bay TMDL will satisfy the requirements of the Virginia TMDL Consent Decree settling the lawsuit American Canoe Association, Inc. and the American Littoral Society v. EPA, Civil No. 98-979-A (E.D. Va). Portions of the Chesapeake Bay and its tidal tributaries were identified as impaired for aquatic life uses and exceedance of the numeric criteria for dissolved oxygen caused by nutrient and sediment pollutants on Virginia's 1998 section 303(d) list of impaired waters. Other Bay and tidal tributary segments impaired by nutrients and sediment have been identified on Maryland and the District of Columbia section 303(d) lists.

Under the Virginia TMDL Consent Decree, EPA is obligated to establish a TMDL for the Bay's waters identified on the 1998 Virginia list including those aquatic life use impairments caused by the nutrient and sediment pollutants by no later than May 1, 2011, if those waters are not previously removed from the list or if Virginia has not already developed a TMDL for those waters. EPA must establish a TMDL covering the listed Virginia Bay tidal waters by May 1, 2011 because the Virginia segments of the Chesapeake Bay and its tidal tributaries remain on Virginia's 2008 section 303(d) list. Virginia has requested that EPA establish the TMDL for those waters pursuant to the Virginia Consent Decree schedule.

In addition to the Virginia segments identified above, the Potomac River is listed on the District of Columbia's section 303(d) impaired waters list for low pH. The water quality standards exceedances for pH in the Potomac River are the result of algal impacts from excess nutrients. Establishment of a Potomac River pH TMDL is directly linked to the establishment of the Chesapeake Bay TMDL because of their common impairing pollutants (nutrients) and hydrologic connection. Like Virginia, EPA is under a consent decree obligation to establish a pH TMDL for the Potomac by May 1, 2011 if the District of Columbia does not develop that TMDL (Kingman Park Civic Association, et al. v. U.S. Environmental Protection Agency, et al., No. 1:98CV00758 (D.D.C.)). Like Virginia, the District of Columbia has asked EPA to establish the Potomac River pH TMDL.

Finally, Maryland has also requested that EPA develop TMDLs on the same schedule to address Maryland's Chesapeake Bay and tidal tributary waters identified on its current section 303(d) list as impaired for aquatic life uses caused by nutrient and sediment pollutants.

The President's Executive Order for the Chesapeake Bay established an accelerated schedule for EPA to complete the Chesapeake Bay TMDL by December 31, 2010. EPA intends to collect public comments on the Draft TMDL between September 24 and November 8, 2010. EPA will establish the Final TMDL by December 31, 2010.

EPA is establishing a federal TMDL for segments of the Chesapeake Bay and its tidal tributaries and embayments that are impaired from the discharge of nutrients (nitrogen and phosphorus) and sediment and listed on the jurisdictions' respective CWA 2008 Section 303(d) list of impaired waters. The TMDL allocates loadings of nitrogen, phosphorus, and sediment to all jurisdictions in the Bay watershed (Delaware, the District of Columbia, Maryland, New York, Pennsylvania, Virginia, and West Virginia). The Chesapeake Bay TMDL is the largest, most complex TMDL in the country, covering a 64,000 square mile area in the seven jurisdictions.

The scope of Chesapeake Bay TMDL includes nutrient and sediment loads delivered to the Chesapeake Bay from all sources throughout the watershed and atmospheric deposition of nitrogen to the watershed and tidal waters from air emission sources within and outside the watershed. The Chesapeake Bay TMDL addresses only the restoration of aquatic life uses for the Bay and its tributaries that are impaired from excess nutrients and sediment.

Several previously approved TMDLs have been established to protect local waters across the Chesapeake Bay watershed. While some were based on reducing nutrient and sediment, many were for other pollutants. In contrast, the Chesapeake Bay TMDL will be based on protecting the Bay and its tidal waters from excessive nitrogen, phosphorus, and sediment loading. For watersheds and waterbodies that have both local TMDLs and Chesapeake Bay TMDLs for nitrogen, phosphorus, and sediment, the more stringent of the TMDLs will apply. In some cases, the reductions required to meet local conditions shown in existing TMDLs may be more stringent than those needed to meet Bay requirements, and vice versa.

The pollutants of concern for this TMDL are nutrients—nitrogen and phosphorus—and sediment. Excessive nutrients in the Chesapeake Bay and its tidal tributaries promote a number of undesirable water quality conditions such as excessive algal growth, low dissolved oxygen, and reduced water clarity (Smith et al. 1992; Kemp et al. 2000). The effect of nutrient loads on water quality and living resources tends to vary considerably by season and region.

Sediments suspended in the water column reduce the amount of light available to support healthy and extensive SAV or underwater grass communities (Dennison et al. 1993; Kemp et al. 2004). The relative contribution of suspended sediment and algae that cause poor light conditions varies with location in the Bay tidal waters (Gallegos 2001).

Sources of Nutrients and Sediment to the Chesapeake Bay

Nitrogen, phosphorus, and sediment loads originate from many sources in the Bay watershed. Point sources of nutrient and sediment include municipal wastewater facilities, industrial discharge facilities, combined sewer overflows (CSOs), sanitary sewer overflows (SSOs), NPDES permitted stormwater (municipal separate storm sewer system [MS4] and construction and industrial sites), and concentrated animal feeding operations (CAFOs). Nonpoint sources

include agricultural lands (animal feeding operations [AFOs], cropland, hay land, and pasture), atmospheric deposition, forest lands, on-site treatment systems, stormwater runoff, streambanks and tidal shorelines, tidal resuspension, the ocean, wildlife, and natural background. Unless otherwise specified, the loading estimates presented in this section are based on results of the Phase 5.3 Chesapeake Bay Watershed Model (P5.3). Estimates of existing loading conditions are based on the 2009 Progress scenario of the P5.3 (P5.3 2009 Progress).

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Jurisdiction Loading Contributions

Analysis of monitoring data and computer modeling results shows that Pennsylvania provides the largest proportion of nitrogen loads delivered to the Bay and is second to Virginia in the proportion of phosphorous and sediment delivered to the Bay. The table below lists the proportions of nitrogen, phosphorous and sediment delivered by the Jurisdictions to Chesapeake Bay.

Comparison of 2009 Nutrient and Sediment Loads by Jurisdiction

Source: EPA Phase 5.3 Watershed Model

State	Nitrogen (lbs/yr)	Percent
Pennsylvania	106,413,000	44%
Virginia	65,303,000	27%
Maryland	49,421,000	20%
New York	10,541,000	4%
West Virginia	5,774,000	2%
Delaware	4,180,000	2%
District of Columbia	2,853,000	1%
Totals	244,485,000	

State	Phosphorous (lbs/yr)	Percent
Virginia	7,168,000	44%
Pennsylvania	3,965,000	24%
Maryland	3,304,000	20%
West Virginia	833,000	5%
New York	801,000	5%
Delaware	316,000	2%
District of Columbia	86,400	1%
Totals	16,473,400	

State	Sediment (tons/yr)	Percent
Virginia	1,616,000	40%
Pennsylvania	1,283,000	32%
Maryland	693,000	17%
West Virginia	188,000	5%
New York	164,000	4%
Delaware	32,300	1%
District of Columbia	15,900	0%
Totals	3,992,200	

Sources of Pennsylvania's Nutrient and Sediment loads to Chesapeake Bay

According to water quality data and supported by computer analysis, agriculture is considered the leading source of nitrogen, phosphorous and sediment loadings to Chesapeake Bay. The second leading source of nitrogen loads is forest land. Pennsylvania is fortunate in that about 60 percent of the Chesapeake Bay watershed in the Commonwealth remains forested. This accounts for the quantity of nutrient and sediment attributed to forests. After forest lands, the remaining sources, in order of estimated nutrient and sediment loads, are point sources, urban/developed land and septic systems. The estimated nutrient and sediments loads for each sector are summarized on the table below.

Pennsylvania 2009 Nutrient and Sediment Loads Delivered to Chesapeake Bay
Source: EPA Phase 5.3 Watershed Model

Sector	Nitrogen (lbs/yr)	Phosphorous (lbs/yr)	Sediment (tons/yr)
Agriculture	59,864,000	1,755,000	895,000
Forest	22,684,000	617,000	249,000
Point Source	12,792,000	1,174,000	8,300
Urban/Developed	6,704,000	378,000	131,000
Septic	3,290,000	0	0
Air Deposition to Water	1,079,000	41,000	0
Totals	106,413,000	3,965,000	1,283,300

Under the TMDL requirements, watersheds that discharge nutrients and sediment to any one or more of the 92 Chesapeake Bay segments that are listed as impaired will be required to reduce the loads discharged to the Bay. In Pennsylvania there are five watersheds that fall under this requirement. These include Pennsylvania's portion of the Susquehanna River and of the Potomac River, Elk Creek and Northeast Creek in southern Chester County which drain to the Eastern Shore of Chesapeake Bay, and the headwaters of the Gunpowder River in York County which drains to the Western Shore of Chesapeake Bay. The Susquehanna River accounts for 92 percent and the Potomac for 7 percent of Pennsylvania's Bay drainage area. Elk Creek, Northeast Creek the Gunpowder River account for the remaining 1 percent of the watershed.

The table below lists the estimated nitrogen, phosphorous and sediment loads discharged to the Bay by each of these watersheds.

Pennsylvania's Estimated 2009 Delivered Nutrient and Sediment Loads by Watershed
Source: EPA Phase 5.3 Watershed Model

	Nitrogen (lbs/year)	Phosphorus (lbs/year)	Sediment (tons/year)
Susquehanna River Basin			
Agriculture	55,123,000	1,390,000	762,000
Forest	21,639,000	544,000	224,000
Point Source	12,559,000	1,099,000	8,000
Urban/Developed	6,365,000	334,000	119,000
Septic	3,076,000	0	0
Air Deposition to Water	1,071,000	39,900	0
Totals	99,833,000	3,406,900	1,113,000
Potomac River Basin			
Agriculture	4,442,000	353,000	119,000
Forest	994,000	71,500	23,700
Urban/Developed	300,000	41,600	10,400
Point Source	205,000	70,100	180
Septic	163,000	0	0
Air Deposition to Water	7,600	860	0
Totals	6,111,600	537,060	153,280
Eastern Shore of Chesapeake Bay			
Agriculture	274,000	11,500	14,000
Septic	49,300	0	0
Forest	49,200	1,250	680
Urban/Developed	36,700	1,820	1,150
Point Source	28,700	4,960	30
Air Deposition to Water	200	10	0
Totals	438,100	19,540	15,860
Western Shore of Chesapeake Bay			
Agriculture	24,800	910	340
Urban/Developed	1,900	90	11
Forest	1,810	60	10
Septic	1,350	0	0
Air Deposition to Water	12	1	0
Point Source	0	0	0
Totals	29,872	1,061	361
Grand Total (rounded)	106,413,000	3,965,000	1,283,300

Watershed Implementation Plans

A major element of EPA's plan to demonstrate reasonable assurance for this TMDL is the development of Watershed Implementation Plans (WIPs) by each of the Bay jurisdictions. The WIPs are part of the accountability framework, which is the method of implementing the TMDL but is not part of the Chesapeake Bay TMDL itself. In essence, the WIPs represent the roadmap for how the jurisdictions, in partnership with federal and local governments, plan to achieve and maintain the Chesapeake Bay TMDL nitrogen, phosphorus, and sediment allocations.

WIPs are expected to identify a schedule for accomplishing reductions in nutrient and sediment loads needed to attain Water Quality Standards (WQS) and will be developed over three Phases. Draft Phase 1 WIPs were developed and submitted to EPA on September 1, 2010 to support the Draft TMDL. The jurisdictions submitted their Final Phase 1 WIPs to EPA by November 29, 2010 for consideration in the Final TMDL. The jurisdictions are to submit their Phase 2 WIPs in draft and final form to EPA by June 1 and November 1, 2011, respectively. Finally, the jurisdictions, after working with local partners, are to submit their Phase 3 WIPs to EPA by 2017 describing refined actions and controls to be implemented between 2018 and 2025 to achieve WQS. With each successive WIP, the detail at which allocations are made is to become increasingly specific, as described in the following table.

Comparison of elements within the Chesapeake Bay TMDL and Phase 1, 2, and 3 Watershed Implementation Plans

	Bay TMDL	Phase 1 WIP	Phase 2 WIP	Phase 3 WIP
Individual or Aggregate WLAs and LA to Tidal States	X			
Gross WLAs and LAs for Non-tidal if those states submit WIPs that meet EPA expectations	X			
Loads for individual significant point sources, or where appropriate, aggregate point sources		X	X	X
Loads for nonpoint source sectors		X	X	X
Proposed actions and, to the extent possible, specific controls to achieve point source and nonpoint source targets		X	X	X
Point source and nonpoint source loads by local area		X	X	X
Specific controls and practices to be implemented by 2017			X	
Refined point source and nonpoint source loads				X
Specific controls and practices to be implemented by 2025.				X

Source: U.S. EPA Letter from Region III Acting Regional Administrator William C. Early to Secretary L. Preston Bryant, Virginia Department of Natural Resources, November 4, 2009.

Two-year Milestones

Progress toward reaching the TMDL's ultimate nutrient and sediment reduction goals will be measured against two-year milestones by which the jurisdictions are expected to, with contingencies, identify and seek to implement specific pollutant reduction controls and actions in each of their successive two-year milestone periods. Prior to the start of each milestone period, EPA will evaluate whether these two-year targets are sufficient to achieve necessary reductions identified in the WIPs for the associated two-year milestone period and whether the jurisdictions have fulfilled their previous milestone goals.

When assessing two-year milestone targets, EPA will evaluate whether proposed actions, controls, and practices would result in estimated loads at the jurisdiction scale that are equal to or below the jurisdiction's two-year milestone targets. If EPA's prospective assessment indicates that the goals would not achieve the milestone loads identified, EPA may identify which source sectors, basins, and local areas would not achieve reductions on schedule to meet that jurisdiction's interim and final target loads. EPA will then be in a position to decide what appropriate action it may decide to take. After a milestone period is complete, EPA would expect that model estimated nutrient and sediment loads resulting from reported implementation would be at or below target loads at the jurisdiction scale.

In comparison to past Bay restoration efforts, the WIPs and two-year milestones will contain greater source sector and geographic load reduction specificity, more rigorous assurances that load reductions will be achieved, and more detailed and transparent reporting to the public.

Section 4.

Development of Phase 1 Watershed Implementation Plan and Public Participation

The DEP made it a priority to effectively involve the public in the development of the Phase I Watershed Implementation Plan (WIP). As defined in the DEP's policy on public participation, the public includes citizens, interest groups, local governments, business, industry associations, and any individual or group who may be affected by a proposed project or activity and shows an interest in participating. Involving the public provides increased opportunities for more informed decision making, particularly related to processes and documents within the broad scope addressed in the Pennsylvania WIP.

To effectively engage the public during the development of the WIP, the DEP utilized various means to encourage and allow input and comments, including:

- o Participating in meetings of local government, associations, and other organizations.;
- o Facilitating discussions at meetings of the DEP's standing advisory committees;
- o Participating in EPA's public meetings on the TMDL; and
- o Posting draft documents and summaries to the DEP's website during WIP development.

To further allow for detailed discussions of the policy and technical issues addressed in the WIP, a structure was established that mirrored the approach taken for the DEP's most recent Chesapeake Bay Tributary Strategy. Discussions were held with the DEP's Chesapeake Bay Advisory Committee (CBAC), along with a Management Team and three workgroups, all of which are further described in the following sections.

Finally, the draft WIP was published for public comment during the timeframe for public comment on the EPA Chesapeake Bay TMDL. EPA's public comment period extends from September 24 to November 8, 2010. At the close of the comment period, all submitted comments will be reviewed and considered as the draft WIP is finalized.

The remainder of this section provides additional details on the involvement of the public in the development of the WIP.

Chesapeake Watershed Implementation Plan Management Team

To help obtain input on the extensive number of issues and technical matters that needed to be addressed in the WIP, the DEP employed a structure created in response to a suggestion made at a March 31, 2010 public meeting. The structure was similar to a process utilized to review the DEP's most recent Chesapeake Bay Tributary Strategy.

A Management Team was formed, and was composed primarily of organizations from the CBAC. Members included representatives of agriculture, wastewater, development, municipalities, business and environmental organizations. The Management Team worked through the products of the various workgroups and focused on analyzing the WIP for the benefit of the Commonwealth and the represented sector or organization. Three workgroups were also

formed in order to consider topics in more detail: Wastewater; Urban/Suburban/Rural; and Agriculture. Each of these workgroups focused on issues pertinent to that sector, identified areas of concern and offered solutions to advance the WIP. The workgroups were also vital in reviewing the content of the WIP as it was drafted.

Membership on the workgroups was open to any interested group or individual. Meetings were open to the public, and dates were published on the DEP's website at http://www.portal.state.pa.us/portal/server.pt/community/chesapeake_bay_program/10513.

Chesapeake Bay Advisory Committee (CBAC)

The primary purpose of the CBAC is to provide guidance to the DEP regarding Pennsylvania's work on its Chesapeake Bay goals. CBAC was initially created by the Secretary, Department of Environmental Resources (now Department of Environmental Protection), acting as the Chairman of the State Conservation Commission (the Commission). The Advisory Committee was reorganized in 1996 as a result of the restructuring of the Department and the Commission. The Advisory Committee was again reorganized in 2001.

CBAC is composed of individuals representing the State Conservation Commission, local governments, environmental organizations, county conservation districts, state and federal agencies, educational institutions, agricultural organizations, businesses, watershed organizations and other groups as deemed appropriate by the Secretary. Advisory Committee membership is not limited to a specific number, but is determined through discussions with CBAC and formalized through approval by the Department.

CBAC met on May 3, 2010, where the Management Team and workgroup structure were discussed in detail. CBAC will also meet on October 4, 2010.

CBAC meeting materials are available on the Department's website at <http://www.dep.state.pa.us/dep/subject/advcoun/chesbay/chesbay.htm>.

Presentations to Interest Groups

As resources allowed and in response to invitations, the Department made presentations at meetings of interest groups, local governments, business, industry associations and other groups. Through these meetings, the Department discussed the approach to WIP development, answered questions pertaining to the drafting and implementation of the WIP, and listened to comments and suggestions.

EPA Webinars and Public Meetings

EPA is the lead agency responsible for the Chesapeake Bay TMDL. EPA employed several approaches to publicize the TMDL and obtain public input.

EPA Webinars

As the Chesapeake Bay Total Maximum Daily Load was developed in 2010, EPA hosted a series of monthly webinars to provide updates on this "pollution diet" for the watershed.

The webinar series was a key feature of a concentrated outreach effort to provide transparency and collaboration in the establishment of EPA's largest and most complex TMDL to date. The webinars were designed to help demystify the process and allow interaction between officials *designing the TMDL* and the general public, particularly interested stakeholders.

Each of the webinars featured a non-EPA special guest and a lengthy question and answer session. More information on the webinars can be found at http://www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/CalendarOfEvents_2009.html?tab1=1&tab3=2

EPA Public Meetings

A team of EPA Region 3 employees conducted an intense, seven-week outreach campaign in the fall of 2009 to exchange information on the Chesapeake Bay TMDL. A number of the public meetings were also broadcast to a live online audience. EPA estimates that 3,000 people were part of the outreach effort Chesapeake Bay-wide, which was further covered by print, radio and television media.

In Pennsylvania, EPA held four meetings that were well attended. The meeting dates were:

- o November 17, 2009: Ashley, PA (Wilkes- Barre area)
- o November 18, 2009: Williamsport, PA
- o November 19, 2009: State College, PA
- o November 23, 2009: Lancaster, PA

Presentations and meeting materials are available at:

http://www.epa.gov/reg3wapd/tmdl/ChesapeakeBay/CalendarOfEvents_2009.html?tab1=1&tab3=2

In addition, EPA plans to hold an additional four public meetings in Pennsylvania during the TMDL public review period. The meeting dates are:

- October 18, 2010: Lancaster, PA
- October 19, 2010: State College, PA
- October 20, 2010: Williamsport, PA
- October 21, 2010: Ashley, PA (Wilkes- Barre area)

Information pertinent to the scheduled meetings will be posted to:

<http://www.epa.gov/chesapeakebaytmdl/>

Section 5.
Interim and Final Nutrient and Sediment Load Targets

Interim and Final Nutrient and Sediment Load Targets

This section describes the process for developing allocations in Pennsylvania's Chesapeake Watershed by source sector and basin.

Based on computer analysis, The EPA has determined that Pennsylvania must collectively reduce total nitrogen loads to 76.77 million pounds per year, total phosphorous loads to 2.74 million pounds per year and total sediment loads by at least 2,093 million pounds per year in order have Chesapeake Bay waters conform to water quality standards established for Chesapeake Bay by Maryland.

For Pennsylvania, the TMDL will include aggregate nutrient and sediment wasteload and load allocations for each of the major basins and watersheds that discharge to impaired waters of Chesapeake Bay. These include the Susquehanna, Potomac and Gunpowder Rivers and the Northeast and Elk Creeks. On August 13, 2010, EPA issue nitrogen and phosphorous draft allocations to the states. On July 1, 2010, EPA issued sediment draft allocation to the states. These draft allocations defined the Gunpowder River as the Western Shore watershed and the North East and Elk and Creeks as the Eastern Shore watershed. The draft allocations and a comparison to 2009 Progress numbers from EPA Phase 5.3 watershed model are listed in the below table.

Comparison of 2009 Loads to Draft Allocations

Total Nitrogen - Million pounds per year			
	2009	Draft	Remaining
Watershed	Progress	Allocation	Reductions
Susquehanna	99.83	71.74	28.09
Potomac	6.11	4.72	1.39
Eastern Shore	0.438	0.28	0.158
Western Shore	0.03	0.02	0.01
Totals	106.408	76.76	29.648

Total Phosphorous - Million pounds per year			
	2009	Draft	Remaining
Watershed	Progress	Allocation	Reductions
Susquehanna	3.41	2.31	1.1
Potomac	0.537	0.42	0.117
Eastern Shore	0.0195	0.01	0.0095
Western Shore	0.00106	0.001	0.00006
Totals	3.96756	2.741	1.22656

Total Sediment - Million pounds per year			
	2009	Draft	Remaining
Watershed	Progress	Allocation	Reductions
Susquehanna	2,226	1,826	400
Potomac	307	243	64
Eastern Shore	31.62	23	8.62
Western Shore	0.727	0.41	0.31700
Totals	2,565.347	2,092.41	472.937

Pennsylvania is required to sub-allocate the watershed draft allocations to the major load generating sectors within each watershed. The major load sectors in Pennsylvania are agriculture, forest, wastewater treatment facilities, urban/developed, septic systems, and air deposition to open water. Additionally, any entity required to have a NPDES permit must be assigned waste load allocations within the Bay TMDL. Non-permitted operations or load sectors are assigned load allocations within the Bay TMDL. The permitted sectors include concentrated animal feeding operations associated with agriculture and MS4, construction, mining, and industrial stormwater permits associated with urban/developed land.

The draft allocations were split-out to the major sectors using the projected 2009 sector loads estimated by EPA using the watershed model. The first step was to assign the existing allocations to the wastewater facilities, also known as point sources. These allocations were

developed for the 2005 Tributary Strategy Document. The point source allocations were based on the percentage of the nutrient loads attributable to the point source at the time the 2005 Chesapeake Bay Tributary Strategy was developed. These allocations were the basis for the individual load allocations that were assigned in the NPDES permit issued to all significant discharge facilities in the Bay watershed. Retaining these point source allocations maintains continuity with the permits and the implementation plans submitted to DEP to attain the required point source allocations.

After accounting for the point source loads, the allocations for the other major sectors were based on the remaining percentage of the 2009 projected loads contributed by each sector. The permitted sectors loads were calculated based on the methodologies described in the sections following this introduction.

Tables listing the projected sector loads and the associated waste load and load allocations are below.

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Projected Sector Loads and the Associated Waste Load and Load Allocations

Note: Totals may not equate due to rounding of numbers

Susquehanna River Basin		Total Nitrogen Delivered to Chesapeake Bay (lbs/year)				
Sector	2009	Percents	Reductions	Total Allocations	WLA	LA
Agriculture	55,123,000	63%	15,895,000	39,228,000		38,358,000
CAFOs				0	870,000	
Forest	21,639,000	25%	6,240,000	15,400,000		15,400,000
Point Source	12,559,000		2,927,000	9,632,000	9,632,000	
Septic	3,076,000	4%	887,000	2,189,000		2,189,000
Urban	6,365,000	7%	1,835,000	4,530,000		
MS4 Permits	542,000				542,000	
Construction Permits	400				400	
Mining Permits	730,000				730,000	
Industrial Stormwater	19,500				19,500	
Air Deposition to Water	1,071,000	1%	309,000	762,000		762,000
Total	99,833,000					
Draft allocation	71,740,000			71,741,000		
Needed Reductions	28,093,000					
Point Source Reductions	2,927,000					
Remaining Reductions	25,166,000					

Potomac River Basin		Total Nitrogen Delivered to Chesapeake Bay				
Sector	2009	Percents	Reductions	Total Allocations	WLA	LA
Agriculture	4,442,000	75%	1,299,000	3,143,000		3,091,000
CAFOs			0		52,000	
Forest	994,000	17%	291,000	703,000		703,000
Point Source	205,000		-335,000	540,000	540,000	
Septic	163,000	3%	47,800	115,200		115,200
Urban	300,000	5%	87,900	212,100		196,000
MS4 Permits	560				560	
Construction Permits	51				51	
Mining Permits	15,100				15,100	
Industrial Stormwater	910				910	
Air Deposition to Water	7,600	1%	2,220	5,380		5,380
Total	6,112,000					
Draft allocation	4,720,000					
Needed Reductions	1,392,000					
Point Source Reductions	-335,000					
Remaining Reductions	1,728,000					

Projected Sector Loads and the Associated Waste Load and Load Allocations (cont)

Note: Totals may not equate due to rounding of numbers

Eastern Shore Watershed		Total Nitrogen Delivered to Chesapeake Bay (lbs/year)					
Sector	2009	Percents	Reductions	Total Allocations	WLA	LA	
Agriculture	274,000	67%	105,000	169,000		167,000	
CAFOs					1,590		
Forest	49,200	12%	19,000	30,300		30,300	
Point Source	28,700		200	28,500	28,500		
Septic	49,300	12%	19,000	30,300		30,300	
Urban	36,700	9%	14,200	22,600		21,900	
MS4 Permits	620				620		
Construction Permits	5				5		
Mining Permits	0				0		
Industrial Stormwater	10				10		
Air Deposition to Water	200	0.01%	77	120		120	
Total	438,100						
Draft allocation	280,000			280,820			
Needed Reductions	158,100						
Point Source Reductions	200						
Remaining Reductions	157,900						

Western Shore Watershed		Total Nitrogen Delivered to Chesapeake Bay (lbs/year)					
Sector	2009	Percents	Reductions	Total Allocations	WLA	LA	
Agriculture	24,800	83%	8,180	16,620		15,700	
CAFOs					903		
Forest	1,810	6%	600	1,210		1,210	
Point Source	0			0	0		
Septic	1,350	5%	440			901	
Urban	1,900	6%	630	1,270		1270	
MS4 Permits	0				0		
Construction Permits	1				1		
Mining Permits	0				0		
Industrial Stormwater	0				0		
Air Deposition to Water	12	0.04%	4	8		8	
Total	29,900						
Draft allocation	20,000			20,000			
Needed Reductions	9,860						
Point Source Reductions	0						
Remaining Reductions	9,860						

Projected Sector Loads and the Associated Waste Load and Load Allocations (cont)

Note: Totals may not equate due to rounding of numbers

Susquehanna River Basin		Total Phosphorus Delivered to Chesapeake Bay (lbs/year)				
Sector	2009	Percents	Reductions	Total Allocations	WLA	LA
Agriculture	1,390,000	60%	279,000	1,111,000		1,074,000
CAFOs			0		36,700	
Forest	544,000	24%	109,000	435,000		435,000
Point Source	1,099,000		634,000	465,000	465,000	
Septic	0	0%	0			0
Urban	334,000	14%	67,000	267,000		152,000
MS4 Permits	42,000				42,000	
Construction Permits	53				53	
Mining Permits	72,100				72,100	
Industrial Stormwater	1,480				1,480	
Air Deposition to Water	40,000	2%	8,000	32,000		32,000
Total	3,407,000					
Draft allocation	2,310,000					
Needed Reductions	1,097,000					
Point Source Reductions	634,000					
Remaining Reductions	463,000					

Potomac River Basin		Total Phosphorous Delivered to Chesapeake Bay				
Sector	2009	Percents	Reductions	Total Allocations	WLA	LA
Agriculture	353,000	76%	88,400	264,700		261,100
CAFOs			0		3,600	
Forest	71,500	15%	17,900	53,600		53,600
Point Source	102,000		32,000	70,000	70,000	
Septic	0	0%	0	0		0
Urban	41,600	9%	10,400	31,100		22,500
MS4 Permits	100				100	
Construction Permits	13				13	
Mining Permits	8,390				8,390	
Industrial Stormwater	130				130	
Air Deposition to Water	860	0.2%	210	640		640
Total	537,060					
Draft allocation	420,000			420,000		
Needed Reductions	117,060					
Point Source Reductions	100					
Remaining Reductions	116,960					

Projected Sector Loads and the Associated Waste Load and Load Allocations (cont)

Note: Totals may not equate due to rounding of numbers

Eastern Shore Watershed		Total Phosphorous Delivered to Chesapeake Bay				
Sector	2009	Percents	Reductions	Total Allocations	WLA	LA
Agriculture	11,500	79%	7,300	4,150		4,070
CAFOs					86	
Forest	1,250	9%	800	450		450
Point Source	4,960		230	4,730	4,730	
Septic	0	0%		0		0
Urban	1,820	12%	1,160	660		580
MS4 Permits	78				78	
Construction Permits	1				1	
Mining Permits	0				0	
Industrial Stormwater	1				1	
Air Deposition to Water	11	0.08%	7	4		4
Total	19,540					
Draft allocation	10,000					
Needed Reductions	9,540					
Point Source Reductions	230					
Remaining Reductions	9,310					

Western Shore Watershed		Total Phosphorous Delivered to Chesapeake Bay				
Sector	2009	Percents	Reductions	Total Allocations	WLA	LA
Agriculture	910	86%	51	860		840
CAFOs					21	
Forest	57	5%	3	54		54
Point Source	0		0	0	0	
Septic	0	0%				0
Urban	91	9%	5	86		85
MS4 Permits	0				0	0
Construction Permits	0				0	
Mining Permits	0				0	
Industrial Stormwater	0				0	
Air Deposition to Water	1	0.07%	0	1		1
Total	1,059					
Draft allocation	1,000					
Needed Reductions	59					
Point Source Reductions	0					
Remaining Reductions	59					

Projected Sector Loads and the Associated Waste Load and Load Allocations (cont)

Note: Totals may not equate due to rounding of numbers

Susquehanna River Basin		Total Sediment Delivered to Chesapeake Bay (million lbs/year)					
Sector	2009	Percents	Reductions	Total Allocations	WLA	LA	
Agriculture	1,523	69%	276	1,247		754	
CAFOs					493		
Forest	449	20%	81.2	368		368	
Point Source	16.1		0	16.1	16.1		
Septic	0	0%	0			0	
Urban	238	11%	43.1	195		160	
MS4 Permits	26.4				26.4		
Construction Permits	0.1				0.1		
Mining Permits	6.89				6.89		
Industrial Stormwater	1.1				1.1		
Air Deposition to Water	0	0%	0	0			
Total	2,226						
Draft allocation	1,826						
Needed Reductions	400						
Point Source Reductions	0						
Remaining Reductions	400						

Potomac River Basin		Total Sediment Delivered to Chesapeake Bay (million lbs/year)					
Sector	2009	Percents	Reductions	Total Allocations	WLA	LA	
Agriculture	238	78%	49.8	189		152	
CAFOs					36.4		
Forest	47	15%	9.91	37		37.6	
Point Source	0.360			0.360	0.360		
Septic	0	0%				0	
Urban	20.7	7%	4.33	16.4		16.4	
MS4 Permits	.0622				.0622		
Construction Permits	.0169				.0169		
Mining Permits	0.178				0.178		
Industrial Stormwater	.0845				.0845		
Air Deposition to Water	0	0%					
Total	307						
Draft allocation	243						
Needed Reductions	64						
Point Source Reductions	0						
Remaining Reductions	64						

Projected Sector Loads and the Associated Waste Load and Load Allocations (cont)

Note: Totals may not equate due to rounding of numbers

Eastern Shore Watershed		Total Sediment Delivered to Chesapeake Bay (lbs/year)				
Sector	2009	Percents	Reductions	Total Allocations	WLA	LA
Agriculture	27,900,000	88%	7,620,000	20,300,000		20,200,000
CAFOs					126,000	
Forest	1,360,000	4%	370,000	987,000		987,000
Point Source	52,300		0	52,300	52,300	
Septic	0	0%				0
Urban	2,290,000	7%	625,193	1,660,000		1,571,000
MS4 Permits	88,100				88,100	
Construction Permits	3,880				3,880	
Mining Permits	0				0	
Industrial Stormwater	1,460				1,460	
Air Deposition to Water	0	0%				
Total	31,600,000					
Draft allocation	23,000,000					
Needed Reductions	8,620,000					
Point Source Reductions	0					
Remaining Reductions	8,620,000					

Western Shore Watershed		Total Sediment Delivered to Chesapeake Bay (lbs/year)				
Sector	2009	Percents	Reductions	Total Allocations	WLA	LA
Agriculture	683,000	94%	298,000	385,000		383,000
CAFOs					2,360	
Forest	20,600	3%	8,990	11,600		11,639
Point Source	0	0%	0	0	0	
Septic	0					0
Urban	22,800	3%	9,950	12,900		12,900
MS4 Permits	0				0	
Construction Permits	304				304	
Mining Permits	0				0	
Industrial Stormwater	0				0	
Air Deposition to Water	0					
Total	727,000					
Draft allocation	410,000			410,000		
Needed Reductions	317,000					
Point Source Reductions	0					
Remaining Reductions	317,000					

Pennsylvania Sector Methodologies for Developing Current Loads

Agriculture

CAFOs

The 9-30-09 list of CAFO facilities was used as the master list of CAFOs in Pennsylvania. PADEP does not distinguish between federally defined large CAFOs and state-defined CAFOs in state electronic databases because all facilities are required to meet a uniform set of NPDES requirements; therefore, all state-defined CAFOs are included in the list of CAFOs provided to EPA. Using the latitude and longitude, each facility was mapped to confirm which are located within the Chesapeake Bay watershed. The CAFO facilities and AEU's are summarized by county in the table below.

Table Summary of the Number of CAFO facilities by County and the AEU's of each Animal Type by County.

County Counts	CAFOs	Cattle	Dairy	Swine (over 55 lb)	Swine (under 55 lb)	Horses	Sheep / Lamb	Turkey	Duck (wet)	Veal	Broilers (dry)	Layers (dry)	Bison	Deer
Adams	14	231.09	6052.6	498.2	0	0	0	1945.25	0	0	1257.12	17254.6	0	0
Bedford	4	20.5	1042.4	2315	0	0	0	0	0	0	0	0	0	0
Berks	11	189.9	12.6	2458.3	0	0	0	0	73.5	0	1187.57	1162	0	0
Blair	3	15.8	7170.1	2.2	0	0	0	0	0	0	0	0	0	0
Bradford	5	0	38	4963.8	0	0	7.5	0	0	0	0	0	99.85	0
Centre	1	0	1397	0	0	0	0	0	0	0	0	0	0	0
Chester	6	7.7	5007.99	2576.3	0	0	4.5	0	98.3	0	0	0	0	0
Clinton	2	0	2417.8	0	0	0	0	0	0	0	0	0	0	0
Columbia	3	27.55	0	1160.44	0	0	0	0	0	0	93.1	385.88	0	0
Cumberland	6	60	626.5	632.6	0	0	0	0	64.08	0	743.8	470	0	0
Dauphin	9	80.25	4483.85	540.5	0	1300	0	0	0	0	7911.97	1352.7	0	0
Franklin	27	389	9192.29	10864.6	0	0	11	0	712.9	0	1350	2133.2	0	0
Fulton	5	20	206.5	3019.85	0	0	0	220.5	0	0	0	0	0	0
Huntingdon	5	34.75	1599.3	1299.29	561.2	0	0	0	0	0	0	0	0	0
Juniata	10	103	0	4269.2	0	0	0	482	1.8	0	288.4	1021.3	0	0
Lancaster	97	2680.47	25717.46	22227.11	728.8	0	3.3	0	226.1	0	8076.98	33671.95	0	0
Lebanon	24	957.21	14.1	5393.97	0	0	3.8	385	42.9	39.45	9732.57	3172.46	0	0
Luzerne	1	0	0	0	0	259	0	0	0	0	0	0	0	0
Lycoming	3	76.5	298.6	1393.2	0	0	0	0	0	0	0	0	0	0
Mifflin	4	122	0	1683.4	0	0	0	300	0	0	0	0	0	0
Montour	1	0	0	0	0	0	0	0	0	0	184.2	0	0	0
Northumberland	6	40.85	0	572	0	0	0	0	61.8	0	1588.34	324.55	0	0
Perry	13	90.57	142.2	7795.61	0	0	3.8	1487.4	0	0	157.56	433	0	0
Potter	2	145.6	71.5	436	0	0	0	0	0	0	0	0	0	0
Schuylkill	3	59.5	0	239	0	0	0	0	130.2	0	257.3	328	0	0
Snyder	8	78	455	4639.45	790.9	0	0	0	15.56	0	401.67	0	0	0
Sullivan	1	52.28	0	580.24	0	0	0	0	0	0	0	0	0	0
Susquehanna	1	22.1	0	0	0	0	0	0	0	791.1	0	0	0	0

County Counts	CAFOs	Cattle	Dairy	Swine (over 55 lb)	Swine (under 55 lb)	Horses	Sheep / Lamb	Turkey	Duck (wet)	Veal	Broilers (dry)	Layers (dry)	Bison	Deer
Tioga	6	81.25	2266.15	3755	0	0	0	0	0	0	0	0	0	0
Union	7	63.4	0	2900.22	0	0	0	0	106.8	0	168	0	0	0
York	14	2094.86	0	4294.11	0	0	0	1661.58	0	6	685.56	4386.2	0	3.5

Information from EPA's watershed model and DEP's Nutrient Management Program were used to estimate the portion of the agriculture load that was regulated as Confined Animal Feeding Operations (CAFOs). The total number and type of animals, expressed as animal units, within those counties within the Bay watershed were estimated by EPA from USDA's Agriculture census and used in the Watershed Model to define nutrient loads from animal operations. The number and type of animals for those operations in Pennsylvania that were classified as CAFO's were compiled at the county level from permits records.

Information on average daily manure production and total nutrient content of manure from the Penn State University Agronomy Guide were used to estimate, by animal type, the nutrient loads generated by both the total number of animals in the watershed and the number of animals associated with CAFO operations. The CAFO manure values were divided by the total animal manure values to estimate the percent of the manure load generated by the CAFO operations in each county. Separate calculations were completed for the nitrogen and phosphorous load percents. The county percents were applied against the animal feeding operation (afo) land use loading rates generated by the watershed model to determine the portion of the afo nitrogen and phosphorous loads that were attributed to the CAFO operations. The county loads were then split out to the TMDL watersheds using riverseg segment percent splits from the watershed model.

Sediment loads from the CAFO operations were developed using average per farm acres developed by EPA. These acres represent the production area of the operation which is defined as the barnyard, loafing lot, or other similar area for each major animal classification. Using these average production areas unit acres and the number and animal type of CAFOs, the total production area of those CAFOs in each county were calculated. The county CAFO acres were then multiplied by the average afo land use sediment loading rates to generate the CAFO total sediment load for each county. The county sediments loads were redistributed to the four TMDL watersheds.

The CAFO load will be expressed as an aggregate waste load from all federally and state-defined CAFOs. All permit numbers will be identified will be identified in Table B2.

Non-CAFO Agriculture

The non-CAFO agriculture load will be derived by subtracting the CAFO load from the total load from agricultural activities, as determine by the EPA watershed model 2009 Implementation Scenario. The non-CAFO load will be expressed as an aggragate load in talbe B2/B3

Stormwater

MS4 Runoff

For Pennsylvania, there are no GIS/spatial data that delineate the actual boundaries of the MS4 service areas. The MS4 service areas were based on the area of roadway within each MS4 municipality that lies within the urbanized area boundary. Urbanized area extent will be derived from the US Census 2000 (2009 corrected version) Urbanized Areas data. PennDOT and the Pennsylvania Turnpike Commission maintain MS4 permits for their roadways within the Urbanized Area portions of the State. The area of their respective roadways lying within the MS4 urbanized areas were used to define the boundaries of these MS4 service areas.

The municipal boundaries of all MS4 municipalities was overlain with the Urban Area boundaries to determine the proportion of each jurisdiction within the Urban Areas.

Local, state and turnpike roadway geospatial data is available from PennDOT. Separate layers are available for local roads and the state roads/turnpike. The state/turnpike data provides the length and width of the paved portions of the roadways, as well as the width and composition of the medians. PennDOT also provided data on the shoulder widths along roads under their jurisdiction.

Local roadway data are less detailed. There is no spatial data detailing the width of the roads; however, some of the local roads which receive federal aid are tracked by PennDOT and the data for these roads do provide total paved width.

For the remainder of the local roads, widths were estimated by sampling local roads in each urbanized area and averaging the widths, which is applied to each of the local roads in the respective urbanized areas. Road width samples were developed manually by drawing polygons around portions of local roads in Google Earth's satellite view and using the ruler feature to measure the width of each local road in the polygon. Three to seven polygons will be drawn in each urbanized area to get a good representation of local road widths. The widths were averaged to establish one local road width for each urbanized area.

The roads length and width data were used to create polygons representing the MS4 service area. Because the MS4 service area is defined only by the conveyance system (roadways), potential double counting of stormwater discharges from industrial, extractive or construction acres is eliminated

The MS4 regulated loads were estimated by multiplying the regulated area by the corresponding nutrient and sediment loadings rates for high density impervious urban land from the EPA's watershed model. The regulated loads were then recompiled to the four TMDL watersheds. The MS4 load is expressed as an aggregate waste load with individual permits numbers listed in Table B2.

Industrial Stormwater

An up-to-date list of industrial stormwater permitted facilities and associated outfall locations in April 2010 were used for to complete the industrial stormwater analysis. The database of permitted facilities included the outfall names and latitude and longitude location. Any duplicate facilities were removed from the list and the remaining outfalls were plotted as an overlay on the Phase 5.3 Watershed Model, using latitude and longitude, to identify the outfalls located within the Chesapeake Bay watershed. This overlay also allowed for a determination of the county in which each facility/outfall was located. The number of facilities per county and the number of outfalls per counted were tallied.

For consistency with other TMDLs developed in Pennsylvania, each outfall was considered to have an estimated drainage area of 1 acre. Therefore, the number of urban acres regulated by industrial stormwater permits in each county is equal to the number of outfalls per county.

The analysis indicated there were 808 NPDES Industrial Stormwater permitted facilities in 38 counties across the watershed with a total of 1825 outfalls York and Lancaster counties had the highest number of industrial stormwater permitted facilities, 98 and 115, respectively. Carbon, Indiana, Jefferson, McKean and Somerset did not have any identified industrial stormwater permitted facilities. The number of industrial stormwater permits per county and acres covered under the permits are listed in the table below.

Number of Industrial Stormwater Permits per County and Acres Covered Under Those Permits

County	Permits Per County	Acres Covered under Permits	County	Permits Per County	Acres Covered under Permits
Adams	20	62	Lackawanna	27	44
Bedford	16	34	Lancaster	115	277
Berks	5	31	Lebanon	22	32
Blair	37	67	Luzerne	48	85
Bradford	19	37	Lycoming	48	95
Cambria	5	8	McKean	0	0
Cameron	4	5	Mifflin	14	44
Carbon	0	0	Montour	2	14
Centre	24	41	Northumberland	36	59
Chester	4	4	Perry	2	3
Clearfield	25	36	Potter	2	2
Clinton	12	27	Schuylkill	11	14
Columbia	14	30	Snyder	12	44
Cumberland	40	102	Somerset	0	0
Dauphin	48	140	Sullivan	1	1
Elk	4	22	Susquehanna	13	14

County	Permits Per County	Acres Covered under Permits	County	Permits Per County	Acres Covered under Permits
Franklin	25	67	Tioga	13	19
Fulton	5	7	Union	11	20
Huntingdon	14	25	Wayne	1	1
Indiana	0	0	Wyoming	4	4
Jefferson	0	0	York	98	290
Juniata	7	18			
County Totals	808 Permits	1825 Acres			

The industrial stormwater loads were then recopiled to the four TMDL watersheds. The industrial stormwater load is expressed as an aggregate waste load with individual permits identified in Table B2.

Construction Stormwater

This first step in estimating construction stormwater was as to calculate the average number of construction acres per county. The average was based on the acreage of disturbed land subject to erosion and sediment controls during each of the years 1999-2008. The 10-year averages for each county are summarized in the table below. The portions of Carbon and Jefferson counties located within the Chesapeake Bay watershed is sufficiently small that the amount of construction acres is considered negligible, due to the uncertainties in estimating the exact location of construction activities at any given time.

Because the MS4 system is being defined as the conveyance system, there will not be any overlap between the construction stormwater acreage and the MS4 acreage. Therefore, subtracting out construction loads from the MS4 system is not necessary.

10-Year Average Construction Acres by County

County	10-Year Average Construction Acres	County	10-Year Average Construction Acres
Adams	1,099.80	Lackawanna	684.3
Bedford	286.6	Lancaster	1,950.90
Berks	192.5	Lebanon	890.7
Blair	540.5	Luzerne	1,652.30
Bradford	283.9	Lycoming	379
Cambria	203.4	McKean	0.7
Cameron	0.8	Mifflin	288.8
Carbon	n/a*	Montour	193.6

County	10-Year Average Construction Acres	County	10-Year Average Construction Acres
Centre	1,296.60	Northumberland	738.7
Chester	688.5	Perry	154.9
Clearfield	376.9	Potter	93.4
Clinton	421.5	Schuylkill	494.9
Columbia	308.4	Snyder	150.8
Cumberland	540.5	Somerset	61.1
Dauphin	1,087.00	Sullivan	274.1
Elk	36.6	Susquehanna	84.1
Franklin	2,169.00	Tioga	479.9
Fulton	130.3	Union	141.1
Huntingdon	339	Wayne	15.1
Indiana	35.7	Wyoming	214
Jefferson	n/a*	York	2,410.90
Juniata	85.1		
Total Acres for All Counties		21,475.90	

The nutrient and sediment loads for the permitted areas were calculated by multiplying the county acres by the average loading rates for high intensity urban land from EPA's watershed model. The county acres were then recompiled to the four TMDL watersheds. The construction stormwater loads are expressed as an aggregate waste load identified in Tables B2.

Resource Extraction

The current list of extractive operations in Pennsylvania was obtained from eFACTs. Using the latitude and longitude provided in eFACTs, each site was mapped to determine its location within the Chesapeake Bay watershed. There are a total of 1642 active extractive operations in the Pennsylvania portion of the Chesapeake Bay watershed. Sixty seven are in the Potomac River Basin and the remaining 1575 are within the Susquehanna River Basin. No extractive operations were identified in the Eastern or Western Shores of the Chesapeake Bay. The average number of acres per permit in the Potomac River Basin is 43.2 and 71.2 acres in the Susquehanna River Basin. To estimate the load from these facilities, the permit effluent limit for total suspended solids (TSS) (35 mg/L) was multiplied by a flow of 2 gpm/acre. The flow was derived as the expected water yield from disturbed mine lands. The concentration and flow were multiplied by the number of permitted acres at each operation to yield a TSS load. Both state and NPDES permitted facilities were included in the calculations of sediment load because the state is in the process of developing a stormwater NPDES permit for those operations that are currently only permitted under state regulations. The number of permitted acres and the annual load by county are summarized in the table below.

Table 1. Summary of Extractive (Mining) Permitted Acres and Loads

County	Permitted Acres	TSS tons/year	County	Permitted Acres	TSS tons/year
Adams	2294.6	352.50	Lackawanna	4327.5	664.81
Bedford	1184.3	181.94	Lancaster	2450.6	376.47
Berks	105.4	16.19	Lebanon	1692.4	259.99
Blair	1355.7	208.27	Luzerne	11771.7	1808.41
Bradford	1284.5	197.33	Lycoming	2383.5	366.16
Cambria	673.8	103.51	McKean	0	0.00
Cameron	494.8	76.01	Mifflin	1064.4	163.52
Carbon	0	0.00	Montour	325.9	50.07
Centre	4344.5	667.42	Northumberland	9809.5	1506.97
Chester	53.8	8.26	Perry	283.8	43.60
Clearfield	16939.6	2602.32	Potter	24	3.69
Clinton	230.9	35.47	Schuylkill	27910.9	4287.77
Columbia	4942.2	759.24	Snyder	231	35.49
Cumberland	3314.4	509.17	Somerset	243.9	37.47
Dauphin	826.9	127.03	Sullivan	41.7	6.41
Elk	213.5	32.80	Susquehanna	2981.6	458.04
Franklin	1842.2	283.01	Tioga	508.3	78.09
Fulton	254.3	39.07	Union	747.9	114.89
Huntingdon	2259.3	347.08	Wayne	41	6.30
Indiana	220.8	33.92	Wyoming	1440.8	221.34
Jefferson	0	0.00	York	3728.5	572.79
Juniata	221	33.95			

The county loads are then recompiled to the four TMDL watersheds. The TSS load for the Potomac River Basin is 444.6 tons/year. The TSS load for the Susquehanna River Basin is 17232.2 tons/year. The extractive loads are expressed as an aggregate point source load in Tables B2.

Urban/Suburban Runoff – Non MS4

The non-MS4 urban/suburban runoff load is determined by subtracting out all the point source loads for regulated MS4s, and the loads for the construction, mining and industrial permits from the total urban/suburban area load. The non-MS4 urban/suburban load are expressed as an aggregate nonpoint source load in Table B2.

On-Site Septic

On-site septic loads are automatically derived as an output of the model. EPA's assumptions for determining septic loads were a load of 4.0 kg/person/year of nitrate at the edge of the septic field, with a 40% pass-through rate. On-site septic are expressed as an aggregate nonpoint source load on Tables B2

Forest

Forest loads are automatically derived as an output of the model. Additional calculations are not expected to be necessary. The forest load are expressed as an aggregate nonpoint source load. The forest loads are expressed as an aggregate nonpoint source load in Tables B2.

National Pollutant Discharge Elimination System (NPDES) Permits

The purpose of this section is to introduce the numerous NPDES permits administered by DEP. These include:

- o Municipal Separate Storm Sewer Systems (MS4s) Industrial Stormwater
- o Industrial Stormwater
- o Construction
- o Concentrated Animal Feeding Operations (CAFOs)
- o Wastewater Facilities
- o Resource Extraction

While NPDES permits are an important means to implementation, there are other effective state tools which provide significant support and are described elsewhere in this document.

MS4s

Stormwater is the surface runoff that results from rain and snow melt. Urban development alters natural hydrologic characteristics of the land and generates a host of pollutants that are associated with the activities of urban populations, thus causing an increase in stormwater runoff volumes and pollutant loadings in stormwater discharged to receiving waterbodies. Urban development increases the amount of impervious surface in a watershed as farmland, forests, meadowlands, and agricultural lands. Natural hydrologic characteristics are converted into buildings with rooftops, driveways, sidewalks, roads, and parking lots with virtually no ability to absorb stormwater.

General Program Information

Stormwater runoff is often transported by Municipal Separate Storm Sewer Systems (MS4s), and Institutional MS4s and ultimately discharged into local rivers and streams without treatment. An Institution MS4 could be systems such as military bases, large hospital or prison complexes, and highways and other thoroughfares. The potential implementation variations between a Municipal MS4 and an Institutional MS4 are highlighted throughout this section.

National Pollutant Discharge and Elimination System (NPDES) stormwater regulations establish permit requirements for discharges from MS4s. EPA's Stormwater Phase II Rule establishes an MS4 Stormwater Management Plan (SWMP) that is intended to improve the Nation's waterways by reducing the quantity of pollutants that stormwater carries into waterways during storm events.

Common pollutants include oil and grease from roadways, pesticides from lawns, sediment from construction sites, and carelessly discarded trash, such as cigarette butts, paper wrappers, and plastic bottles. When these kinds of pollutants are carried by stormwater into regulated small MS4s that discharge into nearby waterways, the waterways can become impaired for uses, such as habitat for fish and other aquatic wildlife, drinking water supplies, and water-contact recreational use.

In 1999, EPA promulgated rules to regulate small MS4s. A regulated small MS4 is defined by 40 CFR § 122.32(a) as any part of a small MS4 that is located within an "urbanized area" (UA) as defined by the U.S. Bureau of Census, as well as those MS4s located outside of an UA, but within an area that is designated as regulated by an NPDES permitting authority. A regulated small MS4 includes storm drain conveyance systems owned or operated by a state, city or federal entity, municipality, or other public entity that discharge stormwater into waters of the U.S.

The Federal regulations establish six (6) categories of Minimum Control Measures (MCMs) that must be satisfied by the permittee, Municipality and Institution, through implementation of a SWMP consisting of Best Management Practices (BMPs) designed to reduce the discharge of pollutants from the regulated small MS4 to the Maximum Extent Practicable (MEP). Rather than numeric 'end of pipe' limits, the 'narrative' BMPs are designed to reduce the amount of pollutants discharged in stormwater runoff.

The NPDES Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) General Permit (PAG-13) will require, at a minimum, that permittees, Municipalities and Institutions, develop, implement, and enforce a SWMP designed to reduce the discharge of pollutants from the MS4 area to the MEP, to protect Water Quality (WQ), and to satisfy the appropriate WQ requirements of the CWA. The SWMPs must include the six (6) MCMs and in order to meet eligibility criteria for coverage under PAG-13, permittees, Municipalities and Institutions, must comply with all BMPs required as part of each MCM. These MCMs are:

- o Public Education and Outreach;
- o Public Involvement and Participation;
- o Illicit Discharge Detection and Elimination (IDD&E);
- o Construction Site Stormwater Runoff Control;
- o Post-Construction Stormwater Management (PCSM) for New Development and Redevelopment ;
- o Pollution Prevention/Good Housekeeping for Municipal Operations.

Each MCM will have varying degrees of implementation for Municipal MS4s, and Institutional MS4s.

Public Education and Outreach MCM: In accordance with 40 CFR§122.34(b)(1), permittees must implement a public education program to distribute and/or present educational materials to

the community or conduct equivalent outreach activities about the impacts of stormwater discharges on water bodies and the steps that the public can take to reduce pollutants in stormwater runoff.

PAG-13 specifies target audiences with a message to reduce or eliminate practices and behaviors that contribute to polluted stormwater runoff. Permittees must fully implement and achieve four (4) BMPs to comply with this MCM. The DEP and EPA maintain lists of a variety of public information and outreach materials on stormwater that permittees may utilize to inform the public.

For an Institutional MS4, the primary target audiences may include the employees, consultants, and contractors of the Institutional MS4 area. The education and outreach to this target audience may include training on illicit discharge detection, on the design and implementation of erosion and sedimentation and post-construction stormwater controls, and on the pollution prevention/good housekeeping program.

Public Involvement and Participation MCM: In accordance with 40 CFR§122.34(b)(2), permittees must, at a minimum, comply with applicable state and local public notice requirements when implementing a public involvement/participation program. Permittees must fully implement and achieve three (3) BMPs to comply with this MCM, which will require permittees to provide greater opportunity for public participation in municipal regulation of stormwater management.

This MCM requires municipalities to make annual reports (first-term permittees) or progress reports (renewal permittees) available to the public on websites, at municipal offices, or via US Mail upon request. This is to ensure reasonable public access to information and documents relevant to public involvement and participation in the permittee's SWMP. The public involvement conducted to satisfy other statutory or regulatory requirements may also be used to satisfy the public involvement required under this MCM.

Public participation for an Institutional MS4s may take the form of public input on the institution's stormwater management policies and/or practices; on new development and redevelopment regarding existing stormwater concerns in the project area; and on potential stormwater issues from the new development or redevelopment.

Illicit Discharge Detection and Elimination (IDD&E) MCM: In accordance with 40 CFR§122.34(b)(3), permittees must develop, implement, and enforce a program to detect and eliminate illicit discharges into the MS4. Permittees must fully implement and achieve measurable goals established for six (6) BMPs to comply with this MCM and meet the following requirements in accordance with 40 CFR§122.34(b)(3):

Develop, if not already completed, a storm sewer system map, showing the location of all outfalls and the names and locations of all surface waters of the Commonwealth that receive discharges from those outfalls;

To the extent allowable under State or local law, effectively prohibit, through ordinance, or other regulatory mechanism, non-stormwater discharges into regulated small MS4s and implement appropriate enforcement procedures and actions;

Develop and implement a plan to detect and address non-stormwater discharges, including illegal dumping, to regulate small MS4s; and

Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.

This MCM includes references to the following guidance on building an IDD&E program published by the EPA: “Illicit Discharge Detection and Elimination: A Guidance Manual for Program Development and Technical Assessments.” This manual provides guidance to MS4 communities for their IDD&E program and may be obtained free of charge from EPA at: <http://cfpub.epa.gov/NPDES/stormwater/idde.cfm>

An Institutional MS4 is required to develop and implement a plan to detect and report non-stormwater discharges, including illegal dumping. The plan may include training to detect observable types of illicit discharges flowing into the MS4 area from outside sources and discharges from a mapped outfall. The detection training should focus on making observations while performing routine activities. If an observable illicit discharge is detected, appropriate response measures shall be taken including reasonable efforts to identify the source of the discharge and reporting its location, nature of the discharge, and immediate observable environmental impacts to DEP for enforcement. If not already completed, a storm sewer system map must be developed, showing the location of all outfalls and the names and locations of all surface waters of the Commonwealth that receive discharges from those outfalls.

Construction Site Stormwater Runoff Control MCM: DEP is responsible for implementation of the statewide program for issuing NPDES Permits for Stormwater Discharges Associated with Construction Activities, so permittees may rely on DEP’s program to satisfy all requirements under this MCM. In the Notice of Intent (NOI) for PAG-13, permittees can indicate whether they will rely on DEP’s program to satisfy this MCM or whether they will operate their own program to meet all applicable requirements under this MCM.

If a permittee is implementing a construction site stormwater runoff control MCM in accordance with 40 CFR 122.34(b)(4), the permittee must develop, implement, and enforce a program to reduce pollutants in any stormwater runoff entering the permittee’s regulated small MS4 from construction activities associated with land disturbance of greater than or equal to one (1) acre, including projects that are less than one (1) acre when such projects are part of a larger common plan of development or sale that involves one (1) or more acres. Permittees with their own programs must implement four (4) BMPs to achieve compliance with this MCM and satisfy the regulatory requirements at 40 CFR 122.34(b)(4):

Develop and implement an ordinance or other regulatory mechanism to require Erosion and Sediment (E&S) controls, as well as sanctions to ensure compliance, to the extent allowable under State or local law;

Require construction site operators to implement appropriate E&S control BMPs;

Develop and implement requirements for construction site operators to control waste at the construction site that may cause adverse impacts to WQ. These wastes can include discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste;

Develop and implement procedures for site plan review, which incorporate consideration of potential WQ impacts;

Develop and implement procedures for receipt and consideration of information submitted by the public; and

Develop and implement procedures for site inspections and enforcement of control measures.

In all cases, municipalities, including counties, may not issue a building or other permit or final approval to anyone proposing to conduct earth disturbance activities until the required general (PAG-2) or individual NPDES Permit for Stormwater Discharges Associated with Construction Activities has been issued by DEP or by a delegated County Conservation District (CCD).

Municipalities that implement local programs to regulate construction stormwater controls may choose to explore opportunities to negotiate an agreement (contract) with their CCD for services such as plan reviews, construction inspection, post construction inspections, and training.

When projects require a general (PAG-2) or individual NPDES Permit for Stormwater Discharges Associated with Construction Activities, PAG-13 permittees may not issue a final approval for development or redevelopment before DEP, or a designated local CCD operating on behalf of DEP, issues an NPDES Permit for Discharges Associated with Construction Activities.

Permittees choosing not to rely on DEP's statewide program for issuing general (PAG-2) or individual NPDES Permits for Stormwater Discharges Associated with Construction Activities must fully implement and achieve measurable goals established for the four (4) BMPs under this MCM to meet the requirements of 40CFR122.34(b)(4).

An Institutional MS4 may rely on DEP's Erosion and Sedimentation Control Program (25 Pa. Code Chapter 102) for earth disturbance activities occurring within its boundaries and must develop policies or procedures to assist in complying with DEP's Erosion and Sedimentation Control Program.

Post-Construction Stormwater Management (PCSM) for New Development and Redevelopment MCM: DEP is responsible for implementation of the statewide program for issuing general (PAG-2) or individual NPDES Permits for Stormwater Discharges Associated with Construction Activities. Since this NPDES permitting program requires a PCSM Plan to be included with the plan for construction activities, permittees may rely on DEP's program to satisfy some of the requirements under this MCM. In the PAG-13 NOI, permittees can indicate whether they will rely on DEP's program to satisfy certain parts of this MCM or whether they will operate their own program to meet all applicable requirements under this MCM.

Permittees choosing not to rely on DEP's statewide program for issuing general (PAG-2) or individual NPDES Permits for Stormwater Discharges Associated with Construction Activities to satisfy the requirements for this MCM must develop, implement, and enforce a complete program to reduce the discharge of pollutants in any stormwater runoff entering the permittee's regulated small MS4s from areas that are developed or redeveloped in accordance with an NPDES permit for stormwater discharges associated with construction activities. Permittees implementing their own programs must implement all six (6) BMPs in this MCM to comply with the regulatory requirements at 40 CFR §122.34(b)(5) and satisfy this MCM:

Develop a written program to satisfy all required components of this MCM.

Develop and implement strategies which include a combination of structural and/or non-structural BMPs appropriate for the local regulated community;

Ensure that controls are installed that shall prevent or minimize WQ impacts.

Use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects.

Develop and implement measures to encourage and expand the use of low impact development (LID) in new development and redevelopment. This includes keeping an inventory of LID BMPs that have been installed and removing provisions in municipal ordinances that conflict with the use of LID practices.

Implement measures to ensure adequate Operation and Maintenance (O&M) of all PCSM BMPs installed at all qualifying development or redevelopment project.

Permittees who rely on DEP's statewide general (PAG-2) or individual NPDES Permitting Program for Stormwater Discharges Associated with Construction Activities to satisfy some of the requirements under this MCM still must implement a written program that includes BMPs to satisfy the last three (3) bulleted items listed above because these three (3) requirements are not addressed in DEP's permitting program.

The ordinance enactment BMP requires permittees to either:

Enact, implement, and enforce an ordinance from an Act 167 Stormwater Management Plan (SMP) approved by DEP in 2005 or later; or

Enact the MS4 Stormwater Management Ordinance; or

Demonstrate that the permittee already has enacted an ordinance(s) that satisfies all applicable requirements by completing, signing, and submitting with the PAG-13 NOI the MS4 Stormwater Management Checklist that is included in the PAG-13 permitting package.

An Institutional MS4 may rely on DEP's general (PAG-2) or individual NPDES Permitting Program for Stormwater Discharges Associated with Construction Activities for qualifying new development and redevelopment activities occurring within its boundaries and if applicable must

develop policies or procedures to assist in complying with DEP's NPDES Permitting Program for Stormwater Discharges Associated with Construction Activities.

Pollution Prevention/Good Housekeeping for Municipal Operations MCM: In accordance with 40CFR122.34(b)(6), permittees must develop, implement and enforce a program to detect and eliminate illicit discharges. Permittees must fully implement and achieve measurable goals established for three (3) BMPs to comply with this MCM and meet the following requirements in accordance with 40CFR122.34(b)(6):

Identify and document all municipal facilities that have the potential to generate stormwater runoff to the regulated small MS4.

Develop, implement, and maintain a written O&M program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations to the regulated small MS4s; and

Develop and implement an employee training program to prevent and reduce the amount of stormwater pollution entering the permittee's regulated small MS4s from activities such as maintenance of parks and open spaces, maintenance of fleets and buildings, new construction and land disturbances, and stormwater system maintenance.

Permittees are encouraged to arrange and schedule joint training events with other nearby operators of regulated small MS4s to improve efficiency and reduce costs.

The Institutional MS4 must develop and implement a pollution preventions/ good housekeeping program to minimize stormwater impacts from the MS4 which may include the operation and maintenance plans and maintenance agreements resulting from the NPDES permit process.

For each regulated small MS4 that directly discharges stormwater into any receiving waters with an approved Total Maximum Daily Load (TMDL), permittees, Municipal and Institutional, must achieve pollutant reductions consistent with all applicable TMDLs.

The first goal for the MS4 municipality through its permit requirements and construction activities is to meet the water quality standards for local waters. By meeting and achieving the local water quality standards the municipality will have improved the overall water quality reaching the Chesapeake Bay. If there is a local impairment with an established TMDL then the MS4 municipality will be required to develop a TMDL Implementation Plan. If the MS4 does not discharge directly to an impaired water subject to an approved TMDL, the TMDL implementation plan requirement is not applicable.

Permittees, Municipal and Institutional, with regulated small MS4s that discharge to an area that lies within an area covered by a pre-approved DEP Watershed or Regional TMDL Implementation Plan must implement and enforce pollutant control consistent with the pre-approved plan.

In areas not covered by a pre-approved DEP Watershed or Regional TMDL Implementation Plan but there is an approved TMDL that is applicable to the MS4 discharge, the MS4 permittee,

Municipal and Institutional, must develop and submit for approval of an MS4 TMDL Plan that is consistent with the applicable TMDL. The MS4 TMDL Plan must identify how the pollutant reductions established by the applicable WLA will be achieved. MS4 TMDL Plans, when required, must be submitted to DEP with a Notice of Intent (NOI) for Coverage under PAG-13 from small MS4s.

The MS4 TMDL Plan submitted with the NOI does not need to include final design details for BMPs that will be implemented during the current permit term; however, design details for BMPs must be amended, in writing, to the MS4 TMDL Plan during the first year of permit coverage. The MS4 TMDL Plan must include a timeline (schedule) with milestones. The timeline may extend across multiple permit terms. MS4 TMDL Plans must demonstrate measurable progress toward substantial reductions in the applicable pollutant loads specified in the applicable WLA of the TMDL. At a minimum, the timeline in the plan must have physical pollutant removal measures installed on-the-ground in time for their successful operation to be documented in the annual report or progress report submitted in the third year of coverage under the PAG-13 permit. MS4 TMDL Plans must be signed and sealed by a Professional Engineer (PE) holding a valid license in good standing from the Pennsylvania Department of State (DOS).

MS4 TMDL Plans should incorporate appropriate content from Nonpoint Source Implementation Plans (CWA Section 319 Plans), Watershed Restoration Strategy Plans, County Comprehensive Plans (Act 247 Plans), as well as other applicable resources.

MS4 TMDL Plans may include measures located within the geographic area that drain to the regulated small MS4 and reduce applicable pollutant loads consistent with approved TMDLs that were implemented by the permittee between the time WQ assessments were completed and the date of the Approval to Discharge. The calculated or reported pollutant removal benefits of an MS4 TMDL Plan may not include benefits of any measures implemented by anyone as a condition of any other NPDES permit.

Permittees, Municipal and Institutional, must implement all measures needed to reduce the pollutant load consistent with the local TMDL applicable to the MS4 discharge as soon as practicable in accordance with the schedule in the approved MS4 TMDL Plan. Implementation of these measures can be adaptive, iterative, and dynamic. The MS4 TMDL Plan must be evaluated and updated continuously, as necessary, based on its effectiveness in reducing pollutant loads in discharges from regulated MS4s.

Permittees must report on progress made with implementation of MS4 TMDL Plans in annual reports or progress reports. Reports on implementation must include reductions in pollutant load attained by implementation of TMDL control measures and BMPs, broken down measure by measure and BMP by BMP. Reports must demonstrate that the required pollutant loads are being achieved and are consistent with the applicable TMDL. This can be demonstrated by showing how measurable implementation progress is being made toward reducing loads as required by the TMDL (or the WLA) in accordance with the implementation schedule in the approved MS4 TMDL Plan and the end date for ultimate attainment of the pollutant load reductions set forth in the TMDL (or the WLA).

Industrial Stormwater

DEP typically addresses Industrial Stormwater through the use of National Pollutant Discharge Elimination System (NPDES) General Permits which have best management practice conditions but no numerical limits. The DEP plans on continuing this approach for Industrial Stormwater through 2025. Progress towards achieving the projected loading targets will be assessed every 2 years.

Construction

DEP uses a variety of state and federal regulatory tools, and enlists help from a number of partners, to manage stormwater in the Commonwealth. The challenge is to integrate them into a comprehensive effort at the federal, state, and local levels. The following describes the regulatory tools and explain how they are applied and how they are coordinated.

Since 1972, Pennsylvania has regulated stormwater runoff from earth disturbance activities under the Erosion and Sediment Pollution Control Program found at 25 Pa. Code Chapter 102 of the DEP's rules and regulations. Under the current regulations all earth disturbances must be conducted with erosion and sediment control BMPs in place. All earth disturbance activities of 5000 square feet or greater require the development of a written erosion and sediment control plan for implementation at the site. Further, erosion and sediment control plans for certain activities exceeding one acre of earth disturbance and plans for most activities that exceed five acres of earth disturbance must be submitted to the DEP or a county conservation district that has delegated authority for review and approval before the project may begin. In addition to state requirements, many municipalities administer similar permitting programs related to erosion and sediment control and post construction stormwater management at the local level.

Erosion and sediment control BMPs are used to minimize the potential for accelerated erosion and sediment pollution from earth disturbance activities. The DEP has developed an "Erosion and Sediment Pollution Control Program Manual," that identifies BMPs, and provides recommended site design standards and specifications as well as their applicability to various situations. The regulations require more protective BMPs for High Quality (HQ) and Exceptional Value (EV) watersheds.

In 1992, the DEP began implementing EPA's finalized regulations under the federal Clean Water Act that require National Pollutant Discharge Elimination System (NPDES) permits for construction activities of five acres or greater. Under the DEP's regulations, any earth disturbance of five acres or greater (including those of less than five acres that occur as part of a larger common plan of development or sale consisting of five acres or more) requires a permit prior to commencing the earth disturbance.

In 1999, EPA promulgated additional stormwater regulations establishing NPDES permit requirements for construction activities affecting between one and five acres of land (including those of less than one acre that occur as part of a larger common plan of development or sale between one and five acres). Pennsylvania began implementing these regulations on December 8, 2002.

A general permit (NPDES General Permit for Stormwater Discharges Associated with Construction Activities, PAG-2) is available for use in most watersheds, but an individual NPDES permit is required for projects discharging in HQ and EV watersheds. The DEP has delegated the primary functions and responsibilities of regulating earth disturbance activities to County Conservation Districts. Sixty-two of the 66 delegated conservation districts have the authority to process NPDES General Permits for Stormwater Discharges Associated with Construction Activities. The DEP maintains responsibility for processing applications for individual NPDES permits.

Since year 1989, Phase I of the federal NPDES regulations has required that post construction stormwater management BMPs be identified in permit applications and in notices of intent for general permit coverage. To further advance effective stormwater management and to support the DEP's water quality protection program requirements, NPDES permit applicants must submit a post construction stormwater management plan describing BMPs that will be maintained after construction has been completed

An NPDES Permit Notice of Intent/Application must contain separate Erosion and Sediment Pollution Control (E&S) Plan and a separate Post Construction Stormwater Management (PCSM) Plan. The E&S plan should contain BMPs designed to minimize point source discharges to surface waters, preserve the integrity of stream channels, and protect the physical, biological, and chemical qualities of the receiving water. The plan must be developed utilizing guidelines and BMP information provided in the Erosion and Sediment Pollution Control Manual.

A separate PCSM plan must also be submitted which identifies BMPs to be installed which manage and treat the stormwater discharges to protect water quality after construction. The plan should be prepared and implemented in accordance with the DEP's Pennsylvania Stormwater Best Management Practices Manual. PCSM BMPs should be designed to maximize groundwater infiltration, to protect the structural integrity of the receiving stream, and to protect, maintain, reclaim and restore the existing and designated uses.

The application and the E&S and PCSM plans are submitted to the reviewing entity (DEP or authorized conservation district) along with the completed application. The application and plans and supporting documentation are reviewed to ensure they are complete and meet all standards and specifications and regulatory requirements. Individual permits are issued by the DEP's regional office which services that county and general NPDES permits are authorized by delegated county conservation districts.

To further understand the relationship between TMDLs and stormwater management, it is useful to look closer at how TMDLs are developed. The allowable point and nonpoint contributions are established by assigning maximum loads to a number of categorical activities. One of these categories is "transitional lands," literally those in transition from one use to another. Transitional lands include construction activities. Earth disturbance activities conducted under an NPDES permit can be undertaken within the transitional land wasteload allocation. The general NPDES permit contains conditions that the permit may not be used for discharges directly to surface waters identified as impaired waters where the proposed discharge will result in a net change (pre-condition to post-condition) in volume or rate or water quality of the

stormwater. It also contains another condition that the general permit may not be used for discharges of pollutants of concern to waters for which there is an approved and applicable total maximum daily load (TMDL), unless the E&S and PCSM plans include implementation measures or controls that are consistent with the assumptions and requirements of such TMDL. To be eligible for coverage under the general permit a person must implement conditions applicable to their proposed discharges necessary for consistency with the assumptions and requirements of the TMDL. If a specific wasteload allocation has been established that would apply to the discharge, persons must implement necessary steps to meet that allocation. Individual NPDES permits may also incorporate numeric effluent limits or other special conditions as needed into the terms and conditions of the permit authorization beyond the no net change, such as trading or offsetting provisions. If the construction activity does not discharge directly to an impaired water subject to an approved and applicable TMDL, the NPDES permit conditions for controlling volume, rate and water quality apply.

The DEP will be incorporating the new federal Effluent limitation guidelines into both the individual and general NPDES permits.

CAFOs

In Pennsylvania, the Concentrated Animal Feeding Operations (CAFO) and Nutrient Management Programs continue to coordinate efforts to maximize program results and minimize duplication. The success of these and other related programs depends on a partnership that includes the State Conservation Commission (SCC), Pennsylvania Department of Agriculture (PDA), DEP, conservation districts, private sector planners, and farm operators. This coordination provides quality assurance at a local and farm level that required practices, plans, and permitting are carried out according to the CAFO and supporting program rules and standards. Activities include permit and plan reviews, annual inspections, following practice design and implementation standards, and required record keeping.

Pennsylvania has 349 CAFOs under permit, 302 of these in the Chesapeake Bay watershed. Currently all CAFOs are carrying out the updates for meeting the revised 2005 CAFO and 2006 Nutrient Management Program regulations revisions. These updates include increased management and monitoring of exported manure and phosphorous levels, increasing implementation of streamside buffers or manure application setbacks, and extension of CAFO requirements to a large portion of the state's poultry operations.

Coordination work with supporting agencies and other stakeholders was finished in 2007 for the document titled *Implementation Guidance for NPDES CAFO Permits*. This document along with other guidance is available on the DEP website at:

<http://www.portal.state.pa.us/portal/server.pt?open=514&objID=554279&mode=2>

DEP continues its ongoing program outreach efforts for agency, private and farmer participants.

CAFOs have a setback requirement from surface waters, stockpiling restrictions, Pollution Prevention Control (PPC) Plan requirements and significant recordkeeping and reporting requirements. CAFOs with greater than 1000 AEUs must obtain a state Water Quality Management Permit for new or expanded manure storage facilities. DEP inspects these facilities once each year.

Pennsylvania considers CAFOs as "zero discharge" facilities. This will be simulated in the Chesapeake Bay model as 100 percent implementation of all relevant BMPs.

Wastewater Facilities

The major focus of Pennsylvania's wastewater point source nutrient control program in the Chesapeake Bay watershed is the regulation of 183 significant domestic wastewater facilities and 30 *industrial facilities* through nutrient load limits in NPDES permits. For Pennsylvania's Chesapeake Bay Program, a significant point source is defined as a domestic wastewater treatment plant with a design flow of 0.4 million gallons per day (mgd) or greater or an industrial discharge with greater than either 75 lbs/day of Total Nitrogen (TN) or 25 lbs/day Total Phosphorus (TP). Collectively, these significant sources account for approximately 95 percent of the total point source nutrient load. Most of the reduction for the point source sector is expected to be achieved by these significant facilities nutrient reduction efforts. Those point sources not meeting the definition of a "significant" source constitute less than 0.55 percent of Pennsylvania's overall nutrient load.

Program Elements

The program is implemented through a point source strategy that establishes annual TN and TP load limits for the wastewater dischargers. Specific permitted loads for each of the significant dischargers are based on achieving 6 milligrams per liter (mg/l) TN at design flow. Annual load limits for TP are based upon achieving a 0.8 mg/l discharge concentration at design flow, except for any facilities causing in-stream, near-field impacts from their TP discharges. These few dischargers will require a specific locally-driven refinement of the annual TP load limit and a concentration limit. As noted again later in this document, a few facilities already accepted NPDES permit renewals based on achieving 8.0 mg/l TN and 1.0 mg/l TP at 2010 projected flows, voluntarily, and they will not be required to achieve lower cap loads based on the alternate approach.

Approximately thirty (30) significant industrial waste (IW) facilities were allocated loads based upon their current loadings with an additional margin for growth.

The point source discharge TN and TP cap loads will be enforced through individual or watershed-based NPDES permits. Any increase in the discharge volume will necessarily result in a commensurate reduction in the nutrient concentration in order to stay below the annual load allocation.

Point sources that can reliably and consistently treat to below their permitted cap loads, would be eligible to submit the reductions to the Commonwealth's Nutrient Trading Program to be reviewed for certification of nutrient reduction credits. Those facilities unable to achieve and maintain their established cap loads may opt to purchase available authorized nutrient credits. These types of trading activities would be administered through the trading program, which is further described in other portions of this document.

Beyond the cap loads established for existing significant point source dischargers, similar cap loads will be established for new systems and existing small systems when flows are projected to grow above 0.4 mgd. These new significant sources will be required to offset their nutrient loads through nutrient reduction treatment technology, the purchase of nutrient credits, documented septic system retirement offsets. Point sources with flows below 0.4 mgd will, if needed, also receive an annual nutrient load cap. These will be based upon design flow and existing performance or 7306 lbs/yr of TN and 974 lbs/yr of TP, whichever is less.

Specific Program Elements

All significant and some non significant point source dischargers in the Chesapeake Bay basin will have nutrient monitoring and reporting requirements incorporated into their NPDES permits. Further, the sewage facilities planning program will be strengthened to document the septic system relief offset that must be captured and tracked. This creates a TN reduction opportunity for those point sources that relieve these systems. Revisions to the Pennsylvania Sewage Facilities Plan Update regulatory requirements are also under consideration.

Resource Extraction

The resource extraction activities subject to NPDES permitting in the Bay watershed include coal mining, noncoal mining and the earth disturbance related to abandoned mine reclamation activities. Oil and Gas development activities are not subject to NPDES permitting.

Coal Mining

Coal mining permits are typically accompanied by an NPDES permit. Most coal mining permit areas include erosion and sedimentation controls that are permitted stormwater outfalls under an NPDES permit. Some coal mining activity permits include BMPs that are designed to prevent a stormwater discharge. A typical example of this is in the anthracite coal fields where new mining re-affects abandoned mine land (AML), and all stormwater is contained in the pit.

Permitted sediment control outfalls are assigned Best Available Technology (BAT) limits for sediment (either total suspended solids [35 mg/l] or settleable solids [0.5 ml/l]).

Most coal mine permits include re-mining, where AML is reclaimed in the course of mining. This re-mining eliminates significant sources of sediment.

Noncoal Mining

There is a wide variety of noncoal minerals mined in the Bay watershed. Most prominent, from the perspective of the number of permitted mine sites are bluestone. Other minerals mined include limestone, topsoil, sand and gravel, argillite, shale, slate and unclassified fill. The type of mining permit needed is determined by the amount of production per year. There are three categories of production that are tracked (<2,000; <10,000; and unlimited). Most unlimited production permits have associated NPDES permits. NPDES permits associated with noncoal mining activities are usually assigned BAT limits for sediment (total suspended solids [35mg/l]).

Mining Stormwater General Permit

The DEP is developing a stormwater NPDES General Permit (GP) for mining activities. The intent of this permit is to manage stormwater from mine sites where the hydrologic impact is limited to surface water. The GP requires the use of BMPs to manage stormwater to prevent sedimentation. It is anticipated that this GP will be finalized during the summer of 2010.

Oil and Gas Development

While oil and gas development activities are not subject to NPDES permitting, the DEP has in place an Erosion and Sedimentation Control General Permit (ESCGP-1). In response to the EPA's rulemaking and the effect of the federal Energy Policy Act of 2005, DEP issued the ESCGP-1 for oil and gas activities that disturb five acres or greater at one time over the life of the project. This permit applies to earth disturbance activities for oil and gas exploration, production, processing, treatment operations or transmission facilities (oil and gas industry). The added protection gained through this permit will ensure that proper best management practices (BMPs) will be planned, implemented and maintained for erosion and sediment control and post-construction stormwater runoff from these activities. In addition, this approach is an incentive for the operator to minimize the disturbed area and restore the area promptly after completion of the well or installation of the pipeline.

The DEP held training sessions for all staff on the new ESCGP-1 permit application. BOGM offered technical erosion and sediment control plan development training sessions for the oil and gas industry. This training also included administrative training on the new ESCGP-1.

Future Permitting Processes

The DEP will continue to utilize the NPDES permitting process to prevent sediment impacts from resource extraction in the Bay watershed. Waste Load Allocations can be based on the BAT limits and the expected water yield from runoff (about 2 gpm/acre). In addition, the implementation of BMPs will be monitored to assure their effectiveness.

Section 6.

Accounting for Growth

Accounting for growth is an important element of the Commonwealth's plan for addressing nutrient and sediment loads to the Chesapeake Bay. For example, increased population has the potential to result in increased discharge rates at sewage treatment plants, or a need for new treatment plants. This section provides details on several program initiatives that will be employed to address growth and related potential impacts. Other sections throughout this plan also address this important element.

Sewage Discharges

The Wastewater section of this WIP provides details on how the Point Source Strategy and Sewage Facilities Planning process will address growth through a "no net nutrient increase" strategy. The NPDES permitting process, in conjunction with the Sewage Facilities Planning process, provides the authority for this strategy, along with the ability for enforcement and quantification. Total nitrogen (TN) and total phosphorous (TP) limits have been established for existing point source treatment facilities. In some cases, existing treatment facilities may be able to accommodate new land development or other new sources of nutrients, provided that the facility will not exceed its permit limit by taking on the new loading. For other cases, such as the construction of new facilities or the expansion of existing facilities, the following options can be considered for maintaining no net increase in nutrients:

- Acquire nutrient reduction credits;
- Employ recycle and re-use technology;
- Perform treatment followed by land application; or
- Retire existing on-lot systems.

Nutrient Trading Program

A core and fundamental element for addressing growth is Pennsylvania's Nutrient Trading Program. The Commonwealth has been, and will continue to be, a national leader in the development of Nutrient Trading policy and program implementation. Significant stakeholder input has been, and continues to be, critical to program development, resulting in a program that is operational with active trading taking place.

A key component for ensuring sustainability and transparency for the program is the promulgation of regulations in 25 PA Code, Chapter 96, referred to as "Water Quality Standards Implementation." This regulation codifies the DEP's policy and guidance that had previously served as the framework for nutrient credit. That policy (Guidance Document Number 392-0900-001: *Final Trading of Nutrient and Sediment Regulation Credits – Policy and Guidelines*), was drafted to help provide compliance options when Maryland revised its water quality standards for the Chesapeake Bay under the Federal Clean Water Act.

The Chapter 96 regulations outline the requirements for facilities and credit generators who voluntarily choose to work with other facilities and/or nonpoint sources to reduce nitrogen,

phosphorus and sediment discharges into tributaries of the Chesapeake Bay. The regulations: provide eligibility requirements and a methodology for calculating credits; define baseline and threshold requirements for generating credits; contain provisions for DEP verification and certification of credits; and provide a framework for the use of credits and offsets generated from activities located within the Chesapeake Bay watershed to meet NPDES permit requirements related to the Chesapeake Bay. Other key elements of the regulations include details on the processes applicable to credits and offsets; a provision for stormwater best management practices; establishment of a 10 percent credit reserve ratio; a farmland preservation provision; and *duration, renewal and revocation* procedures. Although no federal regulations on water quality trading exist, the DEP worked closely on the trading policy with EPA.

As of this writing, the regulations are in the final steps of approval and promulgation.

Stormwater

As mentioned in the preceding paragraphs on Nutrient Trading, the Commonwealth's Chapter 96 regulations contain a provision for stormwater best management practices. This provision was included in order to support DEP's plan to develop the program elements needed to fully integrate nutrient trading into the stormwater program.

The need for a stormwater trading program extends beyond the Chesapeake Bay watershed in Pennsylvania. In January 2010, the Pennsylvania Environmental Council (PEC) released a report titled *The Wissahickon Creek Municipal Sediment Credit System*. EPA provided PEC a grant to work on this topic in order to help develop options to consider for implementing TMDLs. The document provides extensive recommendations on establishing a sediment credit system, and suggestions on how that could be integrated into the NPDES General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s), also known as PAG-13.

As the DEP works on PAG-13, it also plans to develop the elements needed to implement a trading program for local MS4s. In addition, the DEP will explore options to develop a program that encourages stormwater capture and reuse options that promote cost savings for landowners while advancing nutrient reductions.

Adaptive Management

It is anticipated that the program elements described above will be sufficient to address growth while achieving Pennsylvania's nutrient reduction goals. It is not anticipated that other potential growth will result in increased nutrient or sediment loadings *significant enough to require* that growth to be addressed by new program elements or resources. If this assumption is proven incorrect when milestones are evaluated, the Commonwealth will re-consider this approach.

Section 7.

WASTEWATER

Current Programs and Capacity

Pennsylvania's 2006 *Chesapeake Bay Point Source Compliance Strategy* for permitting for wastewater treatment facilities in the Chesapeake Bay Watershed is as follows:

I. Sewage Discharges

Permitting for existing significant sewage discharges is implemented by revoking and reissuing permits using a phased approach, initially imposing TN and TP cap loads for significant sewage dischargers. The phased approach did not prevent any facilities from opting for an earlier implementation schedule if they so chose, and provided flexibility where appropriate. The implementation schedule is as follows:

A. Phase 1 – cap loads were placed in permits and most become effective on 10/01/2010. Draft permits were issued as soon as possible. Dischargers were notified of their proposed cap loads based on concentrations of 6.0 mg/l TN and 0.8 mg/l TP at design annual average daily flow.

B. Phase 2 – cap loads were placed in permits and most will become effective on 10/01/2012, and final permits with cap loads were mostly issued no later than 01/31/2010. Dischargers were allocated a cap load based on concentrations of 6.0 mg/l TN and 0.8 mg/l TP at design annual average daily flow.

C. Phase 3 – cap loads were placed in permits to become effective on 10/01/2013, and final permits with cap loads will mostly be issued no later than 12/31/2010. Dischargers will be allocated a cap load based on concentrations of 6.0 mg/l TN and 0.8 mg/l TP at design annual average daily flow.

D. Phase 4 – non-significant point source sewage dischargers (design annual average daily flow on August 29, 2005, greater than or equal to 0.2 mgd but less than 0.4 mgd):

1. These facilities will begin monitoring and reporting for TN and TP. These monitoring requirements may be placed in NPDES permits as they come up for renewal. These data will provide a basis for future cap load limitations as part of a Phase 4. Monitoring for TN and TP will be required for a period of two years, beginning on the effective date of the new permit.

2. Implementation of Phase 4 cap loads may start after Phases 1 through 3 are completed. DEP's plan is that Phase 4 permits will be revoked and reissued to establish annual mass load limits for TN and TP based upon the lesser of existing performance levels at design annual average daily flow on August 29, 2005, or, loads equivalent to 6 mg/l TN and 0.8 mg/l TP at 0.4 mgd (7306 lbs. TN and 974 lbs. TP).

3. DEP's plan is that any facility in this phase that undergoes an expansion prior to phase 4 implementation will be immediately subject to the requirements shown for phase 4, i.e. no net increase in loading, based on design annual average flow on August 29, 2005 and existing nutrient concentrations, but in no case shall this load exceed 7306 pounds of TN and 974 pounds of TP, annually.

E. Phase 5 – smaller dischargers (design annual average daily flow on August 29, 2005 less than 0.2 mgd and greater than 0.002 mgd):

1. DEP's plan is that these facilities will be given the choice to monitor levels of TN and TP in their discharge for two years when their permit is up for renewal or in a subsequent permit renewal, for the purpose of data collection and possibly assigning cap loads under Phase 5, occurring after the implementation of Phases 1 through 4.

2. DEP's plan is that any facility in this phase that undergoes an expansion prior to phase 5 implementation will be immediately subject to the requirements shown for phase 5, i.e. no net increase in loading, based on design annual average flow on August 29, 2005, and existing nutrient concentrations*, but in no case will this load exceed 7306 pounds of TN and 974 pounds of TP, annually.

*Note: Where data for existing concentrations do not exist, default values for the type of technology in place may be used.

3. Implementation dates will be determined after completion of the first four phases.

F. Any sewage dischargers that have already accepted NPDES permit renewals based on achieving 8.0 mg/l TN and 1.0 mg/l TP at 2010 projected flows, voluntarily, will not be required to achieve lower cap loads based on the alternate approach.

G. Any sewage discharger will be able to meet its cap load by achieving an annual loading equivalent to other TN and TP concentrations at design annual average daily flow, or to purchase nutrient credits or generate an offset to achieve its allocated cap load. For example, a discharger may elect to install treatment technology designed to achieve a concentration limit of 12 mg/l TN and 1 mg/l TP and purchase the remaining load reduction in credits to meet their cap load.

H. DEP's plan is that all dischargers proposing to expand the capacity of their facilities beyond design annual average daily flows on August 29, 2005, will be held to the effluent cap load limits calculated using the design annual average daily flows on August 29, 2005, and the requirements of the phase in which that flow places the facility. The design annual average daily flows for all sewage facilities will include those design annual average daily flows approved as part of any final Act 537 official sewage facilities plan approval on or before August 29, 2005.

II. Industrial Wastewater Discharges

Pursuant to the NPDES regulations at 25 Pa. Code Chapter 92, DEP developed an allocation that was used to address the nutrient loads originating from significant industrial wastewater sources as part of its efforts to ensure compliance with the water quality standards related to the

Chesapeake Bay. This allocation is expressed as annual “cap loads” of TN and TP that DEP plans to incorporate into NPDES permits for those sources.

Based on data available for loadings in 2002, and adding a 10 percent reserve, 1.9 million lbs/year of TN and 66,348 lbs/year of TP were allocated to the significant industrial wastewater point sources as a group.

The determination of cap loads for each industrial wastewater facility was generally divided into five categories. First are those facilities that had reductions before the 2002 loads were calculated; second are those facilities that submitted a Nutrient Reduction Evaluation (NRE) and reduced their nutrient loads between 2002 and 2009; third are those facilities that submitted an NRE and are planning to reduce nutrient loads through upgrades for operation or construction of their treatment plants; fourth are those facilities that are already at low levels of nutrient discharge loads; and fifth are those facilities that did not submit an NRE or submitted an NRE but did not plan to reduce nutrient loads. The loads for these categories are shown below with first through fifth shown as 1 through 5 respectively.

1. The cap loads for the first category are the 2002 load or current load whichever is greater plus 10 percent.
2. The cap loads for the second category are the current load plus 10 percent.
3. The cap loads for the third category are the loads they plan to reduce to in their NRE. The permit will be written such that those facilities will have a compliance schedule to give them time to complete their operation or construction upgrades before DEP would expect them to meet the more stringent loadings.
4. The cap loads for the fourth category would be their current loads.
5. The cap loads for the fifth category would be their current loads reduced by 33 percent.

After applying the loads as outlined above, the phosphorous load still exceeded the allowable total load for significant Industrial Wastewater Facilities of 66,348 lbs/year of TP. Therefore the phosphorous loadings were reduced by an equal percentage basis for all facilities above 0.5 mg/l in their discharge with no one expected to achieve reductions below 0.5 mg/l unless already doing so.

Note that in some cases EPA may have established nutrient Effluent Limitation Guidelines (ELGs) for several types of industries. If a significant industrial discharger in the Chesapeake Bay Watershed is required to meet an ELG, then the load limit for nutrients will be based on the lesser of the ELG or the load from the previous paragraph.

Several of the Significant Industrial Dischargers noted that they withdrew water from the same water body to which they discharged. These dischargers requested that DEP consider the background nutrient level of the water that was withdrawn and get an offset for the background nutrient load, i.e. their cap loads would be established using a net load approach. DEP considered this request and will allow an offset for background loads if the discharger can demonstrate what the annual average daily background nutrient level is, and document that its water is withdrawn from the same stream for the industrial process to which the treated water is discharged. No offset will be given for water withdrawn from wells.

The proposed cap loads for the significant industrial facilities in the Chesapeake Bay Watershed, based on the allocation methodology described above when applying these cap loads will result in a loading of 1,428,977 lbs/yr for TN and a loading of 62,807 lbs/yr for TP to the Chesapeake Bay. These loads will provide a reserve of 519,142 lbs/yr for TN and reserve of 3,541 lbs/yr for TP. These cap loads are part of DEP's overall compliance plan to address the downstream water quality standards in Maryland and Virginia that Pennsylvania needs to meet.

Allocation of the Reserve

DEP included a reserve within its allocation in consideration of future economic growth in the watershed, and plans to apply several criteria to its use of this reserve. First, new and expanding industrial dischargers in the Pennsylvania portion of the Chesapeake Bay Watershed will need to provide a report on how they will address any associated increase in nutrient loadings. The report will consist of a review of non-discharge alternatives followed by a discussion of enhanced treatment. Second, if DEP determines, based on a review of this report, that part of the reserve for either TN or TP should be allocated, a maximum of 5 percent of the initial amount of the reserve, if available, can be allocated to any single new or expanding discharge. Any nutrient load the discharger needs beyond that will need to be addressed through offsets or the purchase of credits pursuant to DEP's nutrient trading program.

Publicly Owned Treatment Works (POTWs) that treat new sources of industrial waste may be able to obtain offsets from the reserve allocation, if available, for treating that wastewater. A new source in this context is a source of wastewater from an industrial facility that did not discharge to any POTW prior to September 1, 2009. The offset will be based on the following formulas. Note that the POTW must have an industrial waste pretreatment program, approved by EPA in accordance with 40 CFR Part 403, in place to obtain such an offset. The offset will in no case be greater than 5 percent of the initial reserve for either TN or TP.

The POTW will be assigned an offset to be added to their nutrient cap loads based on the following formula:

- o Offsets for TN = (IW nutrient concentration after pretreatment (mg/l) – 6 mg/l) x 8.34 x IW flow in MGD x 365 days.
- o Offsets for TP = (IW nutrient concentration after pretreatment (mg/l) – 0.8 mg/l) x 8.34 x IW flow in MGD x 365 days.

When the reserve has been exhausted, new industrial dischargers will need to obtain offsets and/or purchase credits equal to 100 percent of their proposed nutrient loads. From that point forward, expanding discharges will be limited to their existing cap load.

DEP reserves the option to reallocate loads in the future, and to revise this approach as appropriate.

Procedure to Implement Cap Loads

DEP, through its regional offices sent out notification letters under Section 92.8a of DEP's regulations requesting that the significant industrial users receiving proposed nutrient cap loads provide the report or plan and schedule for complying with those cap loads that is required under

that regulation. DEP will review the reports and/or plans and schedules to establish compliance schedules through the permitting process, if necessary, in the same manner that it did for the Phase 1 sewage dischargers.

III. Compliance Schedules

Most permittees submitted plans for compliance with the new cap loads in response to a notice sent under the requirements of 25 Pa. Code §92.8a. When a permittee's plan indicated, and the DEP agreed, that compliance with the new cap loads could not be achieved prior to these new limits becoming effective, a compliance schedule was placed in the new permit. In accordance with federal regulations, this compliance schedule will contain milestones designed to document progress toward compliance in intervals of no less than one year. The final end point of the schedule will be compliance with a water quality-based cap load (an allocation of the larger water quality-based cap load assigned to Pennsylvania by EPA).

IV. Trading

Trading for nutrient reduction credits will be encouraged as a cost-effective method of achieving cap loads.

V. Adaptive Management

DEP will continue development of the Watershed NPDES Permit approach in order to facilitate implementation of the Chesapeake Bay Compliance/Watershed Implementation Plan.

VI. Permitted CSOs

CSOs with approved Long Term Control Plans (LTCP), will be excluded from contributions to the nutrient cap at that particular facility.

Laws, Regulations, Funding, Staffing and Technical Capacity

The DEP relies upon various state laws, such as the Pennsylvania Clean Streams Law, and the Federal Clean Water Act in its implementation of requirements to control pollutants. More recently, the Pennsylvania Phosphate Reduction Act was enacted in 2008. It mandates that dishwashing detergent contains virtually no phosphate by July 1, 2010.

The DEP has regulations promulgated to address the required nutrient credit trading, construction, operation and treatment of technologies to control pollution. Funding for these various programs are derived from Federal Grants, Federal State Revolving Loan funds, Commonwealth bonds, and Commonwealth General Funds.

Current staffing is available in the 6 regional offices as well as the Bureaus in the Office of Water Management. However, additional staff will be needed if work above normal operational duties is expected by the EPA.

Some information is available on the total need for capital funding. The 2008 EPA Clean Watersheds Needs Survey listed statewide point source needs at \$11.9 Billion. It is not known how much of that need is in the Chesapeake Bay drainage area. The *Chesapeake Bay Tributary Strategy Compliance Cost Study* completed in November 2008 estimated nutrient removal costs for Pennsylvania as \$1.40 Billion, and total project costs as \$1.96 Billion. A report issued by the Governor's Task Force on Sustainable Water Infrastructure described statewide wastewater capital needs at \$25 Billion. It is clear that point source needs are substantial, but funding is available for Chesapeake Bay-related work.

Pennsylvania's State Revolving Fund (SRF) program awards approximately \$200 Million per year for traditional wastewater projects. In 2009, far more was invested because of recovery funding. A substantial portion of the total was for nutrient control. The program is managed through a joint effort of the Pennsylvania Infrastructure Investment Authority (PENNVEST) and DEP. A key feature of the PENNVEST process is that it ties the level of subsidy to the local affordability of the project. Projects with high user charges and low median household incomes are offered loans at lower interest rates. The effect is to get more overall work done.

The Pennsylvania Legislature approved \$1.2 Billion in infrastructure funding in 2008. The majority of that funding is for wastewater work, an important part of which is nutrient control in the Chesapeake Bay drainage area.

DEP's role in the processing of the above represented an enormous effort. In 2009 DEP reviewed 360 applications for recovery funding which resulted in 169 awards totaling \$772 Million. An additional 752 applications for the \$1.2 Billion in state funding were also reviewed which resulted in awards of \$480 Million. It represented about four times the normal flow of work without any increase in staffing. The second round of 721 applications seeking \$1.9 Billion are currently under review.

Other funding sources that are important to Chesapeake Bay cleanup are Environmental Stewardship Funding (\$12 Million / year), EPA projects (\$9.9 Million / year), Community Development Block Grants (\$42 Million / year), USDA Rural Utilities Service funding (\$60.5 Million) and Appalachian Region Commission funding (\$3 Million / year). Local funding sources, involving a pay-as-you-go basis with bonds or other forms of loans, are also substantial, but totals are not available.

However, the Commonwealth's ability to meet its targets under this plan depends on adequate funding, which is not being legally committed to in this document.

Accounting for Growth

New needs for sewage discharges from industry as well as domestic sources will be assigned a zero nutrient load for the Chesapeake Bay and therefore will be expected to find credits and/or offsets to address the nutrient needs. Point source growth may be addressed by the purchase of nutrient credits, by the use of offsets from the elimination of less efficient sewage treatment facilities, or by another no discharge alternative such as employing recycle and re-use technology or land application.

Gap Analysis

Due to the development of Pennsylvania's *Point Source Allocation Strategy* in 2006 with the involvement of numerous stakeholders, the wastewater point sources will achieve their allocated reductions. No gap is anticipated.

Contingencies

DEP will continue development of the Watershed NPDES Permit approach in order to facilitate implementation of the Chesapeake Bay Compliance/Watershed Implementation Plan. DEP reserves the option to reallocate loads in the future, and to revise this approach as appropriate.

Tracking and Reporting Protocols

The tracking of point source data will be accomplished semi-annually as currently provided for in the ICIS reporting to EPA pursuant to the Pennsylvania DEP 106 grant agreement.

DRAFT

Section 8. **Agriculture**

DEP has a regulatory program for manure storage, manure application and erosion and sediment control for all agricultural operations regardless of their size or animal density. The scope of the regulatory requirements and administrative oversight of agricultural operations increases with larger animal numbers and density.

Current Programs and Capacity

Pennsylvania has regulatory and non-regulatory programs to address nutrients and sediment in the Chesapeake Bay watershed. Pennsylvania's regulatory program consists of: 1) an approved Concentrated Animal Feeding Operations (CAFO) National Pollutant Discharge and Elimination System (NPDES) permit program; 2) a Nutrient Management Act planning effort; and 3) regulatory requirements that address manure management and erosion and sediment control on all agricultural operations. Pennsylvania's non-regulatory efforts include annual "special projects" grants to county conservation districts to install BMPs; cooperative efforts with Natural Resource and Conservation Service (NRCS) to support Environmental Quality Incentives Program (EQIP) and Chesapeake Bay Watershed Initiative (CBWI) Best Management Practice (BMP) projects; and the state's Conservation Reserve Enhancement Program (CREP) effort, which leads the nation with 205,250 acres enrolled, more than 180,000 of these acres in the Chesapeake Bay watershed.

Laws and Regulations

In Pennsylvania, all farms are required to comply with the federal Clean Water Act as well as the Pennsylvania Clean Streams Law. This state law requires all agricultural operations to address sediment and nutrient discharges and is the "umbrella" legislation for regulation of water quality impacts attributed to agriculture. Regulations that address erosion and sediment control, manure storage, land application of manure and barn yard runoff are promulgated under this legislation. In addition, Pennsylvania's Nutrient Management Act requires farm operations to develop and implement a nutrient management plan where manure can be spread if the animal density exceeds 2,000 pounds of live weight of animals per acre of land on the operation. Pennsylvania's approved CAFO program has permitted 348 permitted large-scale animal operations and integrates the nutrient management plans required under the Nutrient Management Act to coordinate the implementation of planning and permitting requirements. Pennsylvania's Nutrient Management Program has approved plans on 1,036 regulated animal operations and on 1,735 volunteer animal operations.

Erosion and Sediment Control Requirements for Agricultural Operations in Pennsylvania

Pennsylvania Clean Streams Law. Under the Clean Streams Law it is unlawful to discharge pollutants to surface or groundwater except as allowed by regulations or a DEP permit. All agricultural operations are subject to the provisions of the Clean Streams Law. Generally speaking, activities on agricultural operations that could result in pollution are only allowed if best management practices are implemented to comply with water quality protection standards.

Agricultural activities that cause accelerated soil erosion from areas such as fields and stream banks that pollute surface or groundwater are not permitted and could result in enforcement actions. This risk of an enforcement action is greatest when pollution from field erosion and sedimentation begins during conditions less than 10 year/24 hour storm events or impairs designated water uses.

The Clean Streams Law also provides that a complete and fully implemented Conservation Plan can protect farmers from penalties related to sediment pollution resulting from agricultural activities included in the plan.

Regulations on Erosion and Sedimentation Control (25 Pa. Code § 102.4). This regulation applies to all agricultural operations that conduct plowing and tilling, as well as other activities that disturb the surface of the land.

Currently, these regulations address “agricultural plowing or tilling” activities and require BMPs that minimize the potential for accelerated erosion and sedimentation that would result in pollution during conditions up to and including 10 year/ 24 hour storm events or that violate water quality standards. These regulations require a written Erosion and Sedimentation Control (E&S) Plan for any plowing or tilling (including no-till farming) more than 5,000 square feet that includes conservation practices necessary to protect water quality from accelerated E&S and meets soil loss tolerance (i.e. “T”) across the crop rotation for plowed or tilled fields. DEP does not require that these plans be submitted to a state or county agency, but that the E&S plan be available at the farm and made available upon request. In addition, farm construction activities are not treated differently from non-farm construction projects and are required to obtain permits as required in §102.5 for earth disturbances over 1 acre (e.g., buildings, road construction).

Revisions of these regulations were published in the *Pennsylvania Bulletin* on August 21, 2010, with an effective date of November 19, 2010. The revisions will require E&S plans for Animal Heavy Use Areas and require additional vegetative cover or BMPs for fields within 100 feet of a stream.

Nutrient Management Requirements for Agricultural Operations in Pennsylvania

Pennsylvania Clean Streams Law. Under the Clean Streams Law it is unlawful to discharge pollutants to surface or groundwater except as allowed by regulations or a DEP permit. All agricultural operations are subject to the provisions of the Clean Streams Law. Generally speaking, activities on agricultural operations that could result in pollution are only allowed if best management practices are implemented to comply with the requirements for meeting water quality protection standards. Agricultural activities that result in the release of nutrients, sediment or other materials that pollute surface or groundwater could result in enforcement actions. This risk of an enforcement action is greatest when pollution from these activities occurs during conditions up to and including 25 year/24 hour storm events for production and manure storage areas, and 10 year/24 hour storm events in fields where nutrients are applied, or when pollution from these areas impairs designated water uses.

Pennsylvania Nutrient Management Act. Pennsylvania’s Nutrient Management Act was signed into law on May 20, 1993. Revisions to this law were signed by the Pennsylvania

Governor Rendell on July 13, 2005. The law requires farm operations to develop and implement a nutrient management plan where manure can be spread if the animal density exceeds 2,000 pounds of live weight of animals per acre of land on the operation,. The plan must include all nutrient sources utilized on the farm and address the generation, collection, storage and field application of these nutrients. Voluntary nutrient management planning is encouraged. The law requires that nutrient management plans be developed and approved by certified nutrient management specialists. Currently there are over 2,650 operations in Pennsylvania implementing nutrient management plans that have been approved through this program. It is estimated that more than 80 percent of these farms are within the Chesapeake Bay watershed. These plans address the handling of approximately 26 million tons of manure waste produced annually, or about 50 percent of all the manure generated in the state. Implementation of these plans is overseen through annual site inspections handled through the delegated conservation districts.

DEP Regulations for All Farms (25 Pa. Code § 91.36). These regulatory requirements for nutrient management for manure storage and land application apply to all agricultural operations that generate or utilize manure nutrients. Overall, it is unlawful to discharge pollutants from an agricultural operation to surface or groundwater unless permitted or authorized under DEP regulations. Unlawful discharges, including those from fields, silage and manure storage facilities, milkhouses, barnyards and animal concentration areas, are subject to enforcement.

Manure Storage

All manure storage facilities must be designed, operated and maintained to prevent discharges. The regulatory requirement calls for no discharges to surface and groundwater for any storm event up to a 25 year/24 hour storm. For liquid and semi-solid manure storage facilities there must be adequate freeboard of at least 6 inches or more, depending on the construction of the storage facility. A DEP permit is required unless the *Manure Management Manual* and the *Pennsylvania Technical Guide* are followed. Permits are required for any operation more than 1000 Animal Equivalent Unit (AEUs); or for new or expanded liquid and semi-solid manure storage with total capacity greater than 1 million gallons in certain sensitive watersheds; or for a storage facility with a total capacity greater than 2.5 million gallons.

Land application of manure

Land application of manure must follow the guidelines established in the *Manure Management Manual*. For all Concentrated Animal Operations (CAOs), CAFOs and their importers, there is a minimum setback of 100 feet for mechanical manure application, unless there is a 35 foot wide vegetative buffer from certain surface waters (streams with a defined bed and bank, lakes and ponds). For CAFOs, setbacks also apply to all surface waters, and conduits to surface waters. A DEP permit/approval is not required for farms that follow the *Manure Management Manual*, except:

- 1) All CAFOs always require a permit; and
- 2) CAOs must follow an approved Nutrient Management Plan, as required by State Conservation Commission (SCC) under Act 38. No DEP permit is required unless CAO is also a CAFO.

DEP's Manure Management Manual. This manual, along with the *Pennsylvania Technical Guide* (for manure storage facilities and animal concentration areas) and the *Penn State*

Agronomy Guide (for land application and nutrient management plans under the *Manure Management Manual*), identifies the preferred practices to comply with § 91.36 . These practices are similar to those in the SCC's nutrient management program for CAOs.

The *Manure Management Manual* currently addresses a wide variety of subjects and animal types. The Manual is being reviewed by DEP and others and will be undergoing revisions in 2010. This discussion addresses the current requirements found in the *Manure Management Manual*.

The *Manure Management Manual* addresses manure storage facilities and requires BMPs for manure storage and management that follow *Pennsylvania Technical Guide* standards for design, installation, operation and maintenance. The *Manure Management Manual* also requires that some liquid and semi-solid manure storage systems obtain a DEP permit/approval unless they are designed, construction overseen and certified to meeting standards by a Professional Engineer. Some storages always require a DEP permit. Generally, manure storage ponds greater than one million gallons in High Quality (HQ) or Exceptional Value (EV) watersheds or in impaired watersheds, as well as manure storage ponds and structures greater than 2.5 million gallons require permits.

The *Manure Management Manual* addresses land application of manure by requiring manure generation and application rates to be consistent with the *Penn State Agronomy Guide*, Soil Fertility Management Section including Soil Testing, Typical Plan Nutrient Recommendations and Manure Nutrient Management. Manure nitrogen application rates can not exceed the crop nutrient needs (after accounting for residual nutrients and other applied nutrients). Manure hydraulic loading rates can not exceed the soil infiltration rate. Manual revisions currently under public review will describe both nitrogen and phosphorus (based on the options available for P-based planning). Manure applied adjacent to streams must follow the requirements in the *Manure Management Manual* related to snow-covered, frozen, saturated ground and potential flooding.

The *Manure Management Manual* addresses nutrient management plans which are written plans that include BMPs for manure management and storage; BMPs for fields, silage and manure storage areas, milking centers, barnyards and Animal Concentration Areas (ACAs) and other nutrient sources utilized on the operation. Written nutrient management plans under the *Manure Management Manual* need not be developed by certified specialists or approved by DEP unless requested by the department. These plans must also include maps that identify the fields, pastures and BMPs in the plan. A current, implemented and approved NMP under Act 38 of 2005 will meet this standard. Practices are required to prevent discharge of nutrients to surface and groundwater. Plans and records must be retained on site and available for inspection. Records must be kept on manure (and other nutrient sources generated and utilized on the operation) applications and crop yields by field, exported manure and revisions made to the nutrient management plan.

State Conservation Commission's Regulations for CAOs (25 Pa. Code Chapter 83).

Additional requirements apply to farms that are CAOs under Act 38 of 2005, which amended the Nutrient Management Act. Other farms may volunteer to meet these requirements to obtain grant funds and other benefits. CAOs are agricultural operations with more than two AEU's per acre of land suitable and available for manure application.

Pennsylvania's Nutrient Management Act requires farm operations to develop and implement a nutrient management plan if the animal density exceeds 2,000 pounds of live weight of animals per acre of land on the operation, where manure can be spread. Voluntary nutrient management planning is also encouraged under the Act.

The SCC administers the Nutrient Management Act requirements. Existing concentrated animal operations had until October 1, 1998 to develop plans and submit them to the local conservation district for approval. Non-production operations (such as horse boarding stables) had until October 1, 2009 to submit a plan. Expanding and new CAOs must get a plan approved before commencement of operations. Plan implementation is required within three years of approval unless extended because of special circumstances.

The Nutrient Management Act requires that nutrient management plans be developed and approved by certified nutrient management specialists. The law also requires these plans to be approved at a public meeting of either a conservation district or the Commission. The statute also requires the SCC to establish an education and technical assistance program in cooperation with the Nutrient Management Advisory Board, Pennsylvania Department of Agriculture (PDA), DEP, the Penn State Cooperative Extension, and conservation districts. Technical training programs are being implemented for certification of Nutrient Management Specialists, and general awareness education of farmers. Implementation of mandatory and voluntary nutrient management plans is supported through grant programs for plan development and implementation of those plans. In FY 2010-11 budget, \$2.74 million was allocated for the nutrient management program. Most of these funds were allotted to support nutrient management technicians in 55 county conservation districts.

Currently there are over 2,700 operations in Pennsylvania implementing nutrient management plans that have been approved through this program. It is estimated that more than 80 percent of these farms are within the Chesapeake Bay watershed. These plans address 26 million tons of manure waste produced annually, or about 50 percent of all the manure generated in the state. Implementation of these plans is overseen through annual site inspections handled through the delegated conservation districts.

Nutrient Management Plans must include a minimum set of management practices. Nutrient Management Plans are prepared by state-certified nutrient management planners, reviewed and approved by trained/certified conservation district or State Conservation Commission nutrient management staff and verified by annual inspections. These plans are "P-based" and phosphorus is managed using the P-Index. Agronomic rates are established by Penn State and included in the Penn State Agronomy Guide. These rates are established to optimize economic returns/yields and minimize potential environmental impacts.

DEP CAFO Regulations (25 Pa. Code § 92.5a). These regulations implement the federal permit requirements for CAFOs. Changes were put in place in October 2005 expanding the definition of a CAFO and adding requirements for water quality protection. Pennsylvania currently has 349 permitted CAFOs, 317 (about 91 percent) of these operations are in the Chesapeake Bay watershed.

CAFOs include:

1. Operations with any combination of animals that result in more than 1000 AEUs
2. CAOs with more than 300 AEUs
3. Any operation that exceeds any of the following thresholds:
 - a) 700 mature dairy cows, whether milked or dry;
 - b) 1,000 veal calves;
 - c) 1,000 cattle other than mature dairy cows or veal calves;
 - d) 2,500 swine each weighing 55 pounds or more;
 - e) 10,000 swine each weighing less than 55 pounds;
 - f) 500 horses;
 - g) 10,000 sheep or lambs;
 - h) 55,000 turkeys;
 - i) 30,000 laying hens or broilers, if using a liquid manure handling system;
 - j) 125,000 chickens (other than laying hens) if using a dry handling system;
 - k) 82,000 laying hens if using a dry handling system;
 - l) 30,000 ducks, if using a dry manure handling system;
 - m) 5,000 ducks, if using a liquid manure handling system.

These operations are required to obtain a permit from DEP. Failure to obtain a permit is a violation of state and federal law. The permit requires an approved and implemented Nutrient Management Plan under Chapter 83. In addition to meeting the regulatory requirements of all agricultural operations cited above, CAFOs with a direct discharge, CAOs with 301 to 1000 AEUs, and all other CAFOs must meet setback requirements of 100 feet, or vegetative buffers of 35 feet, for surface waters. They also must have restrictions on manure stockpiling and meet the permit conditions regarding manure storage and application. CAFOs with more than 1,000 AEUs have additional requirements for their manure storage facility, including a Water Quality Management Part II permit for new or expanded facilities and freeboard requirements of 24 inches for storages exposed to rainfall and 6 inches for under barn and other storages not exposed to rainfall. CAFO facilities must be inspected once every five years; however DEP policy is for annual inspections.

Staffing Considerations – Regulatory Programs

Pennsylvania's regulatory programs for agriculture coordinate activities under several different regulatory programs with staff from state agencies and county conservation districts. While not part of the regulatory framework, Pennsylvania relies upon technical assistance from USDA-NRCS to implement components of the regulatory program. Pennsylvania utilizes the NRCS Technical Guide and other materials for BMP specifications and recognizes properly written NRCS conservation plans as meeting Chapter 102 E&S regulatory requirements.

Staff resources for these regulatory programs are not sufficient to assure compliance. Pennsylvania's strength in the environmental regulation of agriculture is the laws and regulations currently in place; the weakness is the lack of compliance with some of these regulatory requirements. With current budget considerations, there is no expectation that additional state funds for staff resources will become available in the near term. Currently there are vacancies within the program at the state, regional and local levels which are not expected to be filled.

Commonwealth Agencies. Pennsylvania state government staffing for regulatory programs that address agriculture is found in three state agencies – DEP, the Department of Agriculture (PDA) and the SCC. The Department of Agriculture and SCC have approximately 9 staff that address nutrient management activities across Pennsylvania. These staff provide program administration, technical assistance and compliance activities to address more than 2,700 nutrient management plans / farms regulated under the Nutrient Management Act. Pennsylvania DEP has approximately 15 staff that address the regulation of agriculture under the CAFO, E&S and nutrient management requirements. Staff is located in both central office in Harrisburg and in the three DEP regional offices in the Bay watershed. The staff numbers for the Bay watershed in each program and region are estimates because staff are involved in multiple program areas – not necessarily just agriculture – and because regional offices cover specific counties which do not conform to watershed boundaries. For the CAFO program, there are approximately 1.2 positions in DEP central office that address CAFO program administration; and another 6 staff positions assigned in the regional offices to permit, inspect and address compliance actions. For the other agriculture regulatory efforts, there are 2 positions in central office that address program administration for nutrient management and erosion & sediment control regulatory activities; and another 5.7 staff positions that address inspection and compliance efforts for manure management, nutrient management and E&S control regulatory activities.

County Conservation Districts. It is important to recognize the conservation districts, and their role as the primary staff for implementing Pennsylvania’s agricultural programs. The vast majority of staff available to implement these programs is found in the county conservation districts. The county conservation districts implement the Erosion & Sedimentation Control program and the Nutrient Management program.

Through Nutrient Management delegation agreements, DEP and SCC cost share approximately \$ 2 million for the salaries for approximately 32 conservation district staff which review nutrient management plans and oversee their implementation. The nutrient management technicians are responsible for the review, implementation and inspection of sites and required plans for 944 CAOs and another 1,114 “volunteer” farms in the Bay watershed. These nutrient management technicians also have a major role in coordination with related programs and assuring practice and plan implementation, installation and maintenance according to SCC nutrient management program rules and standards.

Erosion and sediment control program activities are also addressed by county conservation districts for farms and construction activities. Each county conservation district is supported by the Conservation District Fund Allocation Program (CDFAP), which cost shares the salaries for 131 conservation district staff, allowing for up to 50 percent of the salary for district managers and technicians. The 2010/2011 CDFAP provides up to \$1,610/conservation district for administrative costs. The district managers oversee all operation in the county conservation districts; the technicians are primarily responsible for erosion and sedimentation control activities. CDFAP funds represent cost share for 75 employees within the Chesapeake Bay Watershed. (38 managers at a maximum cost-share of \$27,000 which is 38 percent of the average salary and benefits cost per manager, 37 first technicians at a maximum cost-share of \$16,500 which is 31 percent of the average salary and benefits cost per first technician) The total of 75 staff address both agriculture and construction activities, with a majority of their time being spent addressing construction.

Non Regulatory Programs

The non-regulatory programs play a substantial role in protecting and improving Pennsylvania's waters, including with the Chesapeake Bay.

Conservation Reserve Enhancement Program

The Conservation Reserve Enhancement Program (CREP) is a federal program under the USDA Farm Bill that targets highly erodible cropland and marginal pastureland or any cropland within 180 feet of a stream for installation of conservation practices in the Susquehanna, Potomac and Ohio River Basin in Pennsylvania. There are plans to expand CREP to the Delaware River Basin in the near future.

CREP is an enhancement of the Conservation Reserve Program and requires a 20% state match of federal funds. Pennsylvania's CREP also has a significant conditional cost-share reimbursement component for installation of certain conservation practices. PA's CREP began enrollment in 2000 and leads the nation with 205,560 acres under contract as of July 31, 2010. More than 180,000 acres of these practices are in the Chesapeake Bay Basin in Pennsylvania. 11,070 Conservation Plans have been completed on over 207,000 acres through CREP. \$60,377,106 in cost-share payments have been provided to more than 11,000 landowners participating in CREP. Over \$300,000,000 will be provided to landowners in soil rental rates for the total life of the contracts. The majority of CREP Conservation Plans and landowners are in the Susquehanna and Potomac River Basins.

Since January 2009, Conservation Plans were approved on 10,238 acres statewide through CREP. The majority of these plans were written on farms in the Susquehanna and Potomac River Basins. In addition during this time, landowners installed riparian forest buffers on 5,058 acres of land to protect 308 stream miles in Pennsylvania's portion of the Chesapeake Bay watershed through PA CREP.

Conservation District Watershed Specialists

In the Bay watershed, 39 conservation district Watershed Specialists organize and support local watershed groups, deliver nonpoint source pollution education and take a leadership role in watershed restoration and protection projects in their respective counties. These positions, found in the county conservation districts, are funded by DEP through Pennsylvania's Growing Greener Program. DEP pays up to 80 percent of the salary and benefits of 39 Watershed Specialists employed by County Conservation Districts in the Chesapeake Bay Watershed. In the Bay watershed, \$1,235,814 is spent each year to support these staff positions.

Chesapeake Bay Implementation Grant: Chesapeake Bay Program Technician and Engineering Funding

Under the Chesapeake Bay Non-Point Source Pollution Abatement Program Statement of Policy, DEP and the State Conservation Commission oversees technical assistance funding provided to conservation districts from DEP. The intent of this effort is to provide financial assistance to districts to support staff positions that provide technical assistance to accelerate the installation

of agricultural BMPs within the Chesapeake Bay Watershed. DEP considers funding for staff positions a priority for the Chesapeake Bay Implementation Grant and will continue to fund these positions as resources allow.

Each year, DEP requests Commission approval for the cost share rates and reimbursement caps for Bay Technician and Engineering positions. For FY 2010-11, Pennsylvania will allot \$2.636 million for 49.5 staff in 36 counties – nearly 58 percent of the total Chesapeake Bay Implementation Grant. This supports 42.5 Bay Technicians, utilizing a “salary cap” for a full time technician at \$56,000. This will also support 7 Bay Engineers. The maximum dollar amount for salaries and benefits for the Engineer Specialist will be \$75,000 or \$69,000 for the Engineer Assistant.

Chesapeake Bay Implementation Grant: Special Project Funding

For FY 2010-11, DEP has allocated \$956,142 for a variety of projects in 34 Bay counties. Project proposals were submitted by the conservation districts and evaluated by DEP staff. DEP received 106 applications requesting nearly \$2.2 million. All projects and best management practices were considered, with priority given to projects in agriculture-impaired or DEP priority watersheds as well as priority watersheds identified in federal Farm Bill, federal 319, and Growing Greener programs. Priority was also given to no-till/conservation tillage, cover crops, conservation and nutrient management planning activities, riparian corridor protection/restoration improvements (streamside practices, riparian buffers), and tracking of historic BMP implementation. Districts were encouraged to seek out additional funding opportunities, particularly projects that leverage the \$11 million available through USDA’s Chesapeake Bay Watershed Initiative. Three districts (Chester, Lancaster and Susquehanna) will be receiving funds to support positions to develop conservation, plans, provide agriculture BMP assistance, handle complaint inspections or write EQIP contracts.

Another component of the Chesapeake Bay Implementation Grant supports the DEP Stream Bank Fencing Program. From 1994 through December 2007, the CBIG has provided \$2,319,906 to protect about 114 miles of previously degraded stream reaches on 319 separate farms. This effort, at an average cost of under \$14,000 per mile of fence, included the installation of about 161 miles of high-tensile electric fence, 19 ramps, and 229 constructed crossings. (Note: Stream miles protected and miles of fence installed are not equal, as sometimes only one side of the stream needs to be fenced.) The Bay Watershed Model estimates the effectiveness of this livestock exclusion project on reducing sediment and nutrient loads. The inclusion of this stream bank fencing component is important to meeting Pennsylvania’s commitment of 10,000 miles of riparian buffer. DEP has also supported innovative BMPs related to riparian buffer easement, for example the partnership with the Pennsylvania Fish and Boat Commission in Huntington County to establish permanent easements on riparian buffers. The FY 2010-11 budget for Chesapeake Bay Implementation Grant program includes a minimum of \$100,000 available for stream bank fencing.

Growing Greener Watershed Protection Grant Program

Since 1999, the Environmental Stewardship and Watershed Protection Act–“Growing Greener”–has provide funding to preserve farmland and protect open space; clean up abandoned mines and

restore watersheds; and upgrade water and sewer systems. In Pennsylvania's portion of the Chesapeake Bay watershed, over 600 Growing Greener projects totaling over \$70 million dollars have been funded. In July 2005, Governor Rendell signed Growing Greener II, a voter-approved plan that invests \$625 million over 6 years, expands Growing Greener and allots \$230 million of these funds to DEP to clean up rivers and streams; addresses abandoned mine sites and contaminated industrial facilities; and finances the development of advanced energy projects. Pennsylvania's Department of Conservation and Natural Resources (DCNR) is allocated \$217.5 million to preserve natural areas and open space; improve state parks; and enhance local recreational needs. PDA was allotted \$80 million to protect working farms. Pennsylvania's Fish & Boat Commission was allocated \$27.5 million to repair fish hatcheries and aging dams; and PA's Game Commission was given \$20 million for habitat-related facility upgrades and repairs.

The Growing Greener Program in DEP is focused on the restoration and protection of Pennsylvania's watersheds. Ninety-six percent of the water-quality-impaired watersheds in Pennsylvania are polluted because of nonpoint sources of pollution, such as abandoned mine drainage, urban and agricultural runoff, atmospheric deposition, on-lot sewage systems, groundwater base flow, earthmoving, stream hydrologic modification, geological hazard mitigation, and silviculture. The primary purpose of these grants is to address these and similar environmental concerns through local, watershed-based planning, restoration and protection efforts. Growing Greener grant funds were awarded in April 2010 for \$12.6 million statewide. In July 2010, the 2010-11 Growing Greener grant application round was announced with an application deadline of September 17, 2010. About \$6.0 million will be available for watershed projects in this grant round.

Farmland Preservation

The state's farmland preservation program works through the Pennsylvania Agricultural Conservation Easement Purchase Program, which was developed in 1988 to help slow the loss of prime farmland to non-agricultural uses. The program enables state, county and local governments to purchase permanent conservation easements, also called development rights, from owners of quality farmland. During the program's 22-year history, state, county and local governments have invested more than \$1 billion to preserve 433,776 acres on 3,982 farms. State regulations for this program require the development and implementation of a conservation plan on all acres preserved, and also a nutrient management or manure management plan for all preserved farms that have livestock or poultry. This program assists county and municipal governments with the purchase of permanent agricultural conservation easements. Funding for farmland easements in the Chesapeake Bay watershed was \$19.1 million in FY 2008-09, and \$16.6 million in FY 2009-10, and is projected to be \$14,463,671 in FY 2010-11.

Dirt and Gravel Road Maintenance Program

Signed into law in April 1997 as Section 9106 of the Pennsylvania Motor Vehicle Code (§9106), the Dirt and Gravel Road Maintenance Program is based on the principle that informed and empowered local control is the most effective way to stop pollution in the form of sediments and dust from dirt and gravel roads. The law created a dedicated, non-lapsing fund to provide money and training to local communities for local road maintenance. In 2010/2011, funds will be

distributed by the State Conservation Commission (SCC) to the 63 county conservation districts in Pennsylvania (out of 67 total) that participate in the Program.

Section 9106 of the Pennsylvania Motor Vehicle Code annually provides for the allocation of \$5,000,000 from the Motor Vehicle License Fund for the Dirt and Gravel Road Maintenance Program. Of that amount, \$1,000,000 is allocated directly to the Bureau of Forestry for maintaining the dirt and gravel roads in their jurisdictions. The SCC is responsible for allocating the remaining \$4,000,000 to the 65 County Conservation Districts who may participate in the Dirt and Gravel Road Maintenance Program. \$2,441,101 is disbursed to counties in the Chesapeake Bay drainage. The fund is administered as a non-lapsing, nontransferable account restricted to maintenance and improvement of dirt and gravel roads.

Resource Enhancement and Protection (REAP) Program

The REAP program allows farmers and businesses to earn tax credits in exchange for BMPs on agricultural operations that will enhance farm production and protect natural resources. The program is administered by the SCC and the tax credits are awarded by the Pennsylvania Department of Revenue. Eligible applicants may receive between 50 percent and 75 percent of project costs as state tax credits for up to \$150,000 per agricultural operation. The amount of tax credit available to a recipient is dependent on the type of BMP implemented. In fiscal year 2007-08 and in FY2008-09, \$10 million in REAP credits were available. In FY 07-08, over \$13 million in applications were received. In FY 08-09, over \$12.5 million in applications were received. In both fiscal years applications for the entire \$10 million in available credits were received on the first day that applications were accepted by the State Conservation Commission. \$4.5 million is in the current state budget for this state-wide program. Of this total tax credit allocation, a significant amount can be anticipated for use on farms within the Chesapeake Bay watershed area in Pennsylvania. One year after a tax credit is awarded, it can be sold. The SCC is currently reviewing a \$1.6 million credit sale to Fulton Bank.

Conservation District Fund Allocation Program – Agricultural Conservation Technical Assistance (ACT) and Farmland Preservation Administrative Support (FLP) Programs

These programs support increased levels of direct technical services provided by conservation districts to agricultural producers to develop, update and/or implement conservation plans, nutrient management plans and other resource management programs such as the Agricultural Conservation Easement Purchase Program. PDA supports about 18 staff each year to implement agriculture programs in county conservation districts. Note this is 18 full time staff equivalents, but is really 50 percent of staff positions in about 43 counties.

Clean Water Act, Section 319 Program

Pennsylvania's 319 Program, administered by DEP's Bureau of Watershed Management, currently provides about \$4 million annually in competitive projects. The DEP Water Planning Office staff coordinates with 319 grant staff to report any BMPs funded through 319 grants that result in nutrients and sediment reductions.

U.S. Department of Agriculture (USDA)

The Natural Resources Conservation Service (NRCS) and Farm Services Agency (FSA) have actively participated with DEP, the conservation districts, and other cooperators since the inception of the program. Cost share rates and eligible BMP components have been coordinated with FSA, and now with NRCS under EQIP, to strive for similar state and federal cost share opportunities. NRCS has provided essential engineering/technical service in the planning, design, implementation, and maintenance of BMPs. Pennsylvania's Bay program and NRCS Pennsylvania State Office have cooperated on funding engineering positions in several conservation districts. Pennsylvania has actively supported the USDA-PA Office in the development and implementation of the Chesapeake Bay Watershed Initiative (CBWI).

Under the CBWI, PA-NRCS obligated \$5.298 million in 2009 and \$9.708 million in 2010 for BMPs in Pennsylvania. This is in addition to the over \$19 million obligated to EQIP projects in the Chesapeake Bay watershed in Pennsylvania over the same two years. Total NRCS obligations and expenditures in the Chesapeake Bay watershed portion of Pennsylvania for 2009 and 2010 exceed \$36 million. With about half of these projects yet to be completed, a significant improvement in outputs from the Bay model can be expected in 2010 and 2011.

Conewago Creek NRCS Targeted Watershed Project

In December 2008, NRCS, in cooperation with the Pennsylvania State Technical Committee, selected Conewago Creek, an agriculturally impaired watershed located in the Susquehanna River Basin, in December 2008 as the site of a pilot project for protecting and restoring local stream and Chesapeake Bay water quality. The project area straddles 3 counties - Dauphin, Lebanon, and Lancaster and nine municipalities.

The initial objective of the project was to strategically target and leverage resources in a cooperative partnership effort to accelerate the adoption of core and supporting conservation practices, primarily through the Chesapeake Bay Watershed Initiative and Environmental Quality Incentive Program (EQIP), for controlling erosion and reducing sediment and nutrient levels in ground and surface water. One of the primary reasons for selecting the Conewago was because of the existence of an engaged local partnership between the Tri-County Conewago Creek Watershed Association and the three Conservation Districts covering the watershed and a well developed community based restoration plan.

Since initiation of the pilot project, the partnership has expanded and the partners have committed to integrate and coordinate approaches, creating a high level of synergy typically unseen in other projects. Under the leadership of Penn State University, a grant was sought to leverage the partnership's time and resources to significantly increase capacity (technical, social, and organizational) for holistic restoration of the Conewago Creek watershed.

NRCS Pennsylvania joined a group of local and state wide public and private sector stakeholders to sponsor the proposal which was awarded \$750,000 through the National Fish and Wildlife Foundation (NFWF) Innovative Nutrient and Sediment Reduction in the Chesapeake Bay program in June 2009. The grant enables the initiative to build partnerships to pool resources in

order to integrate core and innovative practices and cooperate on different approaches to restoration and management in the Conewago Creek watershed.

Existing Process - Compliance Assistance and Enforcement

Pennsylvania DEP manages its enforcement program similar to the manner that it regulates agricultural operations. For smaller agricultural operations, the county conservation districts provide a field presence. They investigate complaints and provide compliance assistance to agricultural operations in the development of BMPs for manure storage, manure application and agricultural erosion and sediment control planning. In addition to providing technical assistance, they facilitate and in some cases manage funding under various programs. Where necessary, conservation districts refer compliance matters to the DEP (see discussion below).

For CAOs, conservation districts take a more active management role. They not only review and approve Nutrient Management Plans, they conduct annual on-site inspections of CAOs to assure that the plans are being implemented and adequate records are being maintained. Where necessary, districts refer non-compliance situations to the State Conservation Commission. The State Conservation Commission takes action using the various enforcement tools discussed below in order to obtain compliance.

For CAFOs, in addition to inspections by the conservation district as part of the Nutrient Management Program, DEP staff conducts inspections at least once per calendar year. In addition, CAFOs are required to maintain and submit records to the DEP on a routine basis. DEP staff seek to resolve violations through compliance assistance but when that is not productive the matters are referred to DEP regional counsel for enforcement.

In addition to the process described above, where a conservation district or DEP staff member observes a situation that presents a serious potential for pollution, either as a result of a routine investigation or a complaint, the matter is generally referred for immediate enforcement or a compliance order is issued to require immediate compliance.

Once a matter is referred for enforcement, DEP staff and SCC staff seek first to resolve the issue using a negotiated resolution approach. In most situations this resolution is through a Consent Order and Agreement (“COA”) establishing a schedule for corrective action, providing for a civil penalty and establishing stipulated penalties in the event the corrective action schedule is not met. Where the matter is resolved informally after the referral, the DEP generally requires the payment of a civil penalty. The SCC follows a similar approach.

If negotiated resolution cannot be achieved, the DEP or SCC issues an Enforcement Order requiring compliance. These orders are immediately enforceable. Where appropriate the DEP may also file a Complaint for Assessment of a Civil Penalty and the SCC may issue an Administrative Civil Penalty Order. Generally, once an enforcement action is filed, DEP and the SCC are able to resolve the matter through a settlement. The agencies use a COA to effectuate these settlements. In those rare instances where there is not a resolution, the agencies can proceed to the Pennsylvania Commonwealth Court to obtain compliance with the Enforcement Order.

Accounting for Growth

USDA National Agriculture Statistics Service (NASS) data indicates little expectation for growth in agricultural operations or acreage in Pennsylvania. In addition, recent reports from USDA on the national decrease in acres planted reinforce this expectation. Projections for growth and increased loads from agriculture do not appear to be warranted. This is borne out by the significant decreases in nutrient and sediment loads from EPA data and Pennsylvania's existing regulatory requirements for nutrients and sediments.

If EPA has valid data to draw other conclusions on growth in Agriculture loadings, DEP would include this in either the final Phase 1 WIP or the Phase 2 WIP.

Gap Analysis

GAP analysis has been compromised by the complexities of the Phase 5.3 watershed model. When the 2009 implementation of BMPs was converted from the Phase 4.3 model to the Phase 5.3 model, about 700,000 bmp units were not credited in the 2009 Phase 5.3 implementation run. This represents over 8% of the total BMP units implemented since 1985 and is equal to over two and one-half years of BMP implementation. Additionally, when an agriculture and urban/developed compliance model scenario was completed with the phase 5.3 model, the loads for agriculture and urban lands decreased. However, the loads for the point sources, septic systems, forest land and air deposition all increased, even though no changes were made to the level of BMP implementation for these sectors. The net result was an overall increase in nitrogen and phosphorous delivered loads delivered from Pennsylvania to Chesapeake Bay for the scenario. With such non-intuitive results it is difficult to estimate potential GAPS at the sector level.

Strategy to Fill Gaps

Pennsylvania's approach to address additional reductions in agricultural loads includes both regulatory and non-regulatory approaches. On the regulatory side, Pennsylvania will increase compliance with current regulatory requirements, improve our regulatory tools and focus efforts in targeted watersheds. Non-regulatory approaches will include focused efforts to account for all Best Management Practices installed in the Bay watershed regardless of their source of funding (public or private) and improved implementation of voluntary programs through the Chesapeake Bay Implementation Grant and USDA programs. In addition, we will continue to promote the development and implementation of new technologies that can reduce nutrient and sediment loads in new and innovative ways. Pennsylvania will continue to partner with the private sector, lending organizations, research universities, and other units of government to help bring these new technologies on line.

Non-Regulatory Efforts

BMP Tracking

A significant number of agricultural and other best management practices that have been implemented in Pennsylvania have not been “tracked” and entered into the Chesapeake Bay Model. A significant level of interest in this deficiency was expressed by Pennsylvania’s Agricultural Watershed Implementation Plan workgroup. Pennsylvania pilot project efforts in Lancaster and Bradford counties, as well as preliminary evaluation of data from NASS indicates that as much as 84 percent of some implemented BMPs have not been entered into the Bay model, resulting in potentially significant nutrient and sediment reductions not being accounted for in the reductions attributable from Pennsylvania.

The results of the pilot study indicate that staff resources usually tasked with implementing BMPs may be best allocated to tracking BMPs. Conservation District Chesapeake Bay technicians will be given clear specific guidance as to methodology to identify and verify previously installed BMPs and given instruction to include these efforts in their FY 2011-12 work plans. (A summary of this pilot study is provided below.) In the future, Chesapeake Bay Implementation Grant resources will be assigned to the task of identifying and tracking BMPs from both public and private funding sources.

In addition to the the increased tracking activities outlined below that will result from the BMP tracking pilots, other activities to track and identify BMPs will include:

- o Work with the Pennsylvania Game Commission to report the BMPs the state wildlife managers employ (i.e. harvesting resident geese, harvesting nearly half million whitetail deer annually, etc.). Assistance from Game Commission biologists will be needed to calculate the nutrient footprint of a goose/deer/etc. and input that into the model.
- o Work closely with NRCS and National Association of Conservation Districts (NACD) on their recently-initiated efforts to identify methodology to assess and verify BMPs.
- o Work with NASS to utilize existing survey methods to calculate field practices and investigate a mechanism to allow their significant data resources to be utilized for the Bay model.

Best Management Practice Pilot Study

In an effort to test survey techniques, and collect data on the location, number and type of best management practices (BMP), the Commonwealth partnered with the Bradford and Lancaster County Conservation Districts to conduct a pilot study earlier this year. Each district used a slightly different combination of surveys, on-site visits, aerial photography and GIS to collect and manage the data. Bradford also asked about cost share participation.

As a result, BMP data from 635 farm operations on over 123,136 acres were collected by these two conservation districts. Farm and acreage information for each county are as follows:

Bradford County

256 farms - 18% of all the farms in Bradford County.

- 56,562 harvested acres - 17% of total acres in Bradford County.

Lancaster County

- 379 operations - 7.6% of the farms in Lancaster County.
- 66,574 acres - 15.7% of all farmland in Lancaster County.

In addition Bradford County surveyed their 51 municipalities regarding urban BMPs and received responses from 45 municipalities.

The full Bradford County Conservation Districts BMP Pilot Study Report can be found in Appendix 2, and the Lancaster County Conservation District BMP Pilot Study can be found in Appendix 3.

Based on the pilot study, the following conclusions can be drawn, and will be factored into future efforts:

- o There is a large number of voluntary BMPs (i.e. those BMPs that were not cost-shared and presumably not entered into the Bay model) on the ground in Pennsylvania. This study found in Bradford County alone that 85 percent of no-till activities of the survey group were not cost-shared.
- o Obtaining location and contact information on agricultural operations is difficult and time consuming.
- o Specific landowner confidentiality is a continuing interest.
- o A cooperative outreach program tailored to the intended audience must be developed for each area.
- o Multiple methods of data collection should be utilized.
- o Collection of data from municipalities was efficient and effective.
- o Calculation of streamside buffers will require considerable resources.
- o Expansion of this pilot study to all areas within the pilot counties, as well as all other counties in the Bay watershed will require standardization of data collection units, development of survey protocol, appropriate funding and expanded timing to allow for the data collection over several growing seasons.
- o Cooperation and coordination with partner organizations such as the Pennsylvania Farm Bureau, PennAg Industries Association, NRCS, individual producers (such as Wenger Foods), etc. increased outreach efforts through meetings and newsletters.

Chesapeake Bay Implementation Grant

Working with the conservation districts, SCC and NRCS, DEP will re-evaluate our current Chesapeake Bay Implementation Grant program to effectively utilize current technical assistance capabilities and financial resources to enhance the agricultural assessment and compliance initiative.

Chesapeake Bay Implementation Grant: Special Project Funding. As described previously, DEP annually allocates funds for a variety of BMP projects in Chesapeake Bay counties as part of the Chesapeake Bay Implementation Grant. Over the past five years, funding has ranged from \$800,000 to \$1.2 million for these projects. Priority was given to projects in agriculture-impaired or DEP priority watersheds as well as priority watersheds identified in the federal Farm Bill, federal 319, and Growing Greener programs. Priority was also given to no-till/conservation

tillage, cover crops, conservation and nutrient management planning activities, and riparian corridor protection/restoration improvements (streamside practices, riparian buffers), The pilot project for tracking of historic BMP implementation (see above) was funded through this effort. All regions of the Bay watershed are eligible and participation by all conservation districts has kept them engaged in the Chesapeake Bay protection effort.

If initial WIP results indicate that a change in this approach is warranted, these funds can be targeted to specific locations and to specific BMPs. DEP would utilize Bay models to target the most critical watersheds, to the exclusion of those watersheds and counties that do not have the highest nutrient loading. DEP would also target the five specific BMPs identified by EPA Region 3 as their most critical for Bay model loadings. These five BMPs, which track closely to those that have been given priority in the effort, are: riparian buffers; animal fencing; manure storages; cover crops; and P-based nutrient management plans.

Chesapeake Bay Implementation Grant: Chesapeake Bay Program Technician and Engineering Funding. DEP annually provides financial assistance to conservation districts to support staff positions that provide technical assistance to accelerate the installation of agricultural BMPs within the Chesapeake Bay Watershed. For FY 2010-11, Pennsylvania will allocate \$2.6 million for 49.5 staff in 36 counties. DEP considers funding for staff positions a priority for the Chesapeake Bay Implementation Grant and will continue to fund these engineering positions as resources allow.

As required, DEP will revise Chesapeake Bay Technician's annual work plans for the 49 conservation district Bay technicians and engineers. These changes would occur with the July 2011-June 2012 contracts and could include specific tasks to improve tracking of BMPs, as well as other tasks that improve water quality and improve the accuracy of the Chesapeake Bay model.

PENNVEST Non-Point Source Projects

PENNVEST has been empowered by Pennsylvania state law, Pennsylvania Infrastructure Investment Authority Act 16 of 1988, to administer and finance the Clean Water State Revolving Fund (CWSRF) and the Drinking Water State Revolving Fund (DWSRF) pursuant to the federal Water Quality Act of 1987, as well as to administer the American Recovery and Reinvestment Act of 2009 (ARRA) funds. PENNVEST also finances, through the issuance of special obligation revenue bonds, water management, solid waste disposal, sewage treatment and pollution control projects undertaken by or on behalf of private entities. PENNVEST actively funds Green Initiatives that promote and encourage environmental responsibility in our communities. Funded initiatives are creative and innovative, and include green solutions for water quality management. These solutions can be as simple as installation of water barrels for water collection and re-use, to regional projects that reduce sediment and nutrient contamination of the Chesapeake Bay watershed by reducing storm water runoff from agricultural areas. It is projected that this program will result in an additional \$20 million per year for these types of projects.

The first of what will be an on-going effort to fund agricultural non-point sources projects was approved at PENNVEST's July 2010 meeting. At that meeting, \$1.8 million in grants and loans

were awarded for four agricultural projects in the Chesapeake Bay watershed. These projects were:

- o An \$837,000 grant to construct manure storage and handling facilities and a riparian buffer to eliminate barnyard runoff and nutrient contamination of Cove Run.
- o A \$291,000 loan to treat both hog and dairy manure at various farms to remove nitrogen and phosphorous from the manure that farmers spread on their fields, thus reducing the contamination of the Chesapeake Bay watershed by these nutrients.
- o A \$495,000 grant to construct structures for composting and storing manure to reduce both nitrogen and phosphorous contamination of the Conestoga River from the runoff of barnyard waste.
- o A \$213,000 loan to construct manure storage facilities to eliminate winter manure land applications and contamination of streams by nitrogen and phosphorous runoff.

DEP will utilize Section 319 funding in 2010-11 to implement an outreach effort to increase participation and eligible projects for this new source of funds. New delivery mechanisms must be provided to address the needs of potential non-point sources program applicants. Applicants are often non-technical (some are volunteers), with limited computer expertise, and usually do not have the support of consulting engineers. The PENNVEST Project Specialists are not expert in non-point source projects, and have a full workload. DEP has staff that are knowledgeable in technical aspects of non-point source activities, but lack experience in the PENNVEST project management website. They also have a full workload. A knowledge gap and a shortage of staff time therefore exists which, if not addressed, will prevent this program from reaching its potential.

As such, a new service, called the Non-Point Source Program Application Developer (i.e., the “NPS Circuit Rider”), will be established. The role of the Circuit Rider will be to fill the knowledge gap and staff shortages discussed above, resulting in a greater number and quality of PENNVEST Non-Point Source applications.

The Circuit Rider would be responsible for identifying and eliminating bottlenecks in the completion of high-quality PENNVEST NPS applications. The highest priority work would be to make existing mechanisms work more effectively. Systematic solutions will include presentations (at conferences and meetings), writing articles for publication in newsletters, and training (as needed) for DEP and PENNVEST staff. The incumbent will maintain contacts, statewide, in all program funding areas including county conservation districts, watershed groups, environmental groups, municipalities and DEP.

New Technology

A core element of the plan for reaching the Commonwealth’s nutrient reduction goals involves the implementation of new technologies and supporting these efforts through the sale of environmental credits and energy products.

For example, new technologies have the ability to enable agricultural producers to better manage nutrients, reduce nutrient loading from runoff, and generate other environmental benefits. Recently, DEP has been promoting the establishment of enhanced regional digesters that digest manure, produce electricity and substantially reduce nutrients. An enhanced digester includes the ability to reduce nitrogen and phosphorus in the digester's output streams and create usable by-products, which can provide environmental benefits.

DEP has been working with the Department of Agriculture and a number of companies looking to install various technologies such as co-generation on dairy, poultry and hog operations. Many of these technologies can produce electricity and marketable soil amendments; reduce methane emissions; and generate renewable energy, nutrient reduction and carbon credits that can then be sold. Projects of this nature can support three priorities in the Chesapeake Bay region: maintaining a vibrant farming economy; restoring and protecting the water quality of Pennsylvania streams and the Chesapeake Bay; and providing crucial economic development benefits to rural businesses and communities.

Implementing these types of technologies has the promise to significantly reduce nutrients. DEP has estimated, based on information reviewed for proposed projects, that if 42 enhanced digesters were built in 40 counties, about 27 million pounds of nitrogen load could be reduced with the added benefit of carbon-free renewable energy.

Regardless of the many benefits these advanced technologies can produce, there is one limiting factor for all, financing. Depending on the facility, some estimates indicate that up to approximately \$50 million in construction costs could be needed for a single facility, with operational expenses being paid mostly by the revenue generated from the sale of multiple environmental credits and other activities such as biosolids collection. To help support new technologies, DEP continues to work with Pennsylvania stakeholders to enhance our own Nutrient Trading program, as detailed in other sections of this plan.

The federal government must play a constructive role in advancing new technologies and tools. DEP has recommended that an EPA Technology Development Fund be created to support development of regional enhanced methane digesters, septic system de-nitrification technologies, and other innovative technologies. The suggested amount for this fund is \$2 billion.

In addition to new BMP technologies, the Commonwealth continues to develop new technologies for plan development and writing through efforts such as the "One Stop Conservation Planning" website. This is a cooperative effort to develop simple online conservation and nutrient management planning tools that farmers can utilize to develop plans that meet state baseline regulatory requirements. Penn State College of Agriculture is leading this effort, with support from the State Conservation Commission, PDA, DEP and NRCS. When completed, farmers will have an online tool that will allow them to develop an agricultural erosion and sediment control plan and a manure management plan that will meet Pennsylvania's regulatory requirements. Technologies such as One Stop Conservation Planning will help expand the scope of technical assistance that is available to farmers and help them to develop and implement plans and BMPs on the ground that will improve the water quality of the Chesapeake Bay.

Regulatory Efforts

Improved regulatory activities to address agriculture, while maintaining the economic viability of Pennsylvania farms and farm families are the objectives of this component of the Chesapeake Bay efforts in Pennsylvania. The objective is to reduce nutrient and sediment loads to levels necessary to restore water quality in Pennsylvania's portion of the Chesapeake Bay watershed through continued implementation of existing regulatory requirements, increased compliance with current regulatory requirements, improve our regulatory tools and focus efforts in targeted watersheds.

Enhance Compliance with Existing Regulatory Program

The focus of this component is improved compliance with existing regulatory requirements. Pennsylvania's existing regulatory program consists of an approved CAFO NPDES permit program, Nutrient Management Act planning effort and regulatory requirements that address manure management and erosion and sedimentation control on all agricultural operations. The regulatory requirements are established in Pennsylvania regulations (see Section 7.1). Compliance with the existing requirements for CAFOs and the Nutrient Management program is an on-going effort.

Pennsylvania currently has 349 CAFO operations under permit. Previous outreach efforts with county conservation districts and farm operations following promulgation of CAFO regulations in 2005 included notification of CAFO requirements and a period of time where enforcement actions/civil penalties may not have been taken for operations that required a permit. At this time, all CAFO operations are presumed to be under permit or in the permit process. Operations that expand and become CAFOs are expected to apply for a permit; those that are found to be in operation without a permit are required to apply and may be subject to enforcement and/or civil penalty. Pennsylvania continues to work with conservation districts, certified nutrient management planners and agricultural industry organizations to reinforce the expectation for permits.

Pennsylvania will continue routine CAO inspections under the Nutrient Management Act. These inspections continue to yield positive program improvement. Currently Pennsylvania has more than 2,700 state approved nutrient management plans on farms in the state. The Commission, in cooperation with county conservation districts continues to implement most recent changes to their regulations (October, 2006) to: implement nutrient balance sheet requirements for importers receiving manure from CAOs; implement increased set back requirements for CAOs; to require the verification of conservation planning for CAOs; to incorporate horse CAOs into the program; to increase focus on ACAs planning; and incorporation of P-Index phosphorous based planning requirements.

Pennsylvania will continue to respond to complaints, with the emphasis on complaints that identify actual pollution (for example manure spills). For spills or other pollution events, DEP requires corrective action and a penalty where appropriate. In each case, development and implementation of a manure management plan and conservation plan is required for those farms that are not subject to the Nutrient Management or CAFO program. As noted in Section 7.1, all farms in Pennsylvania are required to comply with Pennsylvania's Clean Streams Law and the

Chapter 102 erosion and sedimentation control and manure management requirements. Pennsylvania plans to expand training and outreach to farmers to increase compliance with Chapter 102 and manure management requirements to prevent future spills, chronic runoff problems and excessive soil erosion.

Evaluate and Modify Regulatory and Administrative Tools

Pennsylvania continues to work with partner groups to develop and improve regulatory and administrative tools to better address agricultural compliance.

Chapter 102 regulations. These regulations have been revised to address “animal heavy use areas” and near stream activities. These regulations have completed an extensive regulatory revision, with approval of these regulations by the Environmental Quality Board on May 17, 2010 and approval by the Independent Regulatory Review Commission on July 21, 2010. . The revised regulations were published in the Pennsylvania Bulletin in August 2010 and will become effective November 19, 2010.

Revisions to Chapter 102 require a written E & S Plans for agricultural plowing or tilling activities or for animal heavy use areas that disturb 5,000 square feet (464.5 square meters) or more of land. For agricultural plowing or tilling activities, soil loss from accelerated erosion must be limited to the soil loss tolerance (T) over the planned crop rotation. For agricultural plowing and tilling activities that will occur on fields with less than 25 percent cover and within 100 feet of a river, or perennial or intermittent stream, additional BMPs must be implemented. For animal heavy use areas, the E & S Plan must identify BMPs to minimize accelerated erosion and sedimentation.

Additional revisions provide standards that planners can use to develop agricultural erosion and sedimentation plans for agricultural activities. These regulations also allow for a NRCS conservation plan, which meets Pennsylvania’s regulatory requirements, to be used to meet regulatory obligations.

Guidance and training will be developed and provided for conservation planners on plan development strategies for erosion control. An update of the Chapter 102 Administrative Manual to specifically address agricultural activities under Chapter 102 will also be developed.

Manure Management Manual. Revisions to Manure Management Manual and Land Application Supplement have been initiated to address Pennsylvania’s existing Manure Management Manual. Revisions to this manual were published in the August 14, 2010 PA Bulletin. A 90 day public comment period will allow review and comment on the substantial revisions.

Under 25 Pa. Code § 91.36(b) a permit or approval from the Department is needed for the land application of animal manure and agricultural process wastewater except:

1. Where the land application is consistent with the current standards for development and implementation of a manure management plan as established in the Manure Management Manual;

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2. For a concentrated animal operation (CAO) where the land application is in accordance with a Nutrient Management Plan under 25 Pa. Code Chapter 83, Subchapter D;
 3. For a concentrated animal feeding operation (CAFO), the land application is consistent with a CAFO permit under 25 Pa. Code §92.5a.

As part of Pennsylvania's commitment to reduce nutrient and sediment loading to the Commonwealth's streams and rivers and the Chesapeake Bay, the Department has proposed a revision to the Manure Management Manual. This proposed revision establishes a standard format for manure management plans and is in the form of a "workbook" that can be used by farmers to develop a plan for their farm. 25 Pa. Code §91.36(b)(1) authorizes farmers that do not choose to adopt and implement the standard plan format to seek approval from the Department for an alternative format or approach, or can obtain a permit for the land application of manure.

The proposed revision to the Manure Management Manual includes the following: a process to calculate manure application rates, setbacks from environmentally sensitive areas, special conditions for winter application, periodic evaluation of manure storage facilities, conditions for stockpiling and stacking dry manure, requirements for pasture management in the form of maintaining dense vegetation in pastures and agronomically based stocking rates. It also requires farms with animal concentration areas to establish best management practices to prevent pollution from those areas. Implementation of these practices will result in substantial improvement in pollution prevention and will have a significant impact in reducing pollutants reaching the Chesapeake Bay.

The Department worked with a subcommittee of the Agricultural Advisory Board to develop the proposed Manure Management Manual revision. This subcommittee included other state and federal agencies, representatives from organizations representing agricultural and environmental interests, and farmers.

Training and outreach have been initiated to support changes to the Chapter 102 regulations and *Manure Management Manual*. For the 102 program, six training sessions for DEP and conservation district staff has been schedule between September 14 and October 10, 2010. An additional 20 sessions for conservation district staff and agriculture community have been funded under the Chesapeake Bay Regulatory and Accountability Grant for both 102 and *Manure Management Manual* revisions. These sessions are currently in development.

Educational materials and outreach to all farmers, regardless of operation size, will address changes to Erosion and Sediment Control requirements and Manure Management Plans, including information about steps farmers may take to develop plans. Training and guidance will also include reference to CAFO and CAO requirements to ensure compliance with existing regulations. Training and guidance for DEP, CD, NRCS staff and private consultants on conservation planning objectives will be developed. This training will be consistent with CORE 4 practices and include information about the five key BMPs identified by EPA Region 3 as their most critical for Bay model loadings. These five "preferred" BMPs are: riparian buffers; animal fencing; manure storage; cover crops; and nutrient management plans. EPA involvement could also emphasize the President's Chesapeake Bay Executive Order and the need for Agricultural Compliance with respect to the Chesapeake Bay.

CAFO Program Review. DEP will work with EPA Region 3 to review Pennsylvania's existing CAFO regulatory program to ensure that it meets current federal regulations. DEP will also address the findings of the technical standards review EPA will be conducting in 2010. Specific issues were identified by EPA in a November 2, 2009 letter, which DEP responded to in a January 5, 2010 letter. A meeting on April 26, 2010 in Philadelphia was held to discuss these issues and subsequent follow up meetings are planned. DEP believes that Pennsylvania's approved CAFO program meets current EPA requirements. However, EPA's analysis may have identified specific issues regarding Pennsylvania's current CAFO program that may require additional review/activities. Specific regulatory revisions to Pennsylvania's CAFO program will not be included in this Watershed Implementation Plan, as they are not identified and agreed upon at this time. However, program changes will be made to address EPA concerns. For example, Pennsylvania's current General Permit expires on September 30, 2011. Needed revisions will be incorporated when this General Permit is renewed.

Increase Field Presence to Increase Compliance

Chesapeake Bay Regulatory and Accountability Program (CBRAP) Grant Supported Activities. Pennsylvania DEP proposes to support several components of our regulatory efforts in the Chesapeake Bay watershed with the CBRAP. These components include the existing CAFO permit program; implementation of erosion requirements required of all agriculture operations under our Erosion and Sediment Control regulations (§102.4 regulation); and implementation of manure management requirements for all agriculture operations under our Clean Streams Law and Chapter 91.36. These activities will also address the targeted watershed approach.

One component of the CBRAP will support four new staff positions to provide regional compliance and inspection actions for Pennsylvania's CAFO, stormwater and agriculture regulatory programs. These positions will support increased field presence for additional inspections of non-CAFO agricultural operations. These positions would also support increased compliance activities under Chapter 102 Erosion & Sediment Control regulations, Chapter 91.36 relating to manure management, and local stormwater complaints. DEP expects staff to be available in January 2011 and, once hired, these staff will conduct compliance inspections of agricultural operations, follow-up inspection of non-compliant operations and will assist with enforcement actions. Once fully trained, these new staff are expected to result in an increase of 450 agricultural inspections annually, as well as 50 stormwater inspections and 100 compliance actions per year.

Targeted Watershed Approach. The targeted watershed approach will allow DEP and its federal and local partners to focus limited resources in a coordinated and targeted way to increase the likelihood of improving water quality in agriculturally-impaired watersheds in a shorter period of time.

The targeted watershed approach consists of identifying high priority watersheds for assessment and compliance inspections. Outreach and education activities will be conducted in the selected watersheds to apprise all operations in the watershed of their regulatory obligations and provide a general description of the targeted assessment and compliance initiative.

The assessments would be focused on identifying the current status of farming operations including baseline compliance for trading, already installed BMPs, operational limitations, areas needing attention, and any regulatory violations of both federal law (NPDES violations) and state law (Chapter 91, 102, etc). The assessment results will be used to develop a strategy to identify, evaluate and prioritize follow up efforts needed to assist with compliance, and to identify and target any necessary enforcement activities where compliance cannot be obtained voluntarily. If there are structural, regulatory or funding impediments, these impediments would be identified and, where appropriate, strategies to overcome the impediments would be implemented. In addition, the results of these assessments will include an inventory of BMPs installed and to be installed, which will be available for input into the Bay model.

The targeted watershed process will include working with EPA Region 3, partner groups and the county conservation districts to select manageable-sized watersheds (e.g. both geographically and number of farming operations) for the assessment and compliance initiative. This targeting will consider agriculturally-impaired watersheds, watersheds with a TMDL, watersheds with potential for success. Sufficient conservation district and private sector capacity is needed to assist farmers in fulfilling any compliance issues or required BMPs. DEP will also target watersheds with current watershed plans including: 319, Growing Greener, and County Implementation Plans; and those watersheds where the maximum funding is available.

The targeted watershed process will include the development and implementation of outreach and assessment tools for use in the assessment and compliance initiative. These tools will be modeled after the approach taken in by DEP in its north central region for Spring Bank Run and by EPA Region 3 for Watson Run and Muddy Run. Outreach efforts will be focused over a finite period of time (6-8 weeks) in advance of the actual assessments. Outreach considerations include informational meetings, press releases, direct mailings, private sector involvement, and conservation district stakeholder assistance. The assessment protocol used for Watson Run and Spring Bank Run will be reviewed and modified as appropriate for these assessments.

The targeted watershed approach will involve an extensive number of partners, including conservation districts, NRCS, EPA, Pennsylvania Department of Agriculture, Pennsylvania Farm Bureau, PennAg Industries, Chesapeake Bay Foundation, various watershed associations, and others. It may also include “non-typical” partners, such as Pennsylvania Department of Conservation and Natural Resources and county planning agencies to recognize forest land management practices or activities that address flooding. Additional partners may be included to help address how to serve underserved groups like Plain Sect farmers. EPA Region 3 has suggested a component that addresses private and public water supply testing, which may be included at some level and in some watersheds.

The targeted watershed approach will prioritize DEP staff time to complete an agricultural assessment and compliance initiative in the identified watershed(s) in a finite period of time. Additional resources made available through the CBRAP will be engaged in this effort and may allow for up to three target watershed efforts per year in 2012-2014. Assessments would be performed by DEP staff and conservation district staff. DEP will be the lead agency for this process. However, conservation district staff are particularly significant as they have a strong understanding of agricultural farming operations and farming logistics, and they have the expertise to address the special needs of underserved farming groups. The development of this

targeted watershed initiative will more fully describe the functions of DEP and other partner organizations during the public review of this targeted watershed assessment process. In addition, if non-agricultural activities significantly contributing to water quality degradation are noticed during the assessments, they will be recorded and considered during the assessment evaluation.

The targeted watershed approach will include a compliance process that encourages voluntary compliance, where possible, but also the necessary enforcement tools to address uncooperative agricultural operations or where violations of state or federal requirements impact water quality. The goal of this effort is to get implementation of proper agricultural BMPs. Farmers will be provided the opportunity to comply within a specified timeframe. The compliance process will be a tiered compliance/enforcement approach that includes an effort to rank violations for priority compliance assistance and possible enforcement. This tiered approach would start with conservation district technical assistance. If appropriate actions do not result, it may lead to DEP enforcement activities, based on the severity of the violations, potential for environmental degradation and/or the willingness to comply with regulatory requirements. The compliance process will focus on attaining baseline compliance with Chapter 102- E&S requirements, Chapter 91- manure management, Act 38 – Nutrient management, and Chapter 92- Concentrated animal feeding operations, as appropriate. The compliance process will be similar to that used in Watson Run whereby each farm was notified of concerns, given an opportunity for voluntary compliance and financial assistance, provided a schedule for development of agricultural erosion and sedimentation control plan and manure management plan, a schedule for implementation of these plans, progress reporting requirements, and a compliance assurance process with established timeframes. All of these timeframes were determined by DEP in consultation with the conservation district. The compliance process takes into account enforcement discretion, while allowing DEP to consider all compliance tools available including Notices of Violation (NOV), civil penalties and requiring permits. DEP expects to share information with and accept input from EPA regarding escalated enforcement and may request EPA involvement as appropriate.

The targeted watershed approach will maximize funding opportunities for agricultural operations in the targeted watershed. DEP will designate these targeted watersheds as priority watersheds for Growing Greener, PENNVEST and other programs. In addition, DEP will work with federal partners (EPA 319, NRCS, FSA, and EPA-Chesapeake Bay Program) to prioritize to the extent possible these federal funds for use in the priority watersheds. Program partners will work together to maximize staff availability in developing Manure Management Plans, E & S Plans, and designing BMPs to be installed during the same period in the priority watersheds. An outreach tool will be developed that summarizes all the financial assistance avenues that a farmer could utilize to come into compliance.

The targeted watershed approach will monitor and evaluate progress and effectiveness of this effort. This will include tracking the implementation of existing and future BMPs, planning, and operational changes at farms in response to the assessment and compliance initiative in the watershed. This will include, following installation of BMPs in watershed, consideration of follow-up biological and water quality monitoring and stream biological surveys on the targeted watershed to assess improvements, and calculations of nutrient and sediment reductions realized through the implementation of BMPs. The long-term impact of this effort will be a reduction in

stream miles impaired by agriculture and adequate “credit” in the Bay model for water quality improvements resulting from the actions taken by Pennsylvania farmers. In addition, articles, success stories, watershed tours, would be planned to celebrate the successes of this joint assessment and compliance initiative.

Tracking and Reporting Protocols

Agency and Program Data Sources and Data Formats

The following table provides a listing of the state and federal programs from which BMP implementation is acquired. It also lists the format in which the practice information is received and the geographical spatial level at which the practice data is reported to the DEP Water Planning Office.

For example, from row one, the DEP Stream Bank Fencing Program provides information in electronic form. Stream Bank fencing data is downloaded from the Program’s database into a spreadsheet which is then electronically submitted to DEP. The information is located geographically at the county and the SWPC Level.

Data Source	How Information is Received	Geographical Reporting Level
DEP Stream Fencing Program	Electronic spreadsheet from program database	County/SWPC
DEP Chesapeake Bay Implementation Grant	Electronic spreadsheet from program database	County/SWPC
DEP Section 319 Non-point Source Program	Paper spreadsheet based on review of GRTS database	County/SWPC
DEP Abandoned Mined Land Reclamation Program	Electronic spreadsheet from program database	County
DCNR Forest Stewardship Program	Electronic spreadsheet from program database	County
Pa. Act 6 Nutrient Management Program	Electronic spreadsheet from program database	County/SWPC
Pa Stream Relief Program	Electronic spreadsheet from program database	County
Pa Growing Greener Grant Program	Electronic spreadsheet from program database	SWPC
Pa. Act 102 Erosion and Sedimentation Program	Electronic spreadsheet from program database	County
PDA Agri-Link Program	Spreadsheet received by e-mail from PDA Office	County
FSA Conservation Reserve Program	Spreadsheets downloaded directly from FSA Pa website	County
FSA Conservation Reserve Enhanced Program	Spreadsheets downloaded directly from FSA Pa website	County
NRCS Environmental Quality Incentive Program	Spreadsheets downloaded directly from NRCS Pa website	County
USDA Rural Development Program (septic system hookups to treatment facilities)	Listing received by e-mail from USDA Pa Rural Development)	County and Township
PSU Center for Dirt and Gravel Road Studies	Electronic Spreadsheet	County
USDA National Agricultural Statistics Service	Spreadsheet download from website	County
American Farmland Trust	Spreadsheet received by e-mail	County
PDA - Reap Program	Electronic Spreadsheet	County
DEP Nutrient Trading Program	Electronic Spreadsheet	County/P4.3 Model Segment

Manure Transport

Additional data tracking was requested to address changes in the model that modified manure transport considerations. To address this change, the SCC, DEP and PDA requested that

conservation districts document manure transport and movement throughout the watershed. This updated methodology assumes all manure generated in a county stays in that county, unless data indicates otherwise. A data collection effort, developed jointly by the DEP, SCC and PDA, required a review by county conservation district staff of nutrient management plans or nutrient balance sheets for all permitted CAFOs and the Nutrient Management Act concentrated animal operations (CAOs) and volunteer animal operations (VAOs). This effort did not capture all farm manure movement, but addresses farms and individuals most likely to transport manure. The planning data found in the county conservation district files covers about 50 percent of the manure produced in PA. A related set of manure transport data from brokers is being collected under the Commercial Manure Haulers and Brokers program run by PDA.

The data in nutrient management plans and/or nutrient balance sheets for all permitted CAFOs and the Nutrient Management Act's CAOs and VAOs in the Chesapeake drainage counties was submitted from county conservation districts to DEP by June 15. The resulting data will be provided for the Chesapeake Bay watershed version 5.3 model.

All Chesapeake drainage county conservation districts reported to DEP on the export of manure from its county. Specific information was provided on the equivalent of 359,170 tons of manure leaving its county of origin; 227,527 tons of this can be characterized as leaving Pennsylvania or the Chesapeake Bay watershed. This information will be used when the Bay watershed model shifts from its current allocation method. For Lancaster County there is specific information on 99,373 tons leaving the county and another 77,244 tons going through brokers to unknown destinations. DEP and PDA will work on getting additional specific information on brokered manure and DEP will work with the SCC and PDA on permanent documentation that goes with the tri-annual Nutrient Management Plan updates.

“Untracked” BMP Tracking Pilot

There is a large number of voluntary BMPs (i.e. those BMPs that were not cost-shared and presumably not entered into the Bay model) on the ground in Pennsylvania. A recent study in Bradford County found that 85 percent of no-till activities of the survey group were not cost-shared. Actions to be taken to address this include utilization of tools/protocols under development by NRCS/NACD to track these BMPs; re-tasking conservation district Chesapeake Bay technicians to assess and document these BMPs; and better utilization of Pennsylvania's “BMP Tracker” data system. One of the objectives of Pennsylvania's CBRAP includes contract support to assist Pennsylvania in the effort of better utilizing the existing BMP data and collecting it for the Bay model.

Section 9.

Urban/Suburban Stormwater

Stormwater runoff and flooding are natural events that, over the millennia, have helped shape the world around us. Human changes to the landscape result in alterations of natural drainage patterns by intensifying and redirecting stormwater runoff, potentially leading to stream pollution, property damage and, in extreme cases, loss of life. Impervious surfaces result in increased runoff in volume and rate. Impervious surfaces and maintained landscapes also generate pollutants that are conveyed in stormwater runoff and discharged to surface waters. The particulate-associated pollutants that are initially scoured from the land surface and suspended in stormwater runoff. These pollutants include sediment, phosphorus that is moving with colloids (clay particles), as well as metals, and organic particles and litter. Dissolved pollutants, however, may actually decrease in concentration during heavy stormwater runoff events. These include nitrate, salts and some synthetic organic compounds applied to the land for a variety of purposes.

Current Programs and Capacity

Although the most obvious impact of land development is the increased rate and volume of surface runoff, the pollutants transported with this runoff comprise an equally significant impact. Therefore Pennsylvania predominately utilizes a stormwater strategy that addresses volume and rate of stormwater runoff to address water quality. DEP has developed a volume control standard of managing the net change from pre-construction to post construction conditions for the 2-year storm event, where the pre-construction condition is meadow or better. In addition, when an existing impervious area is redeveloped, 20 percent of the existing impervious area is considered to be in meadow or better condition for application of stormwater retrofits. This management approach focuses on providing stream channel protection and water quality protection from the frequent rainfalls that comprise a major portion of stormwater runoff events in the Commonwealth, including the Chesapeake Bay watershed. In addition, DEP requires peak rate control for representative storms, from 1 to the 100-year event to protect against immediate downstream erosion and flooding. Most designs achieve peak rate control through the use of detention structures. Peak rate control can also be integrated into volume control BMPs in ways that eliminate the need for additional peak rate control detention systems.

Pennsylvania's focus is to manage stormwater runoff as a valuable and reusable resource rather than as a waste that must be quickly moved away. Stormwater is effectively managed through properly constructed and maintained best management practices (BMPs) which remove pollutants, facilitate ground water recharge, provide base flow for surface waters, and protect and maintain the stability and environmental integrity of our ground and surface water resources. Managing increases of stormwater runoff to minimize pollutant loading includes reducing or avoiding the generation of new or increased sources of these pollutants as well as restoring and protecting the natural systems that are able to remove pollutants. These objectives can be accomplished through various BMPs such as stream buffers, vegetated systems, infiltration, and the reuse, recycle or collection of stormwater. Although stormwater runoff cannot be eliminated, the effects of excess stormwater on our citizens and land and water resources are minimized through better management and treatment

This section provides a greater overview of the various aspects that will pertain to MS4 communities and construction activities throughout the Commonwealth and not just those limited to Pennsylvania's portion of the Chesapeake Bay watershed. It is important to note that within previous versions of the watershed model, BMPs were evaluated cumulatively based on the relative effectiveness of the BMPs and the impact of land use changes. Results from the model represent the simulated cumulative impact of all the BMPs and land use changes in reducing N, P, and sediment. It is not possible to determine the relative impact of individual BMPs or land use changes directly from model results. Rather the total cumulative BMP implementation and land use changes for any year can be compared to the overall projected N, P, and sediment loads simulated for previous years.

Laws

The Pennsylvania Clean Streams Law – the Act of June 22, 1937, P.L. 1987, as amended, 35 P.S. §§ 691.1 et seq. provides DEP with the basic legal authority to prevent and abate water pollution in Pennsylvania. The Law also establishes appropriate enforcement procedures and penalties that apply to violations of the law and penalties.

Federal Water Pollution Control Act, §§ 1251 et seq. (Clean Water Act) provides legal authority to restore and maintain the chemical, physical and biological integrity of waters of the United States. Section 404 of the Clean Water Act regulates the discharge of dredged or fill material into United States waters. Section 401 requires federally permitted activities that may impact surface waters to obtain a certification from the state regulatory authority that the proposed activity will not violate State water quality standards. Section 402 regulates the discharge of any pollutant, or combination of pollutants into waters of the United States.

Act 14 – Section 1905-A of the Administrative Code, 71 P.S. Section 510-5, requires permit applicants for certain permits to give written notice to municipalities.

Conservation District Law Act 217 - Act of May 15, 1945, P.L. 547, No. 217 relates to the conservation of soil, water and related natural resources and land use practices contributing to soil wastage and soil erosion. This law provides for the organization of the various counties into conservation districts and the appointment of their officers and employees; prescribes their powers and duties; creates the State Conservation Commission and fixes its powers and duties relative to the administration of this act; provides financial and legal assistance to conservation districts and the commission and authorizes county governing bodies to make appropriations thereto; and provides for disposition and operation of existing districts.

The Pennsylvania Stormwater Management Act (Act 167) - Act 167 establishes a systematic program for counties to develop watershed-based stormwater management plans that identify control measures to address changes in stormwater runoff quantity, runoff quality and ground water recharge from development or activities that may affect stormwater. The measures must be implemented by local municipalities through the adoption of ordinances and regulations.

Within Pennsylvania's portion of the Chesapeake Bay watershed there are 43 counties. Of these, all but 7 counties have prepared an Act 167 plan for at least one watershed in the county.

Twenty-four of the counties are preparing, or have prepared, Act 167 plans on a county-wide basis. Of the 1189 municipalities in the watershed, 872 are or will be at least partially, covered by an Act 167 plan and 277 municipalities have been designated as regulated MS4s. There are a total of 206 permitted MS4s and 71 municipalities were granted waivers. Of the 206 permitted MS4s, 30 have individual permits and 176 have coverage under the PAG-13 MS4 general permit.

Regulations

Erosion and Sedimentation (E&S) and Post Construction Stormwater Management (PCSM) (Chapter 102).

Since 1972, Pennsylvania has regulated stormwater runoff from earth disturbance activities under the Erosion and Sediment Pollution Control Program found at 25 Pa. Code Chapter 102 of the Department's rules and regulations. Under the current regulations, all earth disturbances must be conducted with erosion and sediment control BMPs in place. Erosion and sediment control BMPs are used to minimize the potential for accelerated erosion and sediment pollution from earth disturbance activities. Activities of 5000 square feet or greater require the development of a written erosion and sediment control plan for implementation at the site. Further, erosion and sediment control plans for certain activities exceeding one acre of earth disturbance and most activities that exceed five acres of earth disturbance must be submitted to the Department or a County Conservation District (CCD) that has been delegated that authority, for review and approval before the project may begin. In addition to state requirements, many municipalities administer similar permitting programs related to erosion and sediment control at the local level. The Department has developed an Erosion and Sediment Pollution Control Program Manual that identifies BMPs and provides recommended site design standards and specifications as well as their applicability to various situations. The regulations require more protective BMPs in High Quality (HQ) and Exceptional Value (EV) watersheds.

NPDES Permitting, Monitoring and Compliance (Chapter 92).

In 1992 and 1999, EPA finalized regulations under the federal Clean Water Act that require National Pollutant Discharge Elimination System (NPDES) permits for construction activities of five acres or greater, and activities affecting between one and five acres of land (including those of less than one acre that occur as part of a larger common plan of development or sale between one and five acres), with a point source discharge. Except for oil and gas, timber harvesting, agricultural plowing and tilling or animal heavy use areas any earth disturbance of one acre or greater (including one acre that occurs as part of a larger common plan of development or sale consisting of one or more acres) require an NPDES permit prior to commencing earth disturbance.

Water Quality Standards and Implementation

(25 Pa. Code Chapters 93 and 96) – These regulations address water quality standards and water quality standards implementation, and specifically direct DEP to prevent degradation of water quality that supports existing and designated uses. Erosion and sediment control plans and post

construction stormwater management plans must demonstrate compliance with these antidegradation regulations.

Policies and technical guidance

Comprehensive Stormwater Policy.

The Comprehensive Stormwater Management Policy was developed to more fully integrate post construction stormwater planning requirements, emphasizing the use of volume, water quality, and rate control BMPs into the existing and proposed federally mandated NPDES permitting programs and the Department's Act 167 planning program. The formal policy establishes a framework to integrate all of the Department's stormwater management programs and promotes a comprehensive watershed approach to stormwater management in the Commonwealth. The policy identifies and integrates existing legal requirements and post construction stormwater management planning goals, objectives, and recommended procedures into the various Department stormwater management programs. Fundamentally, the goals of the policy are to improve and sustain ground and surface water quality and quantity through the use of planning practices and BMPs that minimize the generation of stormwater runoff, provide ground water recharge and minimize the adverse effects of stormwater discharges on ground and surface water resources. The policy also supports the fulfillment of the state's obligation under 25 Pa. Code Section 93.4a (antidegradation) to protect and maintain existing uses and the level of water quality necessary to protect those uses in all surface waters, and to protect and maintain water quality in HQ and EV waters.

Riparian Forest Buffer Guidance.

In 2009, the Department published the draft Riparian Forest Buffer Guidance, Commonwealth of Pennsylvania, Department of Environmental Protection, document # 395-5600-001 (2009), as amended and updated. The guidance lists various design, construction, and maintenance standards for developing a riparian forest buffer. This guidance is expected to be finalized by the fall of 2010.

Manuals

The Chapter 102 regulations require persons proposing earth disturbance activities to implement and maintain BMPs that will minimize the potential for accelerated erosion and sedimentation and control post-construction stormwater discharges. The Department has developed the following manuals and policies to facilitate compliance with these regulatory requirements:

Erosion and Sediment Pollution Control Program Manual, document # 363-2134-008, April 15, 2000. This manual contains guidance for the design, implementation, and maintenance of E&S BMPs to achieve the regulatory requirements. This Manual is currently under revision and is expected to be finalized by the fall of 2010.

Pennsylvania Stormwater Best Management Practices Manual, document # 363-0300-002, December 30, 2006. This manual contains guidance for post construction stormwater

management BMPs which may be incorporated as part of the NPDES or E&S permit to achieve the regulatory requirements.

Compliance and Enforcement

Procedurally, post construction stormwater management plans required under the NPDES General Permit for Stormwater Discharges Associated with Construction Activities and the NPDES General Permit for Stormwater Discharges from small MS4s, as well as the stormwater management plans developed under the Act 167 program, must demonstrate compliance with the antidegradation requirements of Section 93.4a and water quality standards. The Department's Chapter 102 regulations establishes criteria to meet these regulatory standards, so that persons involved in the development of erosion and sediment control and post construction stormwater management planning can demonstrate compliance.

In watersheds other than HQ and EV, based upon the comparative stormwater management analysis, planners and applicants must evaluate and use volume control BMPs to ensure no net change in stormwater generated from pre-construction to post construction conditions, or otherwise replicate to the maximum extent possible, preconstruction stormwater infiltration and runoff conditions so that post construction stormwater discharges do not degrade the physical, chemical or biological characteristics of the receiving waters. Additionally, water quality treatment BMPs must be employed where necessary to ensure protection of existing uses and the level of water quality necessary to protect those uses. Finally, the rate of stormwater discharges must be managed to prevent the physical degradation of receiving waters, such as scour and stream bank destabilization and flooding potential. Lastly recent Chapter 102 rulemaking establishes criteria for riparian buffers and establishing mandatory provisions for the use of riparian buffers as a stormwater BMP. Any person proposing a project requiring a permit and located in an EV or HQ watershed which is attaining its designated use, must not conduct earth disturbance activities within 150 feet of a perennial or intermittent river, stream, creek, lake, pond, or reservoir, and must protect any existing riparian buffer. Additionally, if the project site requires a permit and is located in an EV or HQ watershed failing to attain one or more of its designated uses, the person proposing the project must not conduct earth disturbance activities within 150 feet of a perennial or intermittent river, stream, creek, lake, pond, or reservoir, and protect an existing riparian forest buffer, convert an existing riparian buffer to a forest riparian buffer, or establish a new riparian forest buffer.

Based upon the comparative stormwater management analysis, planners and applicants can ensure that existing water quality will be protected and maintained by demonstrating that post construction runoff does not exceed pre-construction rates and volumes and that any post construction discharge will not degrade the physical, chemical or biological characteristics of the surface water. In these watersheds, volume control BMPs should be used to the maximum extent possible. Additionally, water quality treatment BMPs must be employed where necessary to ensure the protection and maintenance of water quality. Nitrogen, phosphorus and sediment are addressed through volume control BMPs, however additional BMPs to ensure that the stormwater does not cause or contribute to a water quality impairment may be required. In addition, the rate of stormwater discharges must be managed to prevent the physical degradation (added sediment load) of receiving waters and flooding potential.

Compliance and enforcement priorities generally are given to the following violations: violations that result in actual releases of pollutants or conditions that pose an imminent threat to human life or public health, safety, or environment; violations that result from conducting an activity without a permit; violations that result from a willful or reckless act; or violations that result from the failure to comply with an order, consent decree, or consent adjudication. The Department and delegated Conservation District staff will carefully consider the facts, the law, and the options, and select the enforcement action properly suited to the situation and best designed to facilitate compliance.

NPDES Stormwater Construction and Erosion and Sediment Control Programs

The Department is responsible for implementation of a statewide program for issuing NPDES Permits for Stormwater Discharges Associated with Construction Activities. The Department's program includes requirements for construction projects to include a post-construction stormwater management program to protect, maintain, reclaim and restore water quality and to protect the existing and designated uses of surface waters of the Commonwealth.

The Department, along with delegated conservation districts, employs a variety of compliance and enforcement tools and processes to seek voluntary compliance for violations under the Chapter 102 and the NPDES stormwater construction programs. Initial efforts generally are directed toward providing compliance assistance to the regulated community. These efforts give attention to correcting the violations, such as implementing and maintaining BMPs or other actions required to bring the site into compliance. If voluntary compliance cannot be obtained, site violations pose a significant threat to the protection of life, health, property and the environment, or a significant pollution event has occurred, the Department and conservation districts take increasingly aggressive compliance steps such as notices of violation, compliance orders, and civil and criminal penalty assessments.

Forty-three conservation districts are currently delegated Chapter 102 Erosion and Sediment Control Program responsibilities within the Chesapeake Bay watershed. Forty are delegated at Level II authority and 3 are delegated at Level III authority. The Level II delegation includes providing training and outreach functions, and compliance responsibilities encompassing complaint investigation, technical reviews, permit processing, and site inspections for the Department. Level III delegation includes Level II responsibilities plus enforcement responsibilities that include enforcement hearings, equity actions, and assessment of civil penalties.

DEP program data and reporting within the Chesapeake Bay watershed for 2008 indicates that the Department and conservation districts conducted a total of 10,243 compliance inspections on permitted and non-permitted sites and investigated 1,439 citizen complaints concerning possible Chapter 102/NPDES construction activity violations. As a result of compliance inspections and complaint investigations, 56 cases of noncompliance were referred by Conservation Districts to the Department for resolution. In addition, Level III Conservation Districts initiated 39 civil and summary actions that resulted in the correction of site conditions and the collection of \$135,225 in penalties.

PA Stormwater Management Act Compliance and Enforcement

Act 167 contains clear and specific enforcement authority for counties to develop stormwater management plans and for municipalities to adopt a stormwater ordinance consistent with the plan. Section 10 of the act states “The Department may institute an action in mandamus on the Commonwealth Court to compel counties to adopt and submit plans in accordance with this act.” Section 12 prescribes what the Department must do if a municipality fails to adopt or amend, and implement ordinances and regulations required by the stormwater management plan. It prescribes issuance of a written notice of violation and directs the State Treasurer, upon notification by the Department, to withhold payment of all funds to the municipality from the General Fund. Historically, the Department has chosen to apply these legal remedies with discretion. Appropriations for the state’s 75 percent cost share of stormwater management planning and municipal implementation costs have been suspended due to budgetary reductions, therefore no funding is currently available to support fulfillment of the Act’s requirements.

Stormwater management ordinances developed under Act 167 identify the following enforcement authorities for the municipality:

- o Right of entry – municipality may enter to inspect stormwater BMPs.
- o The authority to inspect stormwater management BMPs and on what frequency.
- o Require owners to conduct inspections of stormwater management BMPs and on what frequency.
- o The types of enforcement actions the municipality may use.
- o To suspend or revoke permits.
- o To reinstate suspended permits.
- o To invoke penalties for violating the ordinance or permits.

MS4 Program Compliance and Enforcement

Pennsylvania has 206 municipalities with MS4 permit coverage. Each permittee is required to submit an annual report to the Department by June 9 of each year. The annual report requirement is a permit condition and serves as a narrative effluent limitation for the discharge. MS4s may be subject to compliance or enforcement action for failing to conduct the following: obtain a permit, submit an annual report, or make satisfactory progress as described by the annual report. The standard array of tools is available to the Department to enforce these requirements including initial notification, resolution efforts, notices of violation, and orders. Initial enforcement efforts focused on ensuring that the MS4 operators acquired permit coverage or qualified for permit waiver. Subsequent enforcement initiatives will ensure the submission of acceptable annual reports.

MS4 permittees may choose to rely on the Department’s NPDES program to satisfy certain requirements under the minimum control measures (MCM) for erosion and sediment control (MCM 4) and for post construction stormwater control (MCM 5) rather than operating a their own local program to implement these MCMs.

In all cases, municipalities or counties may not issue a building or other permit or final approval to anyone proposing to conduct earth disturbance activities until the required NPDES Construction permit (or approved coverage under a General NPDES Permit) has been issued by

the Department or by a delegated conservation district. Municipalities that implement local programs to regulate construction stormwater controls or post-construction stormwater controls may choose to explore opportunities to negotiate an agreement with their appropriate conservation district to utilize their services for plan reviews, construction inspection, post construction inspections, and training. Stormwater management ordinances developed by municipalities under the MS4 permit program include enforcement provisions and authorities for the municipality as previously identified under the Act 167 Program.

The Pennsylvania Stormwater Management Act (Act 167) obligates counties to develop watershed based stormwater management plans with input from municipalities and the public, and municipalities to adopt ordinances implementing the county plans. Similarly, the federal MS4 NPDES permit program requires specified municipalities located in “urbanized areas” to plan and implement a stormwater management program. Some municipalities may have both the Act 167 ordinance and MS4 NPDES permit obligation. In Pennsylvania, EPA has recognized Pennsylvania’s existing stormwater programs and has authorized DEP to implement the NPDES MS4 program relying on the Pennsylvania Stormwater Management Act and the Chapter 102 regulations.

Local governments with state Act 167 or federal NPDES MS4 regulatory obligations may meet their federal and state requirements on the existing state program under Title 25, Chapter 102 Erosion and Sediment Control and Stormwater Management rulemaking adopted by the Environmental Quality Board (EQB) on May 17, 2010. This approach integrates state and federal regulatory programs. The reliance on existing state stormwater programs as a baseline for meeting state and federal water quality requirements represents a significant cost savings to local governments.

As a result of successful stormwater programs and improved BMP implementation and reporting, urban stormwater runoff does not present a significant cause of water quality impairment to the tributaries of Pennsylvania’s portion of the Chesapeake Bay watershed. Chesapeake Bay Program Model results have identified that urban stormwater runoff accounts for approximately 6 percent of the total nitrogen, 9 percent of the total phosphorus and 10 percent of total sediment that is delivered to the Chesapeake Bay from the Commonwealth’s waters.

Urban stormwater practices have been under reported by Pennsylvania to EPA. As a result, the Chesapeake Bay Program Model has underestimated the actual expected treatment of stormwater management practices within the Commonwealth. Since DEP began reporting stormwater BMPs in 2006, Model results have shown a decrease in nutrient and sediment loads from urban sources when compared to 1985 levels. DEP would expect that the overall results will demonstrate further reductions from regulatory requirements, expanded BMPs, and with improved tracking and reporting of BMP implementation.

Funding

Pennsylvania Stormwater Management Act - Act 167

Act 167 establishes a systematic program for counties to develop watershed-based stormwater management plans that recommend control measures to address stormwater runoff quantity, quality and ground water recharge from development activities. The recommended measures are to be implemented by municipalities through the adoption of local ordinances.

Funding has generally been available from DEP to cover 75 percent of the cost to develop the Comprehensive Stormwater plan. Act 167 also authorizes funding to support municipal implementation of ordinances adopted under the Act 167 plan.

Each municipality located in the watershed must implement the plan through municipal codes and ordinances, subsequent to the adoption of the plan by a county and within six months of the Department's approval of the plan. The Department provides 75 percent reimbursement for eligible costs incurred in developing and implementing the plan. Since 1998, the General Assembly has provided \$1,200,000 annually to reimburse the cost of stormwater plan development and implementation. Over \$15,000,000 has been appropriated statewide by the legislature towards the stormwater grant assistance program since its inception. The Pennsylvania General Appropriation Act of 2009 and 2010 (i.e., the state general fund budget for fiscal years 2009 and 2010) did not fund DEP to pay grants and reimbursements to counties and municipalities for allowable costs to meet obligations under Act 167. While Section 17(b) of Act 167 says that a county's obligation to prepare stormwater management plans and a municipality's obligation to implement stormwater management plans are not affected by a lack of funds to pay grants and reimbursements, DEP recognizes that current financial burdens facing counties and municipalities may impede development or updates of future Act 167 plans.

Conservation District Cost Share

Through delegation agreements, the Department cost shares for the salaries for conservation district staff to review erosion and sediment control (E&S) plans, process E&S Permits and NPDES Stormwater Construction Permits, and conduct inspections.

Permit Fees

The existing permit fees for the Chapter 102 program (including both Erosion and Sediment Control (E&S) and NPDES Permits) do not currently offset the costs to implement the program. The permit fees established under the revised Chapter 102 rulemaking have been developed to offset the costs to the Department to administer the program related to permit reviews, inspections, technical assistance, and program oversight. It cannot be determined if they will adequately offset additional compliance/enforcement activities, training or associated management tasks for the Department or conservation districts. While the permit fees were calculated based on implementation costs at the time of the calculation, sufficient time has passed and costs have significantly risen that the fee increase may not meet the needs of the Chapter 102 program. Under the Conservation District Law (3 P.S. §859(2)), conservation

districts can charge additional fees to meet their increasing costs and have been charging review fees above and beyond the permit filing fee.

Section 106 of the CWA

The CWA authorizes the Environmental Protection Agency (EPA) to provide grants to States and interstate agencies to administer programs for the prevention, reduction, and elimination of water pollution, including the development and implementation of groundwater protection strategies. Section 106(b) of the CWA directs the EPA Administrator to make allotments for grants from sums appropriated by Congress in each fiscal year "in accordance with regulations promulgated by him on the basis of the extent of the pollution problem in the respective States." The current level of 106 funding is not sufficient to cover the Department's costs for implementing the programs identified in Section 106.

Staffing

Pennsylvania has taken an integrated approach to stormwater management, and we coordinate activities under the various previously identified state and federal regulatory and planning programs. Local government, DEP and delegated county conservation districts provide the necessary personnel resources. Available staff resources for these regulatory programs are currently insufficient to carry out federal obligations without additional federal appropriations. With current state and local budget considerations, there is no expectation that additional or increased funds for staff resources will become available in the near term. Increased integration, efficiency, coordination, and cross-training of local, county and state staff to enhance effectiveness in program implementation will be needed.

Office	Technicians	Engineers	Program Management
Central Office	N/A	3	5
Regional Office	N/A	6	24
Conservation District	69	0	0

Technical Capacity

Regardless of the type of land development activity that occurs, the impervious surfaces, changes in vegetation, and soil compaction associated with that activity will result in increases in runoff volume and rate. DEP's volume control, water quality, and rate requirements focus on providing stream channel protection and protection from the frequent rainfalls that comprise a major portion of stormwater runoff events in any part of this Commonwealth. On the basis of these factors, the 2-year/24-hour storm event has been chosen as the stormwater management design storm for volume control. The scientific basis for using a 2-year/24-hour storm event is as follows:

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- o The 2-year/24-hour event provides stream channel protection and water quality protection for the relatively frequent runoff events across the state;
 - o Volume reduction BMPs based on this standard will provide a storage capacity to help reduce the increase in peak flow rates for larger runoff events;
 - o In a natural stream system in Mid-Atlantic States, the bank full stream flow occurs with a period of approximately 1.5 years. If the stormwater runoff volume from storms less than the 2-year/24-hour event are not increased, the fluvial impacts on streams will be reduced;
 - o The 2-year/24-hour storm is well defined and data are readily accessible for use in stormwater management calculations.

Research has demonstrated that bank-full stream flow typically occurs between the 1-year and the 2-year storm event (approximately the 1.5-year storm). Use of the 2-year/24-hour storm for purposes of comparing the pre to post stormwater runoff provides a margin of safety with flows in an out-of-bank condition. The 2-year/24-hour storm can also be determined from data that is readily available. The 2-year/24-hour storm is the event that should be utilized in order to meet antidegradation requirements. In addition, the new federal ELG also supports the 2-year/24-hour event as the design storm.

A volume control requirement is essential to mitigate the consequences of increased stormwater runoff from future growth including redevelopment. To accomplish this, the volume reduction BMP must:

1. Protect stream channel morphology
2. Maintain groundwater recharge
3. Prevent downstream increases in flooding and
4. Replicate the natural hydrology on site before development to the greatest extent possible.

DEP's volume control and water quality requirements are necessary to maintain and protect natural hydrology including velocity, current, cross-section, runoff volume, infiltration volume, and aquifer recharge volume. These requirements will sustain stream base flow and prevent increased frequency of damaging bank full flows. The requirements will also help prevent increases in peak runoff rates for larger events (2-year through 100-year storms) on both a site-by-site and watershed basis. A volume control requirement is protective of water quality and also provides the benefits listed below.

Protect Stream Channel Morphology

Increased volume of stormwater runoff results in an increase in the frequency of bank full or near bank full flow conditions in stream channels. The increased presence of high flow conditions in riparian sections has a detrimental effect on stream shaping, including stream channel and overall stream morphology. Stream bank erosion is greatly accelerated. As banks are eroded and undercut and as stream channels are gouged and straightened, meanders, pools, riffles, and other essential elements of habitat are lost or greatly diminished. Increases in impervious surfaces can cause the natural bankfull stream flows to occur more often.

Maintain Groundwater Recharge

Over 80 percent of annual precipitation infiltrates into the soil mantle in Pennsylvania's watersheds under natural conditions. More than half of this is taken up by vegetation and transpired. Part of this infiltrated water moves downgradient to emerge as springs and seeps, feeding local wetlands and surface streams. The rest enters deep groundwater aquifers that supply drinking water wells. Without groundwater recharge, surface stream flows and supplies of groundwater for wells will diminish or disappear during drought periods. Certain land areas recharge more groundwater than others; therefore, protecting critical recharge areas is important in maintaining the water cycle's balance.

Prevent Downstream Increases in Runoff Volume and Flooding

Although site-based rate control measures may help protect the area immediately downstream from a development site, the increased volume of stormwater runoff and the prolonged duration of runoff from multiple development sites can increase peak flow rates and duration of flooding from stormwater runoff caused by relatively small rain events. Replicating pre-development stormwater runoff volumes for small storms, up to and including the 2-year/24-hour storm event, will substantially reduce the problem of frequent flooding that plague many communities. Although control of runoff volumes from small storms almost always helps to reduce flooding during large storms, additional measures are necessary to provide adequate relief from the serious flooding that occurs during such events.

Replicate the Surface Water Hydrology On-site Before Development

The objective for stormwater management is to develop a program that replicates the natural hydrologic conditions of watersheds to the maximum extent practicable. However, the very process of clearing existing vegetation from a site removes the single largest component of the natural hydrologic regime, evapotranspiration (ET). Unless the ET component is replaced, the runoff increase will be substantial. Several BMPs such as riparian buffers, riparian forest buffers, tree planting, infiltration, vegetated roof systems and rain gardens, are critical to adequate stormwater management because they serve to replace a portion of the ET and other functions.

Whether stormwater plan reviews are conducted under Act 167, MS4 permits or activities regulated under the Department's Chapter 102 regulations, the stormwater management plan that is implemented is required to include provisions to protect water quality, existing uses and the level of water quality necessary to protect those existing uses in all surface waters and to protect and maintain water quality in special protection waters.

Stormwater management plans developed under Act 167 or MS4 permits and approved by the Department, include water quality and quantity protection requirements to be implemented by municipalities. Where Act 167 plans implement these water quality and quantity requirements, individuals and the Department may rely on those Act 167 plans and implementing municipal ordinances to meet the relevant MS4 NPDES permitting requirements for municipalities under the Clean Water Act Phase II stormwater program.

The Department will encourage the use of Act 167 plans to facilitate implementation of the new MS4 NPDES permit program, described above, by including an “MS4 module” in the planning process. In this way, municipalities required to meet the MS4 requirement will be able to do so using the watershed plans, cost-share funds and municipal ordinances available under Act 167.

Accounting for Growth

As a first step in considering the potential or expected stormwater effect from growth associated with new land development, it is important to understand that Pennsylvania’s approach to stormwater is to eliminate or reduce any new, additional or increased discharge from the project in an environmentally sound and cost effective manner. “No net increase” in nutrients or sediment from stormwater sources is achieved when the volume of stormwater discharges matches predevelopment volume of discharge at the 2 year 24 hour storm event, and the rate of stormwater discharge for all storms up to and including the 100-year storm matches the predevelopment rate.

Consistency

The Department’s *Comprehensive Stormwater Management Policy* identifies the Stormwater Management Act as the centerpiece of stormwater planning in Pennsylvania. It enables county and municipal governments to develop comprehensive watershed-based stormwater plans that address the entire spectrum of needs and demands created by land use changes and other activities that may affect stormwater runoff. Act 167 planning also can help local government to meet the requirements of federal MS4 regulations. All of these factors combine to make Act 167 planning an attractive and effective tool to assure an integrated approach to watershed-based stormwater management. The multiple advantages of Act 167 planning have recently stimulated a surge in stormwater planning across the Commonwealth.

Sustainability

Comprehensive stormwater management must be integrated early into project planning. Pennsylvania has emphasized prevention, minimization and mitigation practices that manage stormwater close to the source by relying on simple, non-structural methods designed to complement the more conventional structural controls. Stormwater must be recognized and managed as a critical resource, not as an annoyance or threat to be quickly passed downstream.

Although these fundamental changes in stormwater management planning and design principles are widely recognized, broad acceptance and application of these principles undoubtedly will continue to be more evolutionary. The work of teaching and promoting an integrated approach to stormwater management to a diverse, yet related, constituency is ongoing. The basic way engineers, planners and water resource professionals are educated needs to be modified. Practicing professionals, developers, attorneys and municipal officials also need to be educated so they can understand the importance of integrated stormwater management and put that knowledge into practice. Finally, the general public needs to understand the reasoning behind the change in management practices so that it will not only accept it, but also create a demand for more sustainable and integrated stormwater management approaches.

A strong stormwater management program that is rooted in sound science and reasonable regulation is one of DEP's highest priorities. Stormwater management planning is the original watershed-based planning process, and serves as the backbone of numerous watershed restoration and protection efforts across the Commonwealth. The Department's revised Chapter 102 regulations provide the basis for design, implementation, and long-term operation and maintenance of stormwater BMPs.

Lastly, in contrast to our tradition approach of managing "hard" or "grey" infrastructure, sustainable resource management can often be achieved at lower cost by managing our "green" infrastructure. Providing networks of open space, woodlands, wildlife habitat, parks and other natural areas helps to enhance our water resources and enrich the overall quality of life. Building successful partnerships through non-traditional arrangements will not only enhance overall infrastructure needs, it will also build markets for innovation.

Quantifiable

Procedurally, post construction stormwater management plans (required under the NPDES Permits for Stormwater Discharges Associated with Construction Activities and NPDES Permits for Stormwater Discharges from Small MS4s) and stormwater management plans developed under the Act 167 program must demonstrate compliance with water quality standards.

To meet this regulatory requirement, persons involved in the development of post construction stormwater management planning must prepare a comparative pre-construction and post construction stormwater management analysis that manages the volume of stormwater runoff from a 2 year/24 hour storm event. Additionally, water quality treatment BMPs must be employed where necessary to ensure the protection and maintenance of water quality. Finally, the rate of stormwater discharges must be managed to having no net change in volume and rate to prevent the physical degradation of receiving waters and flooding potential.

MS4 discharges in a TMDL watershed are included as a portion of the MS4 urbanized area. Specific MS4 goals or limitations are not established in the TMDLs but are included in an overall reduction goal for the land use activity. There is no direct translation from numeric TMDL limits to the BMPs required under MS4 NPDES permits. It is presumed that the initial MCMs implemented through the MS4 NPDES permits will result in lasting improvements to the watershed. If additional action is still necessary after full and ongoing implementation of the original six MCMs identified in the MS4 NPDES permit, additional MCMs are included in the revised/renewed version of the MS4 permit to address the outstanding needs and issues. These additional requirements include, but are not limited to, retrofits, updated local ordinances, riparian buffers, sustainable BMPS, and opportunity for trading/offsetting.

Unlike the traditional approach to wastewater which involves establishing a series of treatment or pollutant removal methodologies, the implementation of stormwater quality criteria is intended to change development practices and land management concepts. As a general rule, the removal of particulate and dissolved pollutants from stormwater is a difficult and inefficient process. Because the rate of flow and concentration of pollutants from a developed site vary greatly during a storm, the use of traditional wastewater "unit operation" technologies is inappropriate. The intermittent nature of runoff also complicates the pollutant removal process.

Wet weather flow consists of varying amount and rates of runoff, making it difficult to treat in a medium or structure such as a sewage treatment plant. In addition, the form of pollutant, whether particulate or solute, determines the potential for removal by any physical BMP.

Pennsylvania's BMP program has been successful in meeting water quality standards through the implementation of no net change in volume for the 2 year/24 hour storm event, and by requiring that at least 90 percent of the disturbed area is conveyed or mitigated by individual BMPs. Compliance with the volume criterion assumes that the major portion of particulate pollutants have been removed from stormwater runoff by one or more BMPs. Therefore, the only additional demonstration required for compliance with water quality criteria is to confirm that one or more of the BMPs that are most effective in solute reduction have been included in the stormwater management program.

DEP utilizes pollutant removal efficiencies from various land uses, and worksheets demonstrate how various BMPs treat N, P, or sediment. Without performing a detailed loading analysis, the inclusion of a combination of these measures will provide adequate demonstration that the site design has considered this issue and incorporated the best feasible solution. Where volume reduction cannot be met and the design provides insufficient capture by BMPs, the designer must revisit the overall program and apply additional BMPs to meet water quality standards.

Chapter 102 includes requirements for a licensed professional or their designee to be present onsite during critical stages of construction. Chapter 102 identifies criteria that are used to determine critical stages. The licensed professional identifies these critical stages and determines whether additional activities are also critical. A delegated conservation district or DEP may also identify a critical stage of construction that will require inspection.

Enforceable

Enforcement is an important tool in DEP's quest to achieve compliance with environmental laws and regulations. Other tools such as compliance assistance, training programs and outreach result in compliance; however, DEP uses traditional enforcement measures when necessary and appropriate. In most cases, the goal of enforcement will be to help ensure either current or future compliance is achieved.

Progress

Pennsylvania's progress for stormwater management will be measured by the reduction of runoff generated by development and other activities through various means including the minimization of impervious cover, use of low impact development designs, and the use of structural and non-structural stormwater BMPs that provide infiltration, water quality treatment, and that otherwise more effectively manage the volume and rate of stormwater discharges. These stormwater BMPs and planning practices will be advanced through increased emphasis on the Department's Act 167 stormwater management planning program, and implementation of both the Phase I and Phase II NPDES Stormwater Discharge Associated with Construction Activity Permit, and the Phase II NPDES MS4 Permit programs.

Gap Analysis

Through the drafting of this WIP and the work of the Urban/Suburban/Rural workgroup a number of gaps have been identified but many follow several key themes. These themes include: program capacity and consistency, tracking, BMP maintenance and establishment and funding.

Program capacity and consistency

- o Not all Act 167 plans have incorporated water quality provisions, especially older plans prior to 2000.
- o Need to insure that municipal ordinances required pursuant to Act 167 are developed and being implemented by the municipalities.
- o Inconsistencies between zoning, land development requirements and stormwater ordinances.
- o The federal MS4 regulatory program is not conducive to Pennsylvania's municipal structure.
- o On December 1, 2009, the U.S. Environmental Protection Agency (EPA) published effluent limitation guidelines (ELGs) and new source performance standards (NSPS) to control the discharge of pollutants, primarily sediment, from construction sites. Pennsylvania has incorporated this federal requirement by reference into the final rulemaking for DEP Chapter 102 regulations

Tracking

- o Tracking and reporting could be improved by focusing on stormwater as management systems: i.e. LID, traditional, modified, etc. rather than tracking and reporting of individual BMPs.
- o Staff and the resources to collect the information
- o Develop form(s) based on revised Chapter 102 rulemaking

BMP maintenance and establishment

- o Maintenance of existing BMPs
- o Existing developments with no stormwater controls

Funding

- o The current level of funding under Section 106 is not sufficient to cover the Department's costs for implementing the programs identified by EPA.
- o The current financial burdens facing counties and municipalities may impede development or updates of future Act 167 plans and their obligation to implement stormwater requirements.

Strategy to Fill Gaps

DEP supports an iterative process that allows for a strategic and flexible approach to demonstrate improvement and attainment of the Commonwealth's water quality. In order to overcome the gaps identified in the previous section a number of approaches may be needed. These approaches include:

Compliance

- Identify and facilitate targeted training for professional stormwater staff, elected officials and the public. This may also include continued educational credits for licensed professionals.
- Increase compliance and enforcement of stormwater requirements.
- Provide technical assistance to assist elected officials in identifying areas and opportunities for retrofitting or trading/offsetting to address existing stormwater problems.
- Encourage and support legislation regarding the proper application of fertilizers and the reduction in the amount of nutrients applied while promoting ground cover for erosion control and plant health, and minimizing nutrient losses.
- Encourage and support legislation that would specifically authorize municipal authorities to create watershed-based stormwater utilities or authorities, to charge user fees and manage and oversee local stormwater management facilities and practices.

Milestones

- Build local government capacity to implement effective stormwater management.
- Encourage the inclusion of prevention based solutions, forest buffer preservation or establishment, and other resource based solutions to advance reductions.
- Support additional funding to develop and implement comprehensive and integrated planning to enable local governments to better manage stormwater, reduce nutrient loading from runoff, and generate nutrient and sediment credits. These funds should be prioritized for use within the Chesapeake Bay watershed of Pennsylvania.
- PENNVEST Non-Point Source Projects: PENNVEST actively funds Green Initiatives that promote and encourage environmental responsibility in our communities. Funded initiatives are creative and innovative, and include green solutions for water quality management. These solutions can be as simple as installation of water barrels for water collection and re-use, to regional projects that reduce sediment and nutrient contamination of the Chesapeake Bay watershed by reducing storm water runoff from agricultural areas. It is projected that this program will result in an additional \$20 million per year for these types of projects.
- Identify opportunities to improve the tracking of practices. This may include partnering with groups such as the Golf Course Association to track the nutrient and land management activities voluntarily completed by Golf Course Superintendents.
- Utilize innovative approaches that demonstrate improvements in stormwater management and resulting water quality. These approaches include watershed permitting, integrated stormwater management planning and the development of trading/offsetting program that include stormwater components. Some examples include:
 - York County Act 167 stormwater plan that includes an integrated water resources strategy.
 - Lycoming and Potter County Act 167 stormwater plan includes specific riparian buffer requirements.
 - The Pennsylvania Builders Association stormwater BMP offsets proposal. Pennsylvania is continually evaluating options that will provide the maximum efficiency and cost-effectiveness for controlling water pollution within the Chesapeake Bay watershed and throughout the Commonwealth. One such option that will be evaluated is to allow for a

“stormwater BMP offset” for use by builders, developers, agricultural operations, and urbanized communities.

Technology

- o Work with stakeholders to develop information and data management systems to integrate with Chesapeake Bay TMDL reporting requirements.
- o Engage county and municipal governments to identify areas and opportunities for retrofitting to address existing stormwater problems. This may also include targeting opportunities for cost-effective stormwater retrofits including offsetting provisions.
- o Identify case study examples that highlight innovative stormwater management components that demonstrate improvements in stormwater management and resulting water quality.

Contingencies

An adaptive management approach may include the following components:

Compliance

- Develop an Urban Nutrient Management Education Program to inform the public on the importance of proper fertilizer application techniques, and to reduce the amount of nutrients applied with the goal of maintaining adequate plant health, limiting soil erosion, and minimizing nutrient losses.

Milestones

- Identify programmatic, permitting or policy changes that are appropriate for improving stormwater management. This may include revisions to existing programs such as Act 167, watershed permitting or the development of an MS4 trading program.
- Better tracking of voluntary BMP implementation.
- Better utilization of existing funds and resources to target areas of greatest need.
- Explore how incentives could be utilized to accelerate BMP implementation.
- Develop and implement goals and objectives for fostering economic development, reduced sprawl and resource conservation within Pennsylvania's portion of the Chesapeake Bay watershed. These goals and objectives would be included in an interagency agreement similar in concept to the Keystone Principles for Growth, Investment, and Resource Conservation but with guidelines specific to reducing nutrient impacts to the Chesapeake Bay.
- EPA should assist DEP in improving the ability to track and account for existing urban stormwater management practices.
- Increase federal and state cost-share/grant funding.

Technology

- Promotion of new technologies that effectively demonstrate new approaches to N, P and sediment reductions.

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- Development of enhanced practices that supplement or replace existing practices.
 - Engage the appropriate entities at the Chesapeake Bay Program, such as the Scientific and Technical Advisory Committee and Nutrient Subcommittee's Urban Stormwater Workgroup regarding new and revised BMPs, and pollutant removal efficiencies for BMPs such as urban tree planting, canopy establishment and flood plain restoration.
 - Seek to quantify the reductions that will be obtained from the Chapter 102 regulations and local TMDL implementation plans developed for the MS4 program.
 - Explore options that address long term BMP maintenance.
 - Explore options to develop a program that encourages stormwater capture and reuse options that promote cost savings for landowners while advancing nutrient reductions.
 - Primary research needs include the design, longevity, maintenance, and benefits of BMPs.

Tracking and Reporting Protocols

DEP collects plan review, permit, and compliance information both internally and from delegated conservation districts and cooperating agencies. The data includes the number of: outreach activities, plans reviewed, permits processed, project acres, disturbed acres, inspections conducted, complaints received, and compliance or enforcement actions.

Section 10. **Onsite Wastewater**

Current Program and Capacity

DEP relies upon the Pennsylvania Sewage Facilities Act, also known as Act 537, for the development of municipal sewage plans which address the sewage needs of the jurisdictions addressed by the plan. In addition DEP has promulgated regulations per 25 PA Code Chapters 71, 72, 73 which deal with the plan development, the oversight of sewage facility permitting and the further operation and maintenance of the chosen alternatives, including on-lot disposal systems. Partial funding to assist the jurisdictions with this planning and the enforcement of its implementation is provided through appropriations by the Commonwealth legislature pursuant to Act 537.

DEP requires that onsite systems address denitrification in areas where the groundwater has been shown to be impacted severely. The Commonwealth of Pennsylvania at this time will not be developing or implementing a strategy to ensure that onsite wastewater systems require denitrification solely to provide nutrient reduction for the nutrient loading to the Chesapeake Bay.

Basis for DEP's Approach

DEP is not anticipating changes to its current onsite wastewater program for three reasons: limited technology options, limited contribution to the Bay, and limited benefit relative to cost.

From a technology perspective, DEP is unaware of onsite technology that can sufficiently reduce levels of TN in system effluent. While a reduction of 88 percent has been quoted by the EPA 202(a) Plan report, we have been unable to replicate this reduction in Pennsylvania. DEP recently completed an exhaustive study of a particular enhanced nutrient removal technology through our Technology Verification Protocol that relied not only on laboratory data, but also a three-year field testing of 12 "real" systems. The data collected from the field sites document that this advanced technology can only be expected to achieve a 50 percent removal efficiency when using a 95th percentile analysis. This is the only denitrification technology that is currently approved for use in Pennsylvania, although many other manufacturers have attempted to get such approval over the past 10 years and have either given up or failed to document the anticipated removal efficiency.

EPA has indicated that in aggregate onlot systems in the Chesapeake Bay watershed contributed about 4 percent of the total nitrogen loading to the Bay in 2008, making them relatively minor contributors both individually and collectively. If we assume that 33 percent of the 4 percent nitrogen load is delivered to the Bay from Pennsylvania (a very liberal assumption given the significant travel times in relation to Maryland and Virginia), that would mean that 1.3 percent of the Bay nitrogen loading comes from Pennsylvania septic systems. Given that the best technology available in Pennsylvania only guarantees a 50 percent reduction from each system, if we were to retrofit each of the 759,221 septic systems in the Bay watershed, at most we would see would be a 0.65 percent reduction in nitrogen loading.

Under the above admittedly unrealistic best case scenario, the total estimated cost would be \$8.7 billion. This cost translates to over \$11,000 to retrofit each system, or \$705,000 per ton of TN removed (the cost per ton removed would undoubtedly be much higher due to the delivery ratio considerations previously mentioned). DEP does not believe that this expenditure is justifiable, and we are confident that sufficient reductions will accrue in other sectors to compensate for the lack of a septic retrofit program.

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Section 11. **Forestry**

Current Programs and Capacity

Laws and Regulations regarding Forestry Practices in Pennsylvania

Forestry practices are regulated by their potential to impact water quality. In Pennsylvania, all earth disturbance activities must be undertaken in accordance with DEP's Chapter 102 Erosion and Sediment Control regulations adopted under the authority of the Clean Streams Law. Under these regulations, all earth moving or earth disturbance activities over 5,000 sq. ft., including timber harvesting activities, must have an Erosion and Sediment Control Plan developed, implemented and maintained to minimize accelerated erosion and resulting sedimentation to the waters of the Commonwealth. Timber harvesting operations that will disturb 25 or more acres require a permit from DEP (the earth disturbance area is the total area of haul roads, landings, and skid trails). Inquiries as to whether or not a permit is required should be addressed to the local county conservation district or DEP Regional Office.

Activities associated with timber harvesting operations are also governed by DEP's Chapter 105 Dam Safety and Waterway Management regulations adopted under the provisions of the Dam Safety and Encroachments Act and the Fish and Boat Code – Act 175. The Chapter 105 regulations govern the crossing of streams; construction of culverts, fords and bridges, and other impacts to water courses and wetlands that occur during man-made activities. Commonly used general permits are GP-7 – Minor Road Crossings and GP-8 – Temporary Road Crossings.

Many forest-based activities in Pennsylvania are also managed through non-regulatory means, including technical assistance and guidance provided by DCNR and its public and private partners. DCNR manages the Commonwealth's 2.2 million acres of state forestlands – 2 million acres of which are located in the Bay watershed – as well-managed forest under both the Forest Stewardship Council and Sustainable Forestry Initiative third-party certification programs. DCNR and partners also provide technical assistance to Pennsylvania's more than 600,000 private non-industrial forestland owners and to interested industrial forestland owners and public forestland owners. A Guide for Pennsylvania Timber Harvest Operations is available online at: <http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-75591/3930-BK-DEP4016.pdf>. This guide includes laws and best management practices that benefit water quality. Additional guidance documents include *Best Management Practices for Pennsylvania Forests* (Penn State U., 1999) and DCNR's *Guidance on Harvesting Woody Biomass for Energy in Pennsylvania* (2009).

Programmatic

DCNR Assistance to Private Landowners

One of the Bureau of Forestry's primary programmatic activities is to provide technical assistance to private forest landowners who hold nearly 7 million acres within the Chesapeake Bay watershed in Pennsylvania. DCNR's Harrisburg-based Rural and Community Forestry

(RCF) Staff, along with 21 Service Foresters (CFM) posted throughout the Bay region, provide technical support to private forest landowners and communities. RCF and CFM staff work closely with other state, county and federal agencies, universities and non-profit organizations to coordinate and promote forestry-related Farm Bill programs for private landowners statewide. Working with private forestland owners to develop comprehensive forest stewardship plans, a critical education and planning tool for sustainable forest management and a requirement of some Farm Bill programs, has resulted in more than 3,000 completed plans across the state to date. Hands-on assistance to landowners through service-forester and consulting-forester visits provides owners with working knowledge about best management practices for harvesting, wildlife, water quality, non-timber products, and many others.

Urban and Rural Reforestation

Two additional DCNR-based programs promote reforestation of urban and rural parts of the Bay watershed. The TreeVitalize Program is a DCNR program whose goal is to plant 1,000,000 trees by 2012. The program includes a riparian buffer component to encourage the replanting of streamside forests, particularly in urbanized areas. The program aims to plant 800,000 riparian trees to reach the 2012 goal. Although DCNR is the primary funding source for this program, key partners include the Alcoa Foundation, The Arbor Day Foundation, Plow and Hearth, and WITF Radio (Harrisburg). Other partners include county Conservation Districts, the Chesapeake Bay Foundation, and the Alliance for the Chesapeake Bay. While the program began three years ago in Pennsylvania's largest urban areas - Pittsburgh and Philadelphia - it has since expanded to the Bay watershed in 10 urban communities, including Williamsport, Harrisburg, and York.

The Bureau of Forestry also manages Penn Nursery in Centre County to raise and sell forest tree seedlings for purchase by Pennsylvania landowners for watershed protection, wood products, soil erosion control, reclamation of areas affected by open pit mining, or wildlife food and cover. These seedlings are not limited to urban settings. Due to the State budget shortfall in 2009, however, seedling sales for the spring of 2010 to private landowners were suspended.

REAP

A state program adopted to promote development of forested riparian buffers and other water-quality improvement practices on agricultural lands is the Resource Enhancement and Protection program (REAP). This Pennsylvania state tax credit program allows farmers and businesses to earn tax credits in exchange for implementing best management practices to enhance farm production and protect natural resources.

Farmers can receive tax credits of up to \$150,000 per agricultural operation for 50 or 75 percent of the total cost of a conservation project, depending on the best management practice implemented.

The program is administered by the State Conservation Commission and the tax credits are awarded by the Pennsylvania Department of Revenue. The program was funded at \$10 million in FY 2007 and 2008, at \$5 million in FY 2009, and at \$4.5 million in 2010.

Agroforestry Programs

DCNR is also working with the Pennsylvania Association for Sustainable Agriculture (PASA), Penn State Extension, and NRCS to develop agroforestry programs to provide income streams from farm woodlots and forests to better integrate forestry into farming operations. DCNR's Conservation Community Partnership Program (C2P2) grants program has been funding the Shop Local/Save Farmland program in the northeastern corner of the state to help keep working farmland in operation and save it from development. The program is expanding, through DCNR and other grant funds, to the Bay watershed in the South Mountain area of Adams, York and Franklin counties to develop marketing tools and networks to help keep both farmland and forestland intact and working.

Working Woodlands

Pennsylvania non-profit organizations play a strong role in forest conservation in the state. In 2010, The Nature Conservancy (TNC) introduced its working forest initiative, Working Woodlands, a model forest conservation program that harnesses the growing carbon market to catalyze private forest protection and high quality certified forest management. The Nature Conservancy's Pennsylvania Forest Conservation Program is a Forest Stewardship Council (FSC) Certified Resource Manager (CRM) allowing the Conservancy to provide FSC certification for private landowners. Cooperating with private forest consultants, TNC will conduct rigorous forest and carbon inventories and develop FSC certified management plans for enrolled landowners. Landowners who qualify for Working Woodlands sign on for long-term land management agreements or working forest conservation easements to prevent conversion to non-forest uses and unsustainable management practices. All forest products produced from Working Woodlands properties will be FSC-certified and the landowner will retain 100 percent of solid wood and wood biomass revenues.

The carbon sequestered as a result of avoided forest land conversion and improved forest management practices will be aggregated and marketed as offsets by Blue Source, providing an additional revenue stream to the landowner. A portion of the carbon revenue will cover the Conservancy's and Blue Source's costs of providing a full forest inventory and FSC plan implementation, as well as carbon monitoring, verification and marketing. This approach allows landowners to receive full FSC forest planning and certification with no upfront costs while receiving long-term value from both FSC certified product and carbon sales.

University Research

DCNR works closely with Penn State University and other researchers to conduct forestry-based research programs. Many of these are funded, in part, by U.S. Forest Service state and community forestry funds. One current research project underway in Pennsylvania is looking at the concept of Forest Security Areas, modeled on successful Agricultural Security Areas.

Pennsylvania, like many Eastern states, faces unique challenges in retaining its working forest. While its population has changed relatively little in recent years, it is fourth in the conversion of forest and agriculture lands through urban expansion. A recent study at Penn State University found the state has well more than 600,000 private forestland owners who together hold nearly

12 million acres of forest. The average tenure for these ownerships is nine years. As a result of changing ownerships and frequent parcelization, the potential to retain working forests, or to even meet some landowner objectives, is threatened.

This Penn-State assessment seeks to understand forest owner willingness to create Forest Security Areas, similar to agricultural security areas, wherein development is restricted and activities are pursued to manage forests at a landscape level to ensure their continuance as working forests. Ultimately, the goal of the research is to identify steps to implement a Forest Security Area in two counties within the Chesapeake Bay watershed.

Riparian Forest Buffer Initiative

DEP also plays a major role in forestry through support and administration of a riparian forest buffer program. DEP's Stream ReLeaf Database and Riparian Forest Buffer Initiative tracks buffer projects established by various agencies and groups. The tracking of those submissions began in 2003 in the Chesapeake Bay Watershed and has now expanded statewide. Most of the projects being tracked through the database have been funded by: Alliance for the Chesapeake Bay, Chesapeake Bay Foundation, Conservation Reserve Enhancement Program (CREP), Fish and Boat Commission, Growing Greener, The 319 Program, Watershed Restoration Assistance Program or The William Penn Foundation.

Since riparian buffers are crucial to the protection and enhancement of the water resources of Pennsylvania, DEP is continuing an initiative to restore and protect these extremely complex ecosystems. This initiative formerly called "Stream ReLeaf" uses a triangular approach that brings a regulatory component together with technical and financial assistance for the restoration and protection of Riparian Forest Buffers (RFBs) on the edge of streams, rivers, lake and ponds. The following is a summary explaining the 3 components and how they interrelate:

Regulatory component. The primary focus currently is regulatory revisions to the Chapter 102 - Erosion and Sediment Control and Stormwater Management program and regulations. These regulations prohibit earth disturbance activities within 150 feet of a perennial or intermittent river, stream, or creek, or lake, pond, or reservoir, and requires the protection of any existing riparian buffer where the project site is located in Exceptional Value (EV) or High Quality (HQ) waters which are attaining their designated use. If the project site is located in EV or HQ waters failing to attain one or more of its designated uses the person proposing the project must not disturb any earth within 150 feet of a perennial or intermittent river, stream, or creek, or lake, pond, or reservoir, and must protect an existing RFB, convert an existing riparian buffer to a RFB, or establish a new RFB. The final rule sets out criteria for RFB establishment, RFB management requirements, and exceptions to riparian buffer requirements for certain activities. In addition the final rule provides for an antidegradation presumption and for the trading or offsetting of credits for RFBs. Voluntary RFBs may be established to qualify for antidegradation presumption and trading or credits. The final rule identifies what activities are prohibited, allowable by DEP authorization and allowed in the riparian buffers. DEP is continuing to evaluate the use of RFBs in other program areas such as mine permitting, abandoned mine reclamation projects, and Brownfield development.

Regulatory options requiring RFBs will refer to the technical assistance tools described below for specific RFB establishment and protection recommendations, as well as environmental and economic benefit of RFBs.

Technical Assistance Component. RFB technical assistance is proposed to be accomplished using 2 primary tools.

1. **Riparian Forest Buffer Technical Guidance:** The primary purpose of this guidance is to assist DEP staff in providing and further developing general buffer recommendations for regulatory, voluntary and grant programs. It will also serve to assist any interested entities (municipal, regional, state, federal and others) by providing important information that can be used in developing appropriate science-based guidelines or policies.

The guidance contains science-based descriptions of the environmental benefit of RFBs; recommendations for minimum width, location, and composition for existing and newly established RFBs; and discussions on other related topics including climate change, social and economic benefits, and permanent protection for RFBs. The guidance provides the science-based recommendations and background that can be referenced and used in the above mentioned regulatory component.

2. **Pennsylvania Stream ReLeaf Forest Buffer Toolkit:** The Toolkit was originally written in 2000 by DEP staff and the Alliance for the Chesapeake Bay, updated once in 2004 and is now in need of revision. The toolkit, once revised, will serve as the “how to” companion piece to the Forest Riparian Buffer Technical Guidance. Its primary focus will be describing state of the art information specific to Pennsylvania on: Streamside Forest Site Planning; Buffer Establishment; Buffer Maintenance and Protection; Native Riparian Tree/Shrub Plant Lists; Relevant Field Guides and Other References. The toolkit will serve as a general resource for Watershed Organizations, County Conservation Districts, School Districts, Land Managers and government agencies including DEP.
3. Technical assistance training and outreach will be accomplished, in part, through a partnership with the Alliance for the Chesapeake Bay to provide training to DEP staff, key stakeholders and the public on the establishment and protection of RFBs.

Financial component. Currently DEP provides financial assistance through a variety of programs for the installation and protection of RFBs. Perhaps the single largest source of funding for RFBs is through the Conservation Reserve Enhancement Program (CREP). This USDA/PA joint program provides funding to eligible landowners for the creation of new RFBs and the protection of existing RFBs. In 2006, DEP refocused state participation in the Conservation Reserve Enhancement Program (CREP) to encourage installation of edge of stream practices such as RFBs. As part of this refocusing effort, the DEP requires landowners to protect existing RFBs on their properties for the duration of the CREP contract (which is 15 years for the majority of participants). If landowners sign a Riparian Forest Buffer Protection Land Owner Assurance with the DEP, they are eligible for state cost share on other conservation practices that are more than 180 feet from the stream. To date nearly 400 landowners have signed agreements with the DEP to protect existing RFBs. DEP staff began inspection of the existing RFBs in 2008. The purpose of the inspection is to ensure the RFBs are being protected, determine their

size and composition and identify candidate RFBs for permanent protection under conservation easement. DEP's Growing Greener program also funds projects that create new RFBs and protect existing RFBs. RFB creation and protection has been and will continue to be a priority in the Growing Greener grant solicitation and funding process. Other funds are provided for RFB establishment through the federal 319 program, Chesapeake Bay Program, and several federal grant opportunities.

Appalachian Regional Reforestation Initiative

The Appalachian Regional Reforestation Initiative (ARRI), a federal partnership program that supports planting trees for water quality, is a coalition of citizens, non-profit groups, the federal Office of Surface Mining (OSM), and states who are dedicated to restoring forests on coal mined lands in the Eastern United States. GIS analysis indicates that there are 120,000 acres of Abandoned Mine Lands within the Upper Susquehanna--Lackawanna River Basins. These lands represent a great opportunity to expand forest cover within the Bay watershed while reintroducing native trees to the region. The restoration has already begun. Working with the American Chestnut Foundation, the Pennsylvania Game commission and 30 volunteers, the program planted 2,500 trees on abandoned mine lands in Schuylkill County in 2009. DCNR, Penn State University, OSM, the US Forest Service, and the Army Corps of Engineers have signed agreements with The American Chestnut Foundation to help restore the American chestnut through this program.

Dirt and Gravel Road Program.

The Pennsylvania State Conservation Commission's Dirt and Gravel Road Maintenance Program, in partnership with Penn State Center for Dirt and Gravel Road Studies, DEP and DCNR, provides training and funding to local road owning bodies. The purpose of this program is to alleviate sediment pollution to streams and mitigate dust originating from dirt and gravel roads. The program annually apportions \$4 million to county conservation districts who administer the program at the local level. The conservation districts work with local road-owning entities, mostly townships, to develop work plans to mitigate confirmed pollution problems on unpaved roads. The DCNR Bureau of Forestry (BOF) directly receives \$1 million in state funding to help maintain over 1,400 miles of dirt and gravel state forestry roads within the Bay watershed and actively participates in these training programs.

Pennsylvania Sustainable Forestry Initiative (PA SFI)

The PA SFI program is the primary delivery mechanism to loggers and forest practitioners on Best Management Practices (BMPs), regeneration and resource conservation, safety and OSHA issues. Environmental Logging is a required element of the core curriculum and a PA SFI continuing education typically incorporates necessary updates of BMPs, as well as specific courses that cover more advanced environmental and forest management issues. Nearly 700 individuals are current with their PA SFI training requirements. This training is required to operate on DCNR state forest timber sales. PA SFI also provides landowner outreach on forest management, sustainable timber harvesting and the utilization of BMPs. More than 26,000 landowner information packets have been distributed since the programs inception.

The PA SFI program is a voluntary effort, administered by the Pennsylvania Forest Products Association according to the standards of the national Sustainable Forestry Initiative Program. Oversight is provided by a Pennsylvania State Implementation Committee, which includes representation from industry, harvesters, forest practitioners, DCNR, PA Dept. of Agriculture, U.S. Forest Service, conservation districts and Penn State. Funding is primarily provided by industry support. In the past, the program was supported by the Commonwealth with a grant from the PA Department of Agriculture's Hardwoods Development Council, but this has been eliminated due to recent state budget cuts.

Funding

Funding for forestland conservation has come primarily from state Growing Greener funds, Key '93 funds, and the Oil and Gas fund. These sources are in jeopardy, either scheduled to expire soon, declining with the recession, or diverted to help balance the state budget. New creative funding solutions hold some hope for conservation of these lands in the future. The newly re-energized Chesapeake Bay Program is putting increasing emphasis on protection of forestland and urban forest renewal. Trading schemes for carbon and nutrients may be able to offer cash to forestland owners soon, and economic incentives like tax credits may help forestall more forestland sell-offs. Landowner networks that pool information, aggregate forest-resource value-added chains and promote land preservation have begun to help regions resist fragmentation and development, while new planning and prioritization efforts like the development of voluntary Forest Security Areas may help neighbors access more federal funding for conservation.

Federal funding through Forest Legacy has been important to Pennsylvania over the years but these increasingly limited funds cannot meet current demand for land conservation in the state. Additional revenues anticipated this year from the stateside Land and Water Conservation Fund for Pennsylvania should make some additional funding available for forestland conservation. The newly created Healthy Forest Reserve Program in the 2008 Farm Bill has already proven a boon to the state with a new \$1.3 million award to Pennsylvania NRCS for conservation of forestland habitat to benefit the federally endangered Indiana bat in 12 counties in the state. Numerous county bond initiatives in recent years have provided county and township-level funding for open space, and continue to prove popular to voters, particularly in the eastern counties like Chester and Montgomery. In 2009, despite the economic downturn, voters in Adams County within the Bay watershed approved a bond to protect forested lands and other open space in the county. Pennsylvania's more than 300 active land trusts and conservancies also contribute financially with foundation and private funds to protect forestland.

Staffing

DCNR's Harrisburg-based Rural and Community Forestry (RCF) staff, along with 21 Service Foresters (CFM) posted throughout the regions; provide technical support to private forest landowners and communities. Salaries and benefits for BOF staff are paid mainly through the general fund and partly through income derived from state forest land. Income sources from state forest land include timber sales and gas and oil leases.

There are three full-time RCF Forest Program Specialists whose primary responsibilities are urban forestry, forest stewardship and watershed forestry. These individuals, along with the

section chief, administer private forestry programs across the state. RCF staff, housed in the Harrisburg central office, is assisted by two contract program coordinators: a Chesapeake Bay Forester whose focus is the Chesapeake Urban Tree Canopy Goal, and a TreeVitalize Coordinator who directs and administers the TreeVitalize program. The Chesapeake Bay Forester position is funded through a USFS Chesapeake Bay grant and the TreeVitalize coordinator is funded through a DCNR Bureau of Recreation and Conservation (BRC) grant.

CFM foresters provide on-the-ground assistance to communities and landowners and feedback to the central office staff. However, many CFM foresters divide their time between private forestry and state forest management, thus are not fully dedicated to stewardship outreach. Demands on their time have been intensified due to recent budgetary and staffing cuts; CFM staffing was reduced by 19 percent, resulting in 15 full-time equivalents to provide technical support to 7 million acres of private forest land across the 33 counties within the Bay watershed. In addition, many of these foresters are engaged in urban and community forestry, working to improve urban tree canopy and stormwater management.

Technical Capacity

BOF staff work collaboratively with a number of agencies, university staff, technical service providers, and non-profit organizations to promote forest benefits, BMPs, and conservation. Through USFS grants, the BOF provides funds for 4 external urban forestry positions within the Chesapeake watershed. This collaborative relationship with Penn State Extension amplifies the urban forestry network and provides training for technical service providers, landowners, community staff and volunteers, and BOF staff. Continued USFS funding is critical to this program.

BOF is working with NRCS on a state level to promote forestry practices and agroforestry to enhance forestry across the region. The efficiency and level of collaboration at the field level is highly variable and seems to be a function of location. Some BOF field staff members are co-located with NRCS and Conservation District staff. Others have relatively little interaction with these agencies. Efforts are underway to provide cross-training of BOF and NRCS staff to enhance cooperation and integration of forestry practices.

Accounting for Growth

There are two forest-related sectors in the EPA watershed model projections for Pennsylvania: forest, and harvested forest. EPA lists 10,236,466 acres of forested land in Pennsylvania's Bay watershed area, and assumes 1 percent of this acreage is timbered annually, or 102,889 acres of harvested forestland per year. While the Pennsylvania timber industry considers this number of harvested acres to be high, DCNR's Bureau of Forestry assumes the model's estimate is on the low side, so the estimate is reasonable.

The EPA model estimates average per-acre and total loadings of N, P and sediment from Pennsylvania's forested acres. The model uses an assumption that 16 pounds of N per acre per year falls on forested acres through airborne deposition, and that 14 of those pounds are trapped, fixed or otherwise tied up in the vegetation and soils on site, resulting in a net average of 2.1 pounds per acre per year as a loading rate. While this is the lowest loading rate of any land-use

category recognized in the Bay model, the sheer number of forested acres in Pennsylvania means the total loadings of N from forestland is 21,765,802 pounds per year, or 20 percent of the total N from Pennsylvania's Bay watershed.

Similarly, forested acres are assessed a P loading rate in the model of 0.06 pounds per acre per year, for a total annual loading of 569,689 pounds per year or 14 percent of PA's total Sediment is calculated at the rate of 0.02 pounds per acre per year, for a total loading rate of 226,211 pounds per year or 18 percent of the total.

A portion of the forest load is attributed to nutrient and sediment losses associated with forest harvesting practices. These activities account for 1,627,779 pounds N per year. These loads can be reduced by implementing forest harvesting practices which have an efficiency of 50 percent for N, and 60 percent for P and sediment per acre of forest land. The remaining forest load at 20,129,023 pounds N per year can only be reduced by reduction of the air deposition load to forest land.

Many of the forested acres are managed with best management practices that are not currently recognized or counted in the Bay model. DCNR hopes that additional BMPs, including certified forest acres, forest stewardship-plan-guided management, avoided conversion, carbon sequestration, and augmentation of urban and suburban tree canopies, will be recognized and counted in the model. DCNR's own 2 million acres of state forestland in the Bay watershed, along with the Pennsylvania Game Commission's 1.04 million acres of forestland in the Bay watershed, are all well-managed and follow multiple best management practices – a minimum of 30 percent of the total of Pennsylvania's Bay forested acreage is now managed under BMPs.

The model sector labeled "harvested forest" makes a different calculation to arrive at loading rates for N, P and sediment. In Pennsylvania, harvested acres are assumed to pass all airborne loadings directly into Bay receiving waters, so each acre is credited with loadings of 15.9 pounds of N, 0.46 pounds of P, and 0.21 pounds of sediment per acre per year. Multiplying the per-acre loading rate times 102,889 total acres of harvested forest, the model predicts contributions from this sector of 1,641,261 total annual pounds of N or 2 percent overall; 46,898 total pounds of P or 1 percent overall, and 21,923 pounds of sediment or 2 percent overall.

Here is where we believe the model is fundamentally flawed. While timber practices and use of BMPs varies widely, even a clear-cut forest using no BMPs would not load nutrients and sediments at 100 percent as if it were a paved parking lot. Any timber cut retains some stumpage on site, along with tops, brush and other woody debris that continue to trap nutrients and slow runoff. Most importantly, the forest floor remains, which is the most important infiltration and interception site in any acre of forest. Emergent vegetation also remains in place, again providing nutrient retention and erosion protection. Finally, most cut sites regenerate, and new growth accelerates nutrient uptake.

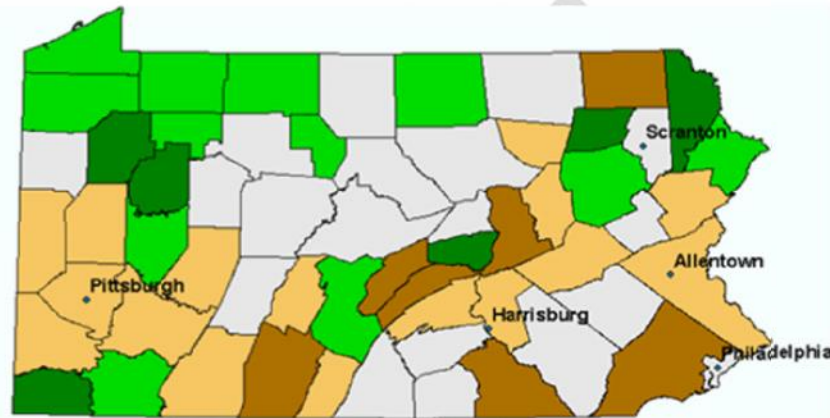
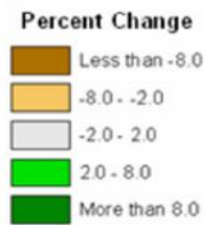
The use of BMPs makes a dramatic difference in loading rates on timbered lands. A literature review by Edwards and Williard for the Bay Program summarizes paired-watershed studies comparing loading rates for harvesting with and without BMPs. Their review yielded the following recommended efficiencies: 50 percent as conservative for sediment, 40 percent as conservative for total N, and 50 percent as conservative for total P. These are efficiencies in

nutrient and sediment retention from harvested acre with no BMPs to harvested acre with BMPs. No comparisons have been done on nutrient and sediment retention rates between harvested acres and a parking lot, so the efficiency rates for harvested acres [BMPs and no BMPs] should actually be considerably higher than 50 percent over current assumptions in the model. DCNR would suggest a revision to the model that assigned a much lower loading rate off harvested forest lands, and a 50 percent reduction of that revised figure for harvested forestlands using BMPs. Actual loading rates might be more like 3 to 4 pounds per acre N for harvested acres with BMPs, and 6-8 pounds per acre N without BMPs. Because DCNR alone timbers 11,000 acres within the Bay watershed a year, all using BMPs, and the Game Commission timbers 5,600 acres within the Bay watershed a year, all using BMPs, and both agencies promote use of BMPs on privately owned timberlands and game –cooperator lands, it would not be radical to assume at least 25 percent of all harvested forestland in the Bay watershed had a drastically lower loading rate for N, P and sediment than now calculated by the Bay model. Adding to that correction the retention of forest floor, woody debris, emergent vegetation and regeneration growth, the actual loadings from harvested forestland are likely much lower still. In accounting for growth, there is still room for improvement through more widespread use of BMPs on harvested forestlands, and this is the sector where any tangible gains to water quality will come from.

The forest-land base has been relatively stable for the last half century and now is the dominant land class at 58 percent. The 16.6 million acres of forest land reported for Pennsylvania's 2004 inventory represents a slight but not statistically significant decrease from the previous inventory's estimate (16.7 million acres) in 1989 (Forest Inventory Analysis, U.S. Forest Service). While Pennsylvania's overall forest-cover growth rate has been stable for the past two decades, regional differences in forest growth and forest losses are pronounced. Most of the regions either losing or gaining forestland, however, are outside of the Chesapeake Bay watershed. The southeastern region of Pennsylvania stretching from Philadelphia to Lancaster, for example, has the smallest proportion of forestland cover at 22 percent and is one of the fastest developing regions, but much of the land-cover loss is agricultural land. The northeastern corner of the state, including the Poconos, is the fastest developing area of the state due to population immigration from New York City and is heavily forested, but lies outside the Bay watershed. The area of the state experiencing the most new forest growth, the northwestern corner, is adding forestland due to afforestation of abandoned mine lands and pasture lands, but again, lies outside the Bay watershed.

The two major regions that are in the Bay watershed are relatively stable in terms of retaining forest cover, but vulnerable to future losses for different reasons. The north-central region, which includes large tracts of state-owned forest, predictably contains the largest amount of forest land (79 percent). Much of this region, excluding the Allegheny National Forest, lies within the Bay watershed, and has by far the largest acreage of state forestland, and the highest number of Exceptional Value watersheds and streams (DEP). This 12-county region was designated The Pennsylvania Wilds, DCNR's first Conservation Landscape Initiative, to promote sustainable economic development while conserving the region's outstanding natural resources. It has the largest land base of any region but only 4 percent of the state's population, only one city over 15,000 in population, and the lowest per capita average income and housing prices [Econsult, 2009]. While timbering remains active in this region, threats are growing due to fragmentation and other impacts from energy extraction and transmission.

The south-central region of the state, including portions of the Susquehanna River and Potomac River drainages, still has a number of large forest tracts intact, protected primarily through state forest and state parks. Recent acquisitions of privately owned timberlands have bolstered state forest holdings. However, development pressure from Maryland and even Washington, D.C. on border counties is accelerating fragmentation and forest loss in this Chesapeake drainage region. A state focus on acquiring forested riparian lands along the lower Susquehanna River in York and Lancaster counties currently owned by utility companies who operate hydroelectric dams in this region may help preserve forested corridors in this region in coming years.



Source: U.S. Forest Service, Pennsylvania Forest Land, Pennsylvania 1989-2004

Forest-Land Loss and Gain

Although no significant net change has occurred in Pennsylvania’s total forest area, both losses and gains in forest continue at various scales. In such a dynamic, the total acreage of forest area may remain the same while shifts occur in the forest-land base. Therefore, characterizing this base as having “no net change” may not accurately represent actual changes in forest distribution, character, and composition. County-level changes in forest land are shown above. Many counties in the north-central and northeastern regions indicate an overall gain in forest land. Losses in forest land at the county level are prevalent in more urbanized counties, particularly in the southeastern region and in some counties in the south-central region. Many counties that show a net loss of forest land are located near urban centers or major connecting highways. Eastern Pennsylvania is part of the band of urban development that follows Interstate 95 along the East Coast. These areas are characterized by large cities, e.g., Philadelphia, with little forest land. Surrounding areas often include development patterns that have led to small patches of highly fragmented forests.

NRS-FIA data indicate that more than 663,000 acres of forest land were lost from 1989 to 2004, an average of about 44,000 acres per year. Nearly two-thirds of the forest land, or 28,000 acres per year, was diverted to residential and industrial development and likely is permanent.

During the same period, there was a 617,500-acre gain in forest land. About 350,000 acres (58 percent) of the gain was from agriculture. In this situation, abandoned fields commonly revert to forest through natural succession. This trend has offset most of the observed permanent loss of forest land and has allowed for the stable acreage in forest. That the most common agricultural

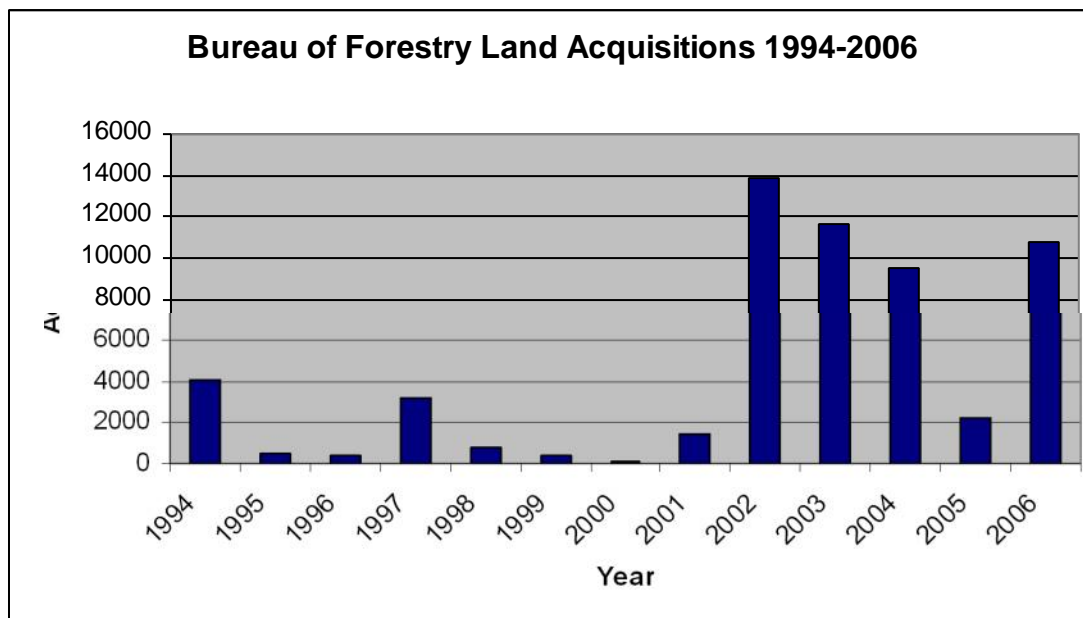
land conversion is to urban land uses might limit this land type as a source for gain in forest land in the future. Reclaimed mined land and rights-of-way were other significant sources of forest gains.

The rate of growth in Census-classified urban areas in the United States over the next several decades was modeled by Nowak and Walton (2005). Counties on the East Coast, including those in Pennsylvania, are projected to have some of the highest rates of urbanization over the next 50 years. The study projected that U.S. urban land will increase from 3 percent in 2000 to 8 percent in 2050. This growth could significantly transform the Commonwealth's forests and attitudes regarding those forests, particularly in the northeastern and southern regions.

Gap Analysis

The Chesapeake Bay Executive Council, including Pennsylvania's governor, signed three forestry-related directives designed to improve water quality in the Bay. These directives include a riparian forest buffer goal, a forestland conservation goal for priority watersheds, and an urban tree canopy expansion goal. Pennsylvania committed to planting over 3,300 miles of riparian forest buffers by 2010. To date, Pennsylvania has recorded 3,524 miles of riparian forest buffers within the Bay watershed and is the only signatory state to achieve this goal prior to the 2010 deadline. In addition, the Commonwealth has agreed to conserve an additional 100,000 acres of forested land within priority Bay watersheds by 2025 and to work with 10 Bay communities to assess existing urban tree canopy cover and to assist communities in setting and attaining new canopy goals. This conservation goal translates into approximately 8,000 additional forested acres a year.

One of the ways Pennsylvania has helped to maintain its steady percentage of forest cover in the midst of high sprawl and development rates is through public acquisition of threatened forestlands to add to the state forestry and parks systems. While private forestland acreage continues to diminish, state-owned forestland acres have increased over the past dozen years. Between 1994 and 2008, DCNR worked closely with municipal, industrial, and non-profit partners to secure an additional 81,217 acres for its state forest system, bringing the total acreage to 2.1 million acres. This investment cost \$38,227,773. The chart below shows the annual increases in state forestland acquisitions from 1994-2006, with largest gains coming in recent years. Because the source of funds that support these acquisitions began declining in 2008, the rate of future forestland acquisition into the state forestland system is expected to also decline unless a new source of state acquisitions revenue is secured. Last year state figures for forestland protection within the Bay totaled 4,141 acres, only half the investment needed to meet the 8,000-acre-per-year conservation goal.



DCNR, 2009

A snapshot of Pennsylvania forestland in 2009 shows several clear trends. Overall, total forestland acreage across the state is holding steady as losses in urbanizing areas are counterbalanced by afforestation, primarily of agricultural lands. Recent expansion of natural gas drilling in the state and pipeline and overhead transmission line expansion for energy conveyance will likely accelerate forest fragmentation at higher rates in the next few years relative to the past 10-20 years. Forestland ownership patterns are changing even more rapidly. Half of private forestland acreage may change ownership in the next 22 years, with increased opportunity for harvesting as well as parcelization and fragmentation. Increasingly, smaller ownerships may mean fewer opportunities for timber harvest. While private landowners' reasons for ownership have not changed in recent years, there are many more landowners, making centralized planning and forest-resource decision-making more difficult and resource-intensive. Finally, the lack of available state-level programs and federal funding to conserve forestland through fee-simple or easement acquisition means current funding cannot keep pace with the need or demand for forestland conservation in the state.

An additional Pennsylvania forestry goal of the Bay Program is 125 acres of best management practices each year. We expect to be able to exceed this goal in coming years. For example, DCNR alone manages 11,200 acres each year in timber harvests in the Bay watershed with highest-level best management practices to meet its certification program requirements. Pennsylvania's State Game Lands provide an additional 6,000 acres of well-managed timber harvests for a total of 17,200 acres, not including other public lands and private lands.

Strategy to Fill Gaps

State Forestry Assessment Report

In June 2010, DCNR completed a State Forestry Assessment report for the U.S. Forest Service that analyzed trends, issues, threats, opportunities and strategies for improving and conserving forestland in the state. The results of that exercise are applicable to the state's Chesapeake Bay watershed, given renewed emphasis on conserving forestlands and federal funding. The following strategies and more detailed substrategies come from the Assessment.

Strategies

1. Promote acquisition of priority forestland in fee or through permanent easements by leveraging existing private, state, local and federal funding sources.
2. Develop and promote new funding mechanisms to finance forestland conservation.
3. Slow the present rate of forestland conversion through state and local government cooperation and legislation.
4. Address forest fragmentation and conversion from inter-generational land transfers through outreach and education of individual private forestland owners.
5. Develop and promote approaches to conserving and revitalizing forest-dependant communities.
6. Accelerate afforestation and reforestation through new and ongoing state, federal, local and private programs.

Substrategies

1. Promote acquisition of priority forestland
 - a. Advocate for full funding for federal and stateside Land and Water Conservation Funds
 - b. Advocate higher funding levels for the USDA Healthy Forest Reserve Program and Forest Legacy.
 - c. Work through private funders, including new health care conversion funds and smaller community foundations, to prioritize forestland conservation
 - d. Work with land trusts and conservancies to better target priority forestland, combine resources, and increase forestland donations
 - e. Develop outreach materials for landowners on the financial benefits of easements and tax credits
2. Develop and promote new sources of funding for forestland conservation
 - a. Develop/broaden tax credits for forestland conservation in Pennsylvania
 - b. Advocate for federal cap and trade legislation to provide incentives and markets for carbon credits
 - c. Encourage development of ecosystem service credits, such as nutrient credits for forestland water quality protection
3. Slow forestland conversion through state-local cooperation and legislation
 - a. Encourage municipalities to adopt protective forest zoning

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- b. Incentivize forestland conservation through recognition of “forest managing communities”
 - c. Promote statewide legislation to require mitigation (reforestation) for forestland acreage losses due to development.
 - d. Eliminate state subsidies for Greenfield development
 4. Address forestland fragmentation and conversion through inter-generational transfers
 - a. Provide additional outreach and education materials to technical assistance providers, including service foresters and agricultural extension staff
 - b. Develop new landowner education materials specifically focused on inter-generational transfer issues and opportunities
 - c. Support university research on incentives to promote inter-generational forestland retention
 5. Develop and promote approaches to conserving and revitalizing forest-dependant communities
 - a. Promote and fund private landowner and wood-industry networking efforts like Woodnet
 - b. Develop multi-owner forestland partnerships, or Forest Security Areas, that would be prioritized for Farm bill funding like Farm Security Areas
 6. Accelerate afforestation and reforestation through new and ongoing state, federal, local and private programs
 - a. Develop programs for large-scale suburban reforestation
 - b. Support local grow-out centers for seedlings to make them cheaper and widely available for reforestation efforts in rural and urban communities
 - c. Work with DEP and OSM to promote afforestation of abandoned mine lands through the Appalachian Reforestation R-- Initiative.
 - d. Work with Department of Agriculture to promote silvopasturing

Remediation of Acid Mine Drainage Sites

Remediation of Acid Mine Drainage (AMD) sites in forested areas represents an opportunity for increased biological activity and algal uptake of nutrients and should be accounted for as reductions to the forest load in the Bay model. A study completed by Stroud Water Research Center showed that “despite near-neutral pH in the AMD-impacted stream (Lorberry Creek), iron hydroxide deposition interferes with normal periphyton colonization and enzyme activities”. Rattling Run, an Exceptional Value stream in the anthracite region, had chlorophyll-a levels nearly fifteen times greater than Lorberry Creek. Stroud also stated that the “most important implication of these findings is that, although water chemistry in a stream might be technically within a range that can sustain aquatic life (i.e. circumneutral pH and low dissolved metals concentrations), metal deposition on substrata clearly inhibits microbial colonization and severely limits phosphorus availability to aquatic bacteria, fungi, and algae.”

Therefore, the nutrients (especially phosphorus) being transported to Chesapeake Bay associated with metal hydroxide-based sediments, to which dissolved phosphorus has a strong affinity, could be reduced through remediation of the mined site and restoration of aquatic life to the stream. Similarly, even though the nitrogen species do not have the same affinity for sediments as the dissolved phosphorus, nitrogen uptake within the watershed by the benthic algae would decrease that available to be delivered to Chesapeake Bay. These reductions should be credited

to the forested areas because the load was probably attributed to forest in the original modeling as the calibration gauges are downstream of primarily forested sites.

Tracking and Reporting

Healthy forests have long been recognized as the best land use for water quality. Forested watershed quality can be degraded when natural or man-made events alter canopy cover. Storms, insect and disease outbreaks, and development on forested land all reduce forests' ability to capture and sequester nutrients and to reduce run-off. Ongoing forest inventories provide information about forest health and composition, whether the forest canopy is expanding or contracting and how land use is changing the face of Chesapeake Forests. Although the only true gauges of watershed health can be measured in the water, capturing land management and use is vital to effective modeling for Bay restoration.

The Chesapeake Bay Forestry Workgroup sponsored three Forestry Directives to contribute to Bay restoration. The first is a riparian forest buffer expansion goal. New buffers, measured in miles, are tracked by DEP in cooperation with Conservation Districts, non-governmental organizations and state agencies. The others, including an urban tree canopy expansion goal and a forest land conservation goal are tracked by DCNR Bureau of Forestry. Progress is annually documented and submitted to the Bay Program. The urban tree canopy goal is measured in both the number of communities assisted and the actual number of trees planted. The conserved land goal is ranked in the number of acres in priority watersheds that are conserved by both private and public entities.

Section 12.

Resource Extraction

Current Programs and Capacity

Resource extraction activities and abandoned mine lands (AML) have the potential to release sediment into nearby surface waters. Although these activities and sites are rarely a source of N or P, acid mine drainage from AML can impair the ability of streams to assimilate these nutrients effectively. This section describes Pennsylvania's programs and capacity for restricting the release of sediments from resource extraction sites.

Laws and Regulations

Since the 1960s, Pennsylvania has been a national leader in establishing laws and regulations to ensure mine reclamation and well plugging occur after active operation is completed. Mine reclamation and well plugging refer to the process of cleaning up environmental pollutants and safety hazards associated with a site and returning the land to a productive condition, similar to DEP's Brownfields Program. Pennsylvania is striving for complete reclamation of its abandoned mines and plugging of its orphan wells. These program elements include legislative, policy, and land management initiatives designed to enhance mine operator/volunteer/DEP reclamation efforts.

Reclamation methods include DEP's primary efforts to improve water quality through reclamation of abandoned mine lands (for abandoned mining) and through the National Pollution Discharge Elimination System (NPDES) permit program (for active mining). Funding sources that are currently being used for projects designed to achieve water quality benefits include the USEPA 319 grant program and Pennsylvania's Growing Greener Program. Federal funding is through the Department of the Interior's Office of Surface Mining (OSM) for reclamation and mine drainage treatment through the Appalachian Clean Streams Initiative and through Watershed Cooperative Agreements.

The DEP Bureau of District Mining Operations (DMO) administers an environmental regulatory program for all coal and noncoal mining activities. DEP offers remining incentives for coal mining which are geared toward reclaiming abandoned mine features and stabilizing the areas.

Regulatory programs are assisting in the reclamation and restoration of Pennsylvania's land and water. DEP has been effective in implementing the NPDES program for mining operations throughout the Commonwealth. This reclamation was done through the use of remining permits that have the potential for reclaiming abandoned mine lands, at no cost to the Commonwealth or the federal government.

Mining sites are regulated under the Clean Streams Law, the Surface Mining Conservation and Reclamation Act (for coal mining) and the Noncoal Surface Mining and Reclamation Act (for noncoal mining). Regulations include the following:

Chapter 77 Noncoal Mining
Chapters 86, 87, 88, 89 & 90 Coal Mining
Chapter 92 NPDES
Chapter 102 Erosion and Sedimentation Control.
Chapter 105 Dam Safety and Waterway Management

Oil and Gas activities are subject to the Oil and Gas Act and the Clean Streams Law. Regulations are found at Chapter 78.

Programmatic

The primary concept employed by the mining program in dealing with sediment issues is prevention. The permitting process provides the framework for the necessary measures, typically collection ditches and sedimentation ponds, to have effective controls. Standard BMPs are employed on most permits. In fact, the application forms for the Small Noncoal Permit and the Small Bluestone Permit include designs for pit sumps and sediment traps.

Coal mining permits and large noncoal permits typically include site-specific engineered Erosion and Sedimentation control plans.

There are about 1,750 permitted mine sites in Pennsylvania in the Bay watershed. Each of these permits include Best Management Practices for prevention of erosion and sedimentation. These permits also include revegetation plans to stabilize the post-mining reclamation area.

There are about 475 mining sites in the Bay watershed for which there are NPDES permits. These permits include effluent limits for suspended solid and/or settleable solids. These measures prevent contributions of sediment in the watershed.

The point of planning and permitting is to prevent increased sediment loads as the level of earth disturbance increases. Mine sites and oil and gas development sites are subject to permitting which minimizes their impact on loads. In the case of coal mining, most new mine permits include some remining where AML is reclaimed in the course of mining. While the potential impact of the earth disturbance for mining is temporary, the overall improvement (i.e. the reclamation of AML) is permanent.

DEP's Oil and Gas program has developed and implemented an Earth Disturbance General Permit under Chapter 102.

Funding/Staffing

The coal mining program derives up to 50 percent of its funding from the Title V grant (administered by the federal Office of Surface Mining, pursuant to the Surface Mining Control and Reclamation Act). The remainder of the program is supported through the general fund appropriation to DEP.

The noncoal mining program is paid for from the Noncoal Surface Mining and Reclamation Fund.

Total program cost for the coal and noncoal mining programs is about \$25 million per year. This supports a staff of about 200.

DEP BAMR, which administers the program to address the Commonwealth's abandoned mine reclamation program, has established a comprehensive plan for abandoned mine reclamation to prioritize and guide reclamation efforts for throughout the Commonwealth to make the best use of valuable funds

(http://www.portal.state.pa.us/portal/server.pt/community/pennsylvania%27s_comprehensive_plan_for_abandoned_mine_reclamation/13964). In developing and implementing a comprehensive plan for abandoned mine reclamation, the resources (both human and financial) of the participants must be coordinated to insure cost-effective results.

The following set of principles guides this decision making process:

- o Partnerships between DEP, watershed associations, local governments, environmental groups, other state agencies, federal agencies, and other groups organized to reclaim abandoned mine lands are essential to achieving reclamation and abating acid mine drainage in an efficient and effective manner.
- o Partnerships between AML interests and active mine operators are important and essential in reclaiming abandoned mine lands.
- o Preferential consideration for the development of AML reclamation or AMD abatement projects will be given to watersheds or areas for which there is an approved rehabilitation plan.
- o Preferential consideration for the use of designated reclamation monies will be given to projects that have obtained other sources or means to partially fund the project or to projects that need the funds to match other sources of funds.
- o Preferential consideration for the use of available monies from federal and other sources will be given to projects where there are institutional arrangements for any necessary long-term operation and maintenance costs.
- o Preferential consideration for the use of available monies from federal and other sources will be given to projects that have the greatest worth.
- o Preferential consideration for the development of AML projects will be given to AML problems that impact people over those that impact property.
- o No plan is an absolute; occasional deviations are to be expected.

A detailed decision framework is included in the plan that outlines the basis for judging projects for funding, giving high priority to those projects whose cost/benefit ratios are most favorable and those in which stakeholder and landowner involvement is high and secure. The Commonwealth is exploring all identified options to address its abandoned mine problem.

Since 2000, new approaches to mine reclamation and mine drainage remediation have been explored and projects funded to address problems in innovative ways. These include:

- o Awards of grants for: (1) proposals with economic development or industrial application as their primary goal and which rely on recycled mine water and/or a site that has been made suitable for the location of a facility through the elimination of existing Priority 1 or 2 hazards; and (2) new and innovative mine drainage treatment technologies that provide waters of higher purity that may be needed by a particular industry at costs below conventional treatment in

common use today or that reduce the costs of water treatment below those of conventional lime treatment plants. Eight contracts totaling \$4.075 M were awarded in 2006 under this program.

- o Projects using water from mine pools in an innovative fashion, such as the Shannopin Deep Mine Pool (in southwestern Pennsylvania), the Barnes & Tucker Deep Mine Pool (the Susquehanna River Basin into the Upper West Branch Susquehanna River), and the Wadesville Deep Mine Pool (Exelon Generation in Schuylkill County).

Current and Future Reclamation Efforts in the Watershed

While numerous remediation projects have already been completed and others are underway, it will take decades at current funding levels until all of the problem areas in the watershed are addressed. Pennsylvania has placed a high priority on efforts in the watershed. In addition to the problems associated with the water quality itself, tremendous amounts of recreation and tourism dollars have been lost in the watershed due to the mining impacts.

DEP is in the process of constructing three AMD treatment systems to treat nonpoint source pollution in the most severely impacted areas of the watershed. These three areas are the Clearfield Creek Watershed, the Bennett Branch Sinnemahoning Creek Watershed, and the main stem headwaters of the West Branch.

Accounting for Growth

The mineral extraction industries are subject to the ebbs and flows of economic activity. The coal market is notoriously cyclical. The industrial mineral mining industry typically has localized markets that can fluctuate dramatically from year to year. For example, the bluestone industry is tied to the residential development activity. Bluestone mining activity can fluctuate dramatically based on the market (and price) for their product.

DEP maintains a database that tracks the active permits for mining. Reports can be developed that give a sense of the level of activity based on industry-wide permits and the area (rough estimates of acres disturbed). This reporting will assist in quantifying progress.

Similarly, there is a tracking database for AML. Progress of reclamation can be reported from year to year.

Strategy to Fill Gaps

Inherent in the approach to the resource extraction sector is the prevention of new sediment sources and the mitigation of existing non-point sources through reclamation of AML.

The mining program has a draft stormwater general permit for mining activities that leads an applicant through the various BMPS available to prevent sediment impacts from mining.

Contingencies

If targets are not met, it could be possible to increase the use of non-discharge alternatives for stormwater to reduce the load.

Tracking and Reporting Protocols

Reports can be developed that present data about the number of active mining permits and the overall disturbed area associated with these permits. These permit records in eFACTS include locational data tied to the National Hydrologic Dataset (NHD). The NHD data can be used to identify permits in the Bay watershed. AML is also tracked. While the AML tracking does not use the NHD, locational data (lat/long) could be used to identify reclaimed features in the Bay watershed.

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Section 13.

Multiple Sector Strategies

Several of Pennsylvania's strategies to fill anticipated gaps address nutrient and sediment loadings from several source sectors, usually agriculture and urban lands. The following are examples of such strategies.

Legacy Sediment

DEP initially became interested in the issue of legacy sediment as a result of the work of Robert Walter and Dorothy Merritts of Franklin and Marshall College. Their work suggested that a significant portion of sediment in streams in Lancaster County were the result of erosion of sediment trapped behind mill dams constructed in the 1700s and 1800s. Previously it was thought that the large majority of sediment in streams was the result of upland erosion. In response to the work by Franklin and Marshall College, DEP established a Legacy Sediment Workgroup in 2006 to evaluate and assess the significance of legacy sediment. With funding provided by Growing Greener and the Chesapeake Bay Commission, Walter and Merritts were able to expand their effort. This resulted in an updated report which formed the basis for new and innovative water management program policies that address legacy sediment non-point sources of pollution within the Chesapeake Bay Watershed.

In March and April of 2007, the Legacy Sediment Workgroup began to develop the new Natural Floodplain, Stream, and Riparian Wetland Restoration Best Management Practice that addresses aquatic resources impaired by legacy sediment. This practice was presented to EPA's Chesapeake Bay Program for review and approval in 2008. The next steps are to establish nutrient and sediment reduction efficiencies for the practice; and to evaluate the extent of the impact of legacy sediment within the watershed.

In January 2008, a research paper by Walter and Merritts titled "Natural Streams and the Legacy of Water Powered Mills" was published in *Science*. This publication represents the important milestone of publishing the research findings in a peer reviewed journal. In May 2010, a more comprehensive report, "Sediment and Nutrient Loads from Stream Corridor Erosion along Breached Millponds" was published. The following information is excerpted from the report.

The 2010 report provides evidence that a process given little attention to date—stream corridor erosion from breached millpond reservoirs—is a substantial source of suspended (i.e., fine grained) sediments and nutrients within the Chesapeake Bay watershed. Furthermore, the processes and rates of stream bank erosion documented are not directly related to modern land use activity (e.g., storm water runoff from urban development or agriculture), but rather to a series of land use activities that began as much as several centuries ago. These activities transformed valley bottom landscapes, first through reservoir sediment accumulation following milldam construction, then by stream bed incision and bank erosion following milldam breaching.

The mid-Atlantic region of the eastern US is characterized by numerous small (1st to 3rd order) streams upon which tens of thousands of mills, forges, and other industries relied for hydropower

throughout the 17th to early 20th centuries (Walter and Merritts, 2008; see U. S. industrial censuses of 1840, 1870, and 1880). More than eight thousand milldams existed in Pennsylvania as of the late 19th century. Given the generally small size of the streams in this region, the typical dam height of 7 to 12 ft was sufficient to produce relatively high sediment trap efficiencies. Pennsylvania state inspection reports indicate that many reservoirs were substantially reduced in volume as a result of sedimentation by the early 20th century.

Assumptions and models regarding Chesapeake Bay water quality focus largely on modern land use, particularly agriculture and construction, as the dominant sources of high suspended sediment and nutrient loads in the majority of the region's waterways. The 2010 report documents, however, that historic sediment and associated nutrients eroded from the stream corridor upstream of breached millponds are also an important component of the total load in modern streams. Results show that stream corridor erosion, and particularly stream bank erosion within the corridor, is a major contributor to the suspended sediment and particulate-phosphorus loads carried by many streams in the Chesapeake Bay watershed, and that minor, but substantial, nitrogen loads are released by bank erosion as well.

Examples of Legacy Sediment Projects

- Banta Natural Floodplain, Stream and Riparian Wetland Restoration Project on Lititz Run: multiple agency funding sources used to implement the new and innovative BMP; ~2,300 feet of natural stream restoration and 5.6 acres of floodplain and natural riparian wetland restoration
- Shober's Run Natural Floodplain, Stream and Riparian Wetland Restoration Project; ~10 acres of natural floodplain and riparian wetland restoration and ~ 5,000 feet of natural stream restoration
- Conoy Creek Natural Floodplain, Stream and Riparian Wetland Restoration Project: Growing Greener grants awarded to implement the new and innovative BMP; 3,200 lineal feet of natural stream restoration and approximately 5 acres of natural floodplain and riparian wetland restoration
- Dunning Creek, Brush Creek Floodplain and Riparian Wetland Restoration: Growing Greener grants awarded; 2000 lineal feet of stream restoration
- Targeted Demonstration Site: Big Spring Run Basin of Mill Creek Watershed, Lancaster County.
 - Nutrient and biological baseline data available -Galeone, et al. 2006. Effects of Streambank Fencing of Pasture Land on Benthic Macroinvertebrates and the Quality of Surface Water and Shallow Groundwater in the Big Spring Run Basin of Mill Creek Watershed, Lancaster Co., PA 1993-2001 ~ \$1 million
 - research and extensive investigations to establish current baseline and post restoration effects- Franklin and Marshall College, USGS, USEPA, PA Fish and Boat Commission, Elizabethtown College, Penn State University, Millerville University
 - BMP implementation funding partnerships - PA DEP, Chesapeake Bay Commission, private landowner owner, Suburban Lancaster Sewer Authority, Foundation for Pennsylvania Watersheds, Pennsylvania Environmental Council

-
- Approximately 5 acres of natural floodplain and riparian wetland restoration and 3,200 lineal feet of natural stream restoration

Lancaster County Clean Water Consortium Chesapeake Bay Initiative

Introduction

The mission of the Lancaster County Clean Water Consortium (Consortium) is to undertake a variety of efforts to develop a proactive, efficient, and cohesive countywide strategy to restore the waterways of Lancaster County, Pennsylvania, ultimately resulting in compliance with imminent federal and state regulations intended to reduce pollution and accelerate restoration of the Chesapeake Bay. The Consortium will consist of stakeholders, including municipalities, authorities, non-profit organizations, businesses, agricultural operators, land owners/developers and individuals.

Education

The Consortium will provide members with a variety of educational and informational materials and seminars, including summaries and analysis of pending and adopted regulations. Professionals engaged by the Consortium will sort through the litany of regulations, policy statements, and other information issued by federal and state agencies, as well as several non-profits leading the charge to clean the Chesapeake Bay, in order to provide concise summaries of that information. The Consortium is not intended to be one additional voice warning about the demise of the Chesapeake Bay and the impending financial havoc triggered by impending regulations, rather, the intent of the Consortium is to provide members with guidance regarding how to proactively approach the new requirements.

Restoration

Part of the strategy will take the form of developing Watershed Implementation Plans (WIPs) for the County's twelve subwatersheds. WIPs are currently in place for the three Watersheds in Lancaster County. Other watersheds have portions of WIPs in place. The implementation of the strategy will provide the County's urban, suburban and rural communities with a better quality of life as fewer pollutants contaminate the county's rivers and streams via non-point municipal and agricultural run-off as well as sewage treatment plants and other point sources.

Services of the Consortium will include support for the already established county watershed alliances through municipal cooperation, establishment of new watershed alliances where needed with municipal cooperation, development of a countywide nutrient credit trading plan, corporate sponsorships for stream restoration, demonstrations and development of innovative storm water Best Management Practices, digester pilot projects, as well as other services necessary to accomplish the goals of the Consortium. The Consortium will contract directly with the design, legal and science professionals to develop and implement the watershed implementation plans.

Financing and Volunteers

In order to implement the strategy, the Consortium will need financial assistance. The Consortium will apply for multiple grants to carry out its mission, including the development and implementation of WIPs. It is anticipated that the money necessary to fund the activities undertaken by the Consortium will ultimately come from grants and donations. However, initially, it will be necessary to solicit funds from Consortium members. The Consortium and its members will seek the help of volunteers to perform a variety of tasks relating to its mission, e.g., stream bank plantings and clean up.

Lycoming County Chesapeake Bay Initiative

Since 2007, Lycoming County has been developing an initiative that seeks to address Chesapeake Bay requirements via a county based effort. The County along with the assistance of consultants and a broad based Steering Committee structure have developed a set of evaluations and recommendations related to the Chesapeake Bay Compliance Plan. These evaluations and recommendations highlight the impact to residents, businesses, municipalities and authorities of Lycoming County and identified roles the County government might participate in and influence. Lycoming County is the first to develop a county wide strategy of this magnitude for compliance with nutrient limits but more importantly local water quality improvements.

As mentioned, the County formed a broad based Steering Committee structure which has met regularly since the winter of 2008. The structure includes an Advisory Committee, a Point Source Work Group, and Non-Point Source Work Group. The mission of the Advisory Committee is to advise the County in developing a cost-effective strategy to address nutrient management and related wastewater and stormwater challenges. The Point Source Work Group specifically focuses on wastewater and infrastructure issues, while the Non Point Source Work Group (NPS) specifically focuses on agriculture, water quality and stream health, and other non-point sources of pollution. Originally, a third work group, Economic Development and Finance (EDF), was formed; however, it became clear that this group's intended function, to establish the local credit trading bank, was neither practical for a volunteer group, nor necessary once the PENNVEST Exchange was established.

This County effort has led to a number of positive impacts. For example, they are in the process of developing a county based nutrient credit trading program in which credits would be generated locally for the local wastewater treatment plants. The County has been submitting proposals for credit certification which are built from projects being installed with farmers enrolled in CREP. The County was successful in obtaining a National Fish and Wildlife Foundation grant to support best management practice implementation and outreach to the agriculture sector and to the public. The three-year grant will allow the County to create an initial pool of credits that, when sold, will provide funding to sustain future program activities. The County Conservation District also made funding available to purchase 600 storm drain markers, which will be installed in the MS4 communities and larger boroughs in the County to educate the public about stormwater. The installation will be accompanied by a public education effort including news coverage and a brochure, which the County hopes to include in residential water bills. This activity is intended to reduce NPS pollution from urban land.

Another notable outcome of the County's efforts to date is the successful regionalization of two aging treatment plants. A new West Branch Regional Authority was recently created to build a new wastewater treatment plant which will serve four municipalities and replace two antiquated facilities situated in the Susquehanna River floodplain. The County's nutrient trading program was crucial in continuing the dialogue between the two communities in which the County offered 40,000 credits to allow one of the facilities time to continue working toward the joint agreement.

Many positive outcomes have been noted from the activities in the County. Whether it is from the relationships built, the increased level of understanding or the on-the ground improvements, the County believes that the developed regional approach increases the viability of more funding options, including government sources that prefer to address environmental issues on a greater geographic scale. The approach allows local investments in best management practices improve the county's natural habitat, recreational uses and tourism, stormwater management, and flood control, all of which provide more opportunities to implement local resource management plans. And, the regional approach enables local economic growth.

Air Reductions

Pennsylvania's air emission reduction strategy is consistent with the federal Clean Air Act (CAA). Reductions in air emissions will result in a reduction in nitrogen deposition within Pennsylvania, with subsequent improvements in water quality. EPA has estimated that, with implementation of several significant federal measures, nitrogen loads to the Chesapeake Bay from Pennsylvania will be reduced by about 1.94 million pounds per year.

Pennsylvania will receive additional credit for air reductions achieved through regulations implemented on a state level to achieve National Ambient Air Quality Standard or to meet other Clean Air Act obligations. The following describes two recent regulations and their anticipated reductions in nitrogen oxides (NO_x), and anticipated reductions from Renewable Energy/Energy Efficiency (RE/EE) and Demand Reduction in the electric generating sector.

Glass Melting Furnaces

This is the link to the Glass Melting Furnaces regulation at the Pennsylvania Code web site (published as final June 19, 2010, 40 PaB 3328): Control of NO_x Emissions from Glass Melting Furnaces, Sections 129.301-129.310

<http://www.pacode.com/secure/data/025/chapter129/chap129toc.html>

Projected reductions of NO_x emissions from this rule: Total glass melting furnace NO_x emissions in 2002 were approximately 11,900 tons. Since 2002, a number of furnaces or facilities, or both, have discontinued operation or made process changes and total NO_x emissions during 2005 were approximately 9,814 tons. This final-form rulemaking is estimated to reduce NO_x emissions from glass melting furnaces by approximately 2500 tons or 25% from 2005 levels.

Cement Kilns

This is the link to the Cement Kilns regulation at the Pennsylvania Code web site (published as final June 19, 2010, 40 PaB 3346): Emissions of NO_x from Cement Manufacturing, Sections 145.141-145.146

<http://www.pacode.com/secure/data/025/chapter145/subchapCtoc.html>

Projected reductions of NO_x emissions from this rule: There are 21 cement kilns in this Commonwealth, which in 2005 emitted 12,967 tons of NO_x emissions in this Commonwealth. Based on 2005 ozone season emissions, implementation of the final-form rulemaking is estimated to result in a reduction of 1300 tons of NO_x per ozone season.

Renewable Energy/Energy Efficiency (RE/EE) and Demand Reduction

Based upon Energy Information Administration (EIA) data, these are the possible reductions from 2008 to 2009: Average emissions reductions of 1.8 Lbs. NO_x per MWH of electrical generation reduction.

2009 Renewable Energy_Megawatt Hours (MWH): 3,741,974

2008 Renewable Energy Megawatt Hours 2008 (MWH): 3,278,284

Difference = 463,690 MWH

Renewable Energy = Estimated additional NO_x emission reductions 417 tons of NO_x.

EE/Demand Reduction: Total PA generation for electricity fell from 222,350,925 Megawatt-hours (in 2008) to 218,976,990 Megawatt-hours (in 2009).

Total Generation difference is 3,373,935 MWH

Estimated NO_x reductions from Demand Reduction Due to Combination of EE / Lower Demand: 3,037 tons of NO_x.

The northeast Ozone Transport Commission, a group of 13 jurisdictions including Pennsylvania, is considering a process to quantify projected decreases in NO_x emissions in the coming years from EE/RE.

Appendix I.

Pennsylvania Chesapeake Registry FY 09 - 10 Report

NOTE: Pennsylvania annually submits state funding data to be entered into EPA's Chesapeake Registry database. The below funding is for the state fiscal year 2009 to 2010 for Pennsylvania's Chesapeake watershed only.

Activity	Activity Category	Topic Area	Goal	Amount
Professional Development for Teachers using the program Reading to Learn the Content in Environment and Ecology	Education	Watershed Education	Foster Chesapeake Stewardship	\$80,000.00
DEP Environmental & Education Center operates an environmental education center and resource library. It annually funds environmental education grants to schools and other non-profit organizations; facilitates workshops for teachers and other educators; conducts environmental education programs; and participates in outreach events.	Education	Watershed Education	Foster Chesapeake Stewardship	\$450,000.00
Classroom Based Programs that allow students to use school sites or local areas for the study of watersheds and wetlands.	Education	Watershed Education	Foster Chesapeake Stewardship	\$45,000.00
PA Farmland Preservation Program: State program that assists count and municipal governments with the purchase of permanent agricultural conservation easements	Protection	Land Preservation	Maintain Healthy Watersheds	\$16,600,000.00
DCNR Land Conservation: Technical Assistance and Land Acquisition. Acquisition program includes new lands (fee simple and easements) for state parks or forests, and agency grants to acquire local parks, greenways, river access, natural areas, stream corridors, etc.	Protection	Land Preservation	Maintain Healthy Watersheds	\$11,278,957.00
Fish Passage Coordination: funding	Restoration	Fish Passage	Protect and Restore Vital Aquatic Habitats	\$500,000.00
Growing Greener Watershed Protection Grant Program: Growing Greener II Mining	Restoration	Acid Mine Drainage	Protect and Restore Water Quality	\$0.00
Nutrient Management Certification and Education Program	Education	Agricultural Lands and Animal Operations	Protect and Restore Water Quality	\$120,000.00
Commercial Manure Hauler and Broker Certification Program	Education	Agricultural Lands and Animal Operations	Protect and Restore Water Quality	\$38,000.00

Activity	Activity Category	Topic Area	Goal	Amount
Resource Enhancement and Protection Program (REAP): REAP provides state tax credits to agricultural operations in exchange for conservation BMPs, equipment and planning.	Funding	Agricultural Lands and Animal Operations	Protect and Restore Water Quality	\$4,225,000.00
Nutrient Management Program - administrative and implementation support	Program Management	Agricultural Lands and Animal Operations	Protect and Restore Water Quality	\$525,500.00
ChesBay Implementation Grant Program Management	Program Management	Agricultural Lands and Animal Operations	Protect and Restore Water Quality	\$145,572.00
ChesBay Implementation Grant State Funds Outside the Grant	Program Management	Agricultural Lands and Animal Operations	Protect and Restore Water Quality	\$765,000.00
Nutrient Management Technical Assistance Funding to Conservation Districts	Technical Assistance	Agricultural Lands and Animal Operations	Protect and Restore Water Quality	\$1,477,000.00
Nutrient Management Plan Development Incentives Program	Technical Assistance	Agricultural Lands and Animal Operations	Protect and Restore Water Quality	\$93,750.00
Conservation District Fund Allocation Program - Agricultural Conservation Technical Assistance and Farmland Preservation Administrative Support programs	Technical Assistance	Agricultural Lands and Animal Operations	Protect and Restore Water Quality	\$895,000.00
NRCS engineering assistance for BMP installation	Technical Assistance	Agricultural Lands and Animal Operations	Protect and Restore Water Quality	\$18,750.00
ChesBay Implementation Grant: Nutrient Management Technician Program CD.	Technical Assistance	Agricultural Lands and Animal Operations	Protect and Restore Water Quality	\$2,060,292.00
Conservation District Fund Allocation Program: cost shares the salaries for 131 conservation district staff, The CDFAP also provides up to \$3,840/conservation district for administrative costs. The district managers oversee all operation in the county conservation districts; the technicians are primarily responsible for erosion and sedimentation control activities.	Technical Assistance	Agricultural Lands and Animal Operations	Protect and Restore Water Quality	\$1,745,352.00

Activity	Activity Category	Topic Area	Goal	Amount
Nutrient Management Delegation Agreements: Through Nutrient Management delegation agreements, DEP and SCC cost shares the salaries for approximately 42 conservation district staff to prepare and review nutrient management plans. The nutrient management technicians are responsible for review, implementation and inspection of sites and required plans for Concentrated Animal Operations and other volunteer farms there are about 2600 of these farms in Pennsylvania.	Technical Assistance	Agricultural Lands and Animal Operations	Protect and Restore Water Quality	\$1,516,000.00
PA Stormwater Planning and Management (Act 167): grants	Funding	Developed Lands	Protect and Restore Water Quality	\$0.00
NPDES Stormwater Permit Program	Regulation	Developed Lands	Protect and Restore Water Quality	\$2,239,200.00
PENNVEST: Loans and grants for wastewater projects	Funding	Municipal and Industrial Wastewater	Protect and Restore Water Quality	\$66,106,370.00
Commonwealth Finance Authority Water and Sewer Systems Assistance Act.	Funding	Municipal and Industrial Wastewater	Protect and Restore Water Quality	\$138,764,079.00
PA Sewage Facilities Act (Act 537) Planning Assistance Grants: Grants to municipalities to help defray the costs of sewage facilities planning activities required by Act 537.	Funding	Municipal and Industrial Wastewater	Protect and Restore Water Quality	\$400,290.00
ChesBay implementation Grant - state match: Chesapeake Bay Education Office	Education	Support to Protect and Restore Water Quality	Protect and Restore Water Quality	\$31,135.00
Growing Greener I: Conservation District Watershed Specialist Grants	Engage Partners	Support to Protect and Restore Water Quality	Protect and Restore Water Quality	\$1,235,814.00
Dirt and Gravel Road Maintenance Program	Remediation	Support to Protect and Restore Water Quality	Protect and Restore Water Quality	\$2,441,000.00
Growing Greener Watershed Protection Grant Program: Growing Greener I Watershed, Growing Greener II Watershed and Growing Greener II County Environmental Initiatives	Restoration	Support to Protect and Restore Water Quality	Protect and Restore Water Quality	\$10,379,764.00
Growing Greener Watershed Protection Grant Program: Growing Greener I & II CREP	Restoration	Support to Protect and Restore Water Quality	Protect and Restore Water Quality	\$2,884,528.00
TOTAL				\$267,061,353.00

Appendix 2.
Bradford County BMP Study

Bradford County Conservation District

BMP Pilot Study – Final Report – July 2010

EXECUTIVE SUMMARY

Late in 2009 the Bradford County Conservation District entered into discussion, and eventually this pilot project, with representatives from DEP on possible method to collect information on best management practices (BMPs) that are relevant to water quality related to the Chesapeake Bay effort as described in CBP Model that have not been cost shared or recorded and are readily determined. There are approximately 1,400 farms and 51 municipalities in Bradford County. To assure maximum participation, the purpose of the data collection was promoted as a method to demonstrate just how much agriculture is already providing to clean water. BMP information collected was relevant to specific landowner and watershed locations but was kept confidential to address any landowner concern. Consensus was that a technically knowledgeable individual would be necessary to assist the farmer with the survey to help describe what is being collected, determine if what is being collected is credible and prompt farmer to identify BMPs.

The District utilized 4 different methods of data collection from the agricultural community, each representing approximately 25% of the information collected: group meetings; farm visits by contractors; phone surveys; and staff collection while visiting the farm for job related purposes. A written survey and follow up phone calls were utilized to collect municipal information. Multiple methods were utilized to best evaluate accuracy and cost effectiveness of methods. BMPs selected to survey were those that were most practical to collect utilizing these methods and had a reasonable measure of assurance of accuracy. Farm visits by contractors and phone surveys were made on farms identified randomly based on a list of agricultural land use owners provided by the County Assessment Office. Attempts to secure a more efficient listing of active farms were attempted but not successful from USDA sources.

Additionally, the District utilized the services of a contractor to determine the actual extent of riparian buffers along all blue line streams utilizing aerial photography and GIS. Challenges to this approach included adjusting blue line streams to actual stream locations on current aerial photography, and the time needed to make detailed determination of riparian land cover. Existing land-cover and blue line stream locations were not accurate enough to accomplish this for the entire County and while progress was significant, the goal of determining the entire County was not accomplished.

Survey Results Summary:

256 farms (18% of County Total)

56,562 harvested acres (17% of county Total)

**Survey Methods: Group Meetings (64), Contractor farm visit (64),
Phone (69), Staff farm visit**

(59)

<u>Practice</u>	<u>Reported</u>	<u>% Not Cost Shared</u>
No Till	6,039 ac	85%
Cover Crop	3,335 ac	74%
Manure Storage	81	43%
Baryard Runoff Treatment	61	48%
No Nutrient Application	10,347 ac	n/a
Nutrient Management Plan	98	n/a
Conservation Plan	145	n/a
Stream Fencing	79 farms/339 ac	51%
Rotational Grazing	74 farms/4,679 ac	88%

Urban BMPs

45 of 51 Municipalities Responded

<u>Practice</u>	<u>Reported</u>
Dirt and Gravel Roads	108,100
Stream Bank Protection	6,245
Street Cleaning	1,092,696
Municipal Sewage Connections	5,709

From a cost efficient perspective, survey facilitation at group meetings and the urban data collection through surveys were the most effective with targeted, special effort farm visits by a qualified technician most costly.

From a cost efficiency perspective, survey facilitation at group meetings and the urban data collection through surveys were the most efficient and effective with targeted, special effort farm visits by a qualified technician most costly.

METHODOLOGY

I - Agricultural BMPs:

The purpose of the pilot project was to collect those BMPs as described in the CBP Model and provided by Kenn Pattison of the PA Department of Environmental Protection (PA DEP) that have not been cost shared or recorded and are readily attainable and reasonably accurate to determine. A list of BMPs that we determined were practical to collect is attached as an appendix. There are approximately 1,400 farms in Bradford County. To assure maximum participation, the purpose of the data collection was promoted as a method to demonstrate just how much agriculture is already providing to clean water under the banner "Agriculture's True Measure". Promotional activities and a news release (see appendix) were initiated to help convey the project and its objectives to the agricultural community. It was the District's consensus that a technically knowledgeable individual would be necessary to assist the farmer with the survey to help describe what is being collected, determine if what is being collected is credible and prompt farmer to identify BMPs.

The District developed a relatively simple survey to record BMPs and worked with Penn State Extension to develop a more detailed survey regarding tillage practices (see final version attached).

Farm Identification:

Landowner names were needed to associate where the BMP information was relevant to specific landowner locations both specific to that farming operation as well as the watershed location. Obtaining a current listing of active farming operation was the first priority and proved to be one of the initial challenges of the project. Several attempts to obtain a current listing from both USDA NRCS office and FSA office were unsuccessful despite assurances that information would only be utilized to make valid contacts and any associated data would not be recorded in connection with the farm owner/operator. As a result, the District utilized the County Tax Assessor's listing of land under agricultural use. This generated a list of approximately 1,800 names after duplications and obvious non-relevant parcels were removed. From this list a random sample was developed to assure that contacts were representative of operations throughout the County. A master list was kept to facilitate who was contacted to avoid multiple contacts through the various survey methods listed below.

It is important to note that while the county data and list generated by the methodology described above was rather simple to employ, it resulted in considerable survey inefficiency. It was discovered that while parcels were categorized within and eligible for agricultural assessment, in many instances, the property was not being actively farmed and subsequently not in need of applying agricultural Best Management Practices. Two factors believed to be attributable to this condition are: agricultural assessment may be provided for lands which are merely capable of agricultural production, and the USDA Conservation Reserve Enhancement Program, is contracted and taken out of production, widespread agricultural land throughout the county. As a result, it at times required as many as 25 phone contacts to set up one applicable interview/field visit.

Data Record:

In order to assure confidentiality of the information collected, all data was entered into a Microsoft Access database with no identification to the farm name, operators' name or owners' name. Data sets for the farm were entered using random numbers. The database was developed to enable distinction of the data by watershed, survey methodology and BMP.

Survey data collected by the various methods was turned over to the District Secretary, who then inputted data. Each survey took approximately 15 minutes to input at a cost of about \$5 per entry.

Data Collection:

4 different methods were utilized to collect agricultural BMPs as described below:

- 1. Farm Visits – On The Job** – District, NRCS, CBF, Extension, are on numerous farms during the year. A number of conversations/visual checks were made while already visiting the farm for other purposes. It was assumed that each conversation/check of the farm would take a minimum of effort and utilizing partners, approximately 100 surveys were targeted. It was hoped that through the numerous contacts related to EQIP sign-ups and other program participation this would be an easily achievable goal. Little survey results were provided by partner agencies, citing time constraints and work load as reasons. As a result, 59 or 23% of the surveys collected were from District and some NRCS staff on-the-job contacts. Each survey took approximately 15 to 20 minutes of time which equated to approximately \$9 per survey.

It should be noted that data collected from farms already participating in programs may not be representative of the entire farming community. It is observed that certain operators will establish long-term, effective relationships with the District, NRCS, and/or Extension and correspondingly, apply a greater amount of agricultural BMP's.

Identified Challenges –

- ***Participation by partner agencies***
 - ***Limited time period of the project***
 - ***Potential bias toward conservation minded farms***
- 2. Farm Visits - Target Visits** – It was determined, as previously mentioned, that an experienced technical person would greatly facilitate accurate BMP determination while working with the farmer. It was also believed that through random farm visits to assist in collecting information on the voluntary BMP implementation in the County, that the District presence and standing would be enhanced. Contactors were selected that had a sound technical base as well as an established working relationship with the District and farming community.

Contractors were given a subset of the random farm contact information and assigned the task of setting up a meeting and visit farms on a watershed by watershed basis. Effort involved would be to set up appointment, travel to farm, and record data. Completed surveys were turned over to the District for recording.

Contractors had difficulty with the list of names provided since they did not always represent active farming operations. Feedback indicated that as many as 25 calls were needed to set up field appointments. As a result, of the 200 surveys targeted for this effort, only 64 were achieved or 25% of the total surveys collected.

Cost of this approach was \$50 per survey.

Identified Challenges –

- *Accuracy of farm contacts*
- *Limited time period of the project*
- *Trusted contractors*

- 3. Meeting Surveys** – There are numerous farmer related meetings throughout the year that see attendance of several hundred farmers. The District requested time at these meetings and after a brief explanation of the purpose and use of the data, walked participants through a survey form listing BMPs. Information was then recorded on master list. Effort included coordinating time at meetings, developing the survey, attendance at the meeting to walk participant through and answer questions, record data on master list.

This approach appears to have been one of the most time and cost effective of the ones utilized. It should be noted that similar to the “on-the-job” surveys, data could be biased in that many of the participants at the meetings were actively involved in conservation or nutrient management programs. Of the 100 surveys targeted, 64 or 25% of the total collected were from meeting surveys.

Challenges to this approach included limited time of the project and timing of the meetings. Costs of this activity were relatively small in that many of the meeting are already attended by District staff.

Identified Challenges –

- *Limited time period of the project*
- *Potential bias toward conservation minded farms*

- 4. Phone Survey** – Utilizing the random County farm list, farmers were called to solicit BMP information. The effort involved included developing a phone survey (see appendix), gathering contact information, and making calls. In this effort, the accuracy of the developed list was an issue of concern. It was necessary to train phone surveyors in how to answer farmer questions. There were limited opportunities during the day to actually make contact with the farm operators since the time period was also an active

period for field work. Of the 200 targeted surveys for this effort, only 69 were achieved or 27% of the total farms where data was collected.

Costs for this effort was compounded by the low efficiency of the results and were approximately \$15 to \$20 per successful survey.

Identified Challenges –

- ***Accuracy of the farm contacts***
- ***Limited time period of the project***
- ***Technical knowledge of the phone surveyors***
- ***Availability and willingness of farmers to participate in a phone survey***
- ***Number of calls to make valid farm operator connection***

DRAFT

Agricultural Data Results:

Summary of All farms surveyed			
Total Farms Surveyed =	256	Estimated 18% of County Farms	
Farms with animals =	219	(86% of total)	
Farms performing "tillage" =	170	(66% of total)	
Total Harvested Acreage Represented =	56,562	Estimated 17% Harvested acres	
Survey Method:			
Group Meeting =	64	25%	
Contractor (farm visit) =	64	25%	
Phone =	69	27%	
Collected by Staff while on-job =	59	23%	
No-Till (2009)			
Total Acres No-till	6,039	# Nutrient Management Plans	98
Acres Continuous no-till	3,711	# Acres	30,263
No-till acres w/ no cost-share	5,139	# Conservation Plans	145
<i>85% of no-till reported was not cost-shared</i>		# Acres	41,326
Cover Crop (2009)			
Acres following moldboard	574	Off Stream Watering w Fencing	
Acres following conservation tillage	2,761	Total # farms	79
Acres with no cost-share	2,456	Acres Buffer	338.66
<i>74% of cover cropping reported was not cost-shared</i>		(without cost-share)	
		Total # farms	40
		Acres Buffer	107.46
		<i>51% of farms excluding cattle from surface water did so without cost-share</i>	
		<i>32% of buffer acreage is not cost-shared</i>	
Manure Storage Facility			
Total # of farms	79	Off Stream Watering without Fencing	
Total # MSFs	81	Total # farms	24
Total AUs	12,093	Total feet of stream	21,927
(without cost share)			
Total # farms	34		
Total # MSFs	35		
Total AUs	2,702		
<i>43% of MSFs reported were not cost-shared</i>			
Rotational Grazing			
		# farms	74
		# acres	4,579
		(without cost-share)	
		# farms	65
		# acres	4,000
		<i>88% of farms practicing rotational grazing used no cost-share</i>	
		<i>85% of rotational grazing acres were implemented without cost-share</i>	
Barnyard Runoff Control			
Total # of farms	61		
Total # systems	61		
Total AUs	4,219		
(without cost share)			
Total # farms	29		
Total # systems	29		
Total AUs	1,357		
<i>48% of Barnyard runoff controls reported were not cost-shared</i>			
Acres Receiving no nutrients	10,347		
<i>18% of total harvested acreage received no nutrient input</i>			

Summary of Randomly Selected Farms			
Total Farms Surveyed =	157	Estimated 11% of County Farms	
Farms with animals =	126	(80% of total)	
Farms performing "tillage" =	86	(55% of total)	
Total Acreage Represented =	27,633	Estimated 8% Harvested acres	
No-Till			
Total Acres No-till	2,641	# Nutrient Management Plans	54
Acres Continuous no-till	1,646	# Acres	15,901
No-till acres w/ no cost-share	2,289	# Conservation Plans	75
<i>87% of no-till reported was not cost-shared</i>		# Acres	20,121
Cover Crop			
Acres following moldboard	169	Off Stream Watering w Fencing	
Acres following conservation tillage	1,111	Total # farms	37
Acres with no cost-share	938	Acres Buffer	152.98
<i>73% of cover cropping reported was not cost-shared</i>		(without cost-share)	
		Total # farms	18
		Acres Buffer	31.07
		<i>49% of farms excluding cattle from surface water did so without cost-share</i>	
		<i>20% of buffer acreage is not cost-shared</i>	
MSF			
Total # of farms	41	Off Stream Watering without Fencing	
Total # MSFs	42	Total # farms	15
Total AUs	5,800	Total feet of stream	7,652
(without cost share)			
Total # farms	16		
Total # MSFs	17		
Total AUs	2,218		
<i>40% of MSFs reported were not cost-shared</i>			
Barnyard Runoff Control			
Total # of farms	32	Rotational Grazing	
Total # systems	32	# farms	39
Total AUs	2,266	# acres	2,638
(without cost share)		(without cost-share)	
Total # farms	15	# farms	36
Total # systems	15	# acres	2,404
Total AUs	888	<i>92% of farms practicing rotational grazing used no cost-share</i>	
<i>47% of Barnyard runoff controls reported were not cost-shared</i>		<i>91% of rotational grazing acres were implemented without cost-share</i>	
Acres Receiving no nutrients			
	6,514		
<i>24% of total harvested acreage received no nutrient input</i>			

II - Riparian Aerial Surveys

Particular BMPs may be easily identified by utilizing current aerial mapping. One of special note are riparian buffers. Many farmers and other landowners maintain riparian buffers in agricultural and urban/residential land use areas that have never been cost shared or recorded. Utilizing GIS, a 35' zone could be delineated along blue line streams. A trained individual could then check all agricultural and urban land uses for existence of vegetated buffers in these zones. Lengths could be measured and area determined to produce a true picture of vegetated riparian areas.

The District hired a contractor proficient in the use of GIS to accomplish this goal. A detailed report is attached as an appendix of the process involved.

One of the first challenges in accomplishing the goals as indicated above was to adjust the location of all blue line streams to the actual location of the streams on current aerial photography. Blue line stream data bases are built on USGS topographic maps which rarely match up with current actual location of stream channels as shown on current land use maps. Approximately 500 hours were spent adjusting the 2,565 miles of streams and creating an accurate stream mapping layer. This was an increase over the previous database of 2,134 miles. Extensions to the blue line stream were made toward tributary headwaters where a defined bed and bank were observable. This and perhaps a minor increase in meander led to the increased distance.

With limited time to complete the project as contracted, use of existing land cover data bases and buffer delineation tools were explored. Utilizing these tools it was determined that measuring a 35' buffer, approximately 2,184.6 miles of streams had buffers that consisted of either forest, brush shrub or grass. This represents approximately 50% of blue line stream channels in Bradford County.

Upon visually verifying the accuracy of the land cover model, it was estimated that this approach is approximately 50 to 70% accurate at best. The land cover data generally included fringe areas of differing land cover in the larger land cover polygons and in some cases did not capture stream buffers as small as 35 feet. It is estimated that it would take a least an additional 500 to 600 hours to accurately measure each stream buffer identified in the newly created blue line stream layer.

A full detail of the process is attached in appendix.

Identified Challenges –

- ***Accuracy of blue line stream database***
- ***Limited time period of the project***
- ***Accuracy of any land cover databases that are refined to a 35'+ buffer***
- ***Technical expertise available to achieve identified goals***

III – Urban BMPs

Municipalities are active in streambank stabilization to protect their road systems. Additionally all of Bradford Municipalities have been trained in environmentally sensitive dirt and gravel road maintenance and are actively applying those principles outside of the cost share program. There are over 1,200 miles of dirt and gravel roads in Bradford County with 1,500 identified sites potentially impacting on water quality. It was also determined that other BMPs as listed on the CBP Model could be easily determined from records kept by municipalities. A survey was developed and mailed with follow up phone calls to each municipality to compile the information on the following BMPs: dirt and gravel road maintenance to the standards of the State program; streambank protection installed over the last five years; street cleaning on an annual basis; and number of households municipal sewage treatment hookups.

40 of the 51 Municipalities in the County responded or 78%.

Collection of this data was extremely efficient and cost effective and with survey development, mailing and data entry totaling at approximately \$3 to \$4 per response.

Urban Data Response:

Dirt and Gravel Road ESM (feet) – 108,100

Streambank Protection (feet) – 6,245

Street Cleaning (feet annually) – 1,092,696

Municipal Sewage (number of household hookups) – 5,709

BRADFORD REPORT APPENDIX 1

BMPs for Consideration

Agricultural:

Animal Waste Management Systems
Conservation Planning
No-Till – Continuous and annual
Other Conservation Tillage
Cover Crops
Enhanced Nutrient Management
Forest Buffers (Agriculture)
Forest Buffers (Mixed Open)
Forest Buffers (Urban)
Grass Buffers (Agriculture)
Grass Buffers (Urban)
Non-Urban Stream Restoration (Agriculture)
Non-Urban Stream Restoration (Mixed Open)
Nutrient Management
Off-Stream Watering with Fencing
Off-Stream watering with Rotational Grazing
Off-Stream Watering without Fence
Tree Planting

Urban:

Dirt and Gravel Road E&S Controls
Septic Connections
Stream Restoration (Urban)
Street Sweeping

BRADFORD REPORT APPENDIX 2
News Release
FARMING'S TRUE MEASURE

As many may already know, a presidential directive, coupled with pending legislation and a developing total maximum daily load (TMDL) aimed at watershed streams, have focused considerable attention on the Chesapeake Bay. Many of the management and water quality strategic planning decisions being considered are driven by a very complicated Bay computer model. That model is directing considerable attention to the Susquehanna River watershed's farms. As the largest land stewards in the watershed, farmers are reflected in the model as having one of the most significant impacts.

Like any computer model though, the results are only as accurate as the data entered. In reviewing the data for Bradford County farms, the Bradford County Conservation District is convinced that everything that our farmers do to manage their resources and protect water quality is not reflected in those numbers. In fact, some practices, such as no-till planting and cover crops, may be under represented by as much as 30 to 50%, according to Mike Lovegreen, manager of the Conservation District. Part of the reason for this is that the only practices that are being reported and included in the Bay Model are those designed and funded through government programs or other agencies and organizations. "Farmers make tremendous personal investments in their operations and even with program assistance they need to come up with funding out of their own pockets, unlike many community water quality projects such as treatment plants," stated Lovegreen. "To be a long-term successful farmer, one needs to also be a steward or protector of the natural resources they depend on," he continued.

In order to determine the validity of the missing information claim, the Bradford County Conservation District is embarking on a project to document those independent efforts of County farmers. The effort, termed "Farming's True Measure", will involve an intensive effort over the next five months to collect as much information as possible as to what farmers have actually done. The hope is to reach out to as many as 500 farms, or approximately one-third of all the farms. "We've always worked with farmers to identify and help plan practices to meet needs on the farms," commented Lovegreen. "This is a slight shift in perspective for us in that we are now looking at all the great practices that have already been accomplished," he continued.

As part of a cooperative effort with its partners, the Bradford Conservation District will be utilizing several different approaches to refine the story of farmer's efforts. Plans include asking producers to complete surveys at County meetings, collecting information while on farms for other business, sending people to farms at their invitation, and phone surveys. "We would like to touch base with every farm in the County eventually, so we're trying to evaluate the most effective method," Lovegreen stated. The Conservation District is asking for the help and cooperation of the farming community to make its case.

One of the concerns raised is who gets the information and how it will be used. "All the information we collect will be compiled and put into a collection of information that will not be reflected to any name or identifiable location. We are assuring absolute confidentiality," assured Lovegreen. For more information, or to offer to participate, contact the Bradford County Conservation District at (570) 265-5539 ext.6

BRADFORD REPORT APPENDIX 3

Farm Survey

Instructions for the phone surveyor

Initiate the call and obtain the person that serves as the farm manager. Avoid survey responders who are not associated with the management of the crop enterprise on the farm. Consistency in lead-in message is key to sound data as it removes variability.

Hello, I'm _____ with the Bradford County Conservation District. We're conducting a phone survey of select Bradford County producers:

- to help improve our services
- to enhance our abilities to obtain additional funding for agriculture
- and to track production practices in Bradford County

Can you take a few minutes at this time to answer a few questions for us?

If No, thank you.

If Yes, thank them, and promise it will take less than 10 minutes.

The information is important for setting programmatic priorities and directing the activities of various agencies and agricultural stakeholders that are in the business of supporting area farmers like yourself. Responses will remain anonymous and will be used in aggregate to identify trends and practices used in Bradford County. This survey is a joint effort involving Penn State Cooperative Extension, the Bradford County Conservation District and USDA's Natural Resources Conservation Service.

We ask that answers be approximated as best possible. The questions pertain to the 2009 growing season and the 2004 (5yrs ago) cropping season.

Bradford County Farm Survey

The only reason we ask you to write your name here is so we make sure we count each farm's response only once.

Name: _____ **Township:** _____ **Watershed**

(Creek): _____

Operation Type (dairy, swine, veal, beef, etc): _____

Tillage Questions:

How many <u>acres</u> did you farm in 2009 ?		
<u>Acres of corn planted?</u>	Moldboard Plow	_____
	Conservation Till	_____
	No-till	_____
	Silage acres	_____
	Grain acres	_____
<u>Acres of hay seeding (legume and/or grass) planted?</u>	Moldboard Plow	_____
	Conservation till	_____
	No-till	_____
Total <u>acres</u> of hay harvested?		_____
Total acres of pasture?		_____
<u>Acres of small grains planted?</u>	Moldboard Plow	_____
	Conservation till	_____
	No-till	_____
	Acres harvested as ensilage	_____
	Grain acres	_____
Herbicide Applications	Do my own (Y or N)	_____
	Custom hire (Y or N)	_____
	Organic (✓)	_____
(Cover Cropping Practices estimate acres) following corn silage harvest	Use none at all	_____
	Winter rye/wheat/barley	_____
	Spring oats	_____
	Brassicas	_____
	Clovers	_____
	Any mix of the above	_____
	Other	_____
Regarding the condition these cover crops were planted into, was the previous crop planted using Moldboard Plow or Conservation/No-till.	Acres where previous crop was moldboard plowed	_____
	Acres where previous crop was conservation till or no till	_____

How many <u>acres</u> DID you farm in 2004 ? (5yrs ago)		
<u>Acres</u> of corn planted in 2004?	With tillage	
	No-till	
	Silage acres	
	Grain acres	
<u>Acres</u> of hay seeding (legume and/or grass) planted in 2004?	With tillage	
	No-till	
Total <u>acres</u> of hay harvested?		
<u>Acres</u> of small grains planted in 2004?	With tillage	
	No-till	
	Acres harvested as ensilage	
	Grain acres	
Herbicide Applications	Did my own (Y or N)	
	Custom hired (Y or N)	
	Organic (√)	
Cover Cropping Practices (estimate acres) following corn silage harvest	Use none at all	
	Winter rye/wheat/barley	
	Spring oats	
	Brassicas	
	Clovers	
	Any mix of the above	
	Other	

How many of your acres have been continuous no-till since 2004?	
In 2009, how many no-till acres were cost-shared by EQIP or Park-the-Plow Program?	
In 2009, how many cover-crop acres were cost-shared by EQIP or Park-the-Plow Program?	

Conservation Practice Questions:

BRADFORD COUNTY AGRICULTURE IS GETTING IT DONE!

HELP THE WORLD SEE

Stewarding our natural resources matters to Bradford County Farmers. Regulators have a limited view of this because they do not see all the conservation measures you take on your farm. If you have implemented any of the following practices let us know below. We will pass along only the numbers to count toward work done by Bradford County farmers. Thank you. A unified response will strengthen our agricultural community.

Conservation Practices Completed on your farm

(check the box and complete the info next to any practice you have implemented)

- Manure storage system – a facility to store manure that prevents manure runoff
If yes, how many animals contribute to this storage: _____ animals.
Was it completed through a cost-share program? Yes No
Comments:
- Runoff controls to filter barnyard runoff.
If yes, how many animals use the barnyard: _____ animals.
Was it completed through a cost-share program? Yes No
Comments:
- Acres harvested that receive absolutely no nutrient application
2009 Acres: _____
Comments:
- Nutrient Management – have a written plan that addresses your nutrient application.
Comments:
- Soil Conservation – have a written conservation plan that you are following.
Comments:
- Stream exclusion fencing for barnyard or pasture
Length of stream bank fenced: _____ Average width of fenced out area: ____

Was this fencing completed through a cost-share program? Yes No
Comments:
- If no to previous question – Do you provide alternative water to pastured animals who have access to the stream?
Length of stream accessible to the animals: _____
Comments:
- Rotational grazing Acres: _____
Was this grazing system established through a cost-share program? Yes No
Comments:

BRADFORD REPORT APPENDIX 4

GIS Riparian Buffer Detail Report

BMP Survey 2010 Pilot Report

Shannon H. Lord
Contractor for
Bradford County Conservation District

June 30, 2010

Introduction:

For the BMP Pilot Survey, an overall picture of the county's buffer areas is desired, this will be completed utilizing the ArcMap software from ESRI at the ArcEditor license. These buffer areas will be classified by land cover and depth from stream stream length in order to gain credit in future buffer programs. This will be done by visually creating polygons of land cover types in order to generate length and areas of the buffers for the entire county. In this project only certain land cover types will be considered. Forested areas are areas where there is dense trees both deciduous and evergreen. Shrub/Brush areas are defined as low and dense bushes and brush. And grasslands are classified as any land, not developed, that is covered with dense grass, hay, fallow, untilled grassland, and pasture areas. These buffer types will be used in the buffers here forth and are defined as such respectively. **[technical notes are in italics]**

Methods:

The first step of this project was the remapping of the county streams with the most current aerials available in order to create better fit streamlines to the aerials. The first portion of this task was approximately 300 hours of work time with only about one third of the county being completed. It was done initially by zooming in to a tight view of the map and mouse clicking points along the streams. These new streamlines generally differed a great deal from the old lines which for future district work will allow any maps made with the streamlines to be more accurate. Figure 1 shows how the new **red streamlines** have better fit than old **blue streamlines**.



Figure 1. Screen shot comparing new and old streamlines

After the first third of the mapping was completed it was understood that this would be a very time consuming project. After several hours spent on the phone with technical support with the ESRI technicians it was determined that with the county's aerials there was not an easier way to complete the mapping work. Therefore a BAMBOO mouse tablet and pen were acquired to generate these line in a quicker fashion and without the stress of "mouse clicking." This method is more creator friendly, saves time and allowed for the rest of the county to be completed in about 200 hours, with a time savings of about 400 hours. This pen and tablet allow for the lines to be streamed into the program at a constant flow that can be paused or finished at any time through a click or CTRL operation.

*Creating shapefiles: To create a new shapefile in ArcCatalog locate the destination to save and bring up the menu under **File**, point to **New** and select **Shapefile**. When creating new file use a meaningful name, in this case "Streams_Edited_2010. (Space, /, . and many other punctuation marks and symbols cannot be used in these names, underscore is the character to use to separate words if desired.) It is important to give coordinate systems here as well, in this case from the **EDIT** button, **Select** button, **Projected Coordinate Systems**, **State Plane**, **NAD 1983 (feet)**, **NAD 1983 StatePlane Pennsylvania North FIPS 3701 (Feet).prj** was chosen for files then select **OK** and the file will appear in the destination chosen.*

*To begin drawing, from the editor toolbar select **EDIT** then start editing. In Editor toolbar you will be able to chose which file you edit (**TARGET: filename**) this will allow you to edit in multiple features with ease, simply change your **TARGET** and continue editing.*

-
- *For this project a total of 2565.72 miles of streams were remapped according to the new aeriels where previous streamlines totaled 2133.51miles, the increase can be explained by the tight fit in the new lines to the aeriels and that the previous lines would most likely have been draw from topographic maps.*

Upon completion of the streamlines a system of polygon shape files was created to classify land covers. These land covers include forested areas, hay/fallow/grasslands, and brush/shrub areas. Over 30 hours were spent on researching the best and easiest ways to create these buffers. Initially this was done by creating buffers, using a land cover file and through a series of intersections, which merge different features, and dissolves, which simplify features. The buffer areas were made up of a wide range of polygons inside the buffer outlines. This gave us stream lengths and areas of land covers with in the buffers but without the ArcInfo license of the ArcMap program, left and right sides cannot be differentiated.

For this method the land cover file from the Bradford County Planning Commission was added to the map project. A buffer was created for the streams, a 300 foot buffer shapefile, and another was created for the river line, a 900 foot buffer shapefile.

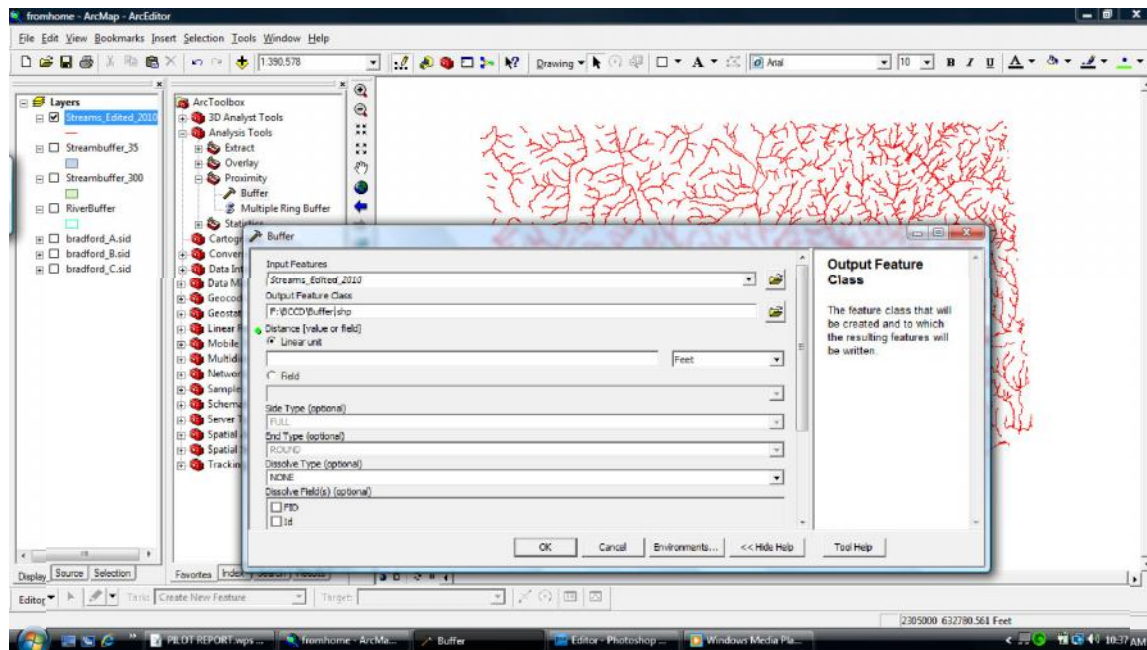


Figure 2. Screen shot for Buffer tool

*Creating buffers: In the ArcToolbox, creator will follow these steps. From the Analysis Tools in the Toolbox select Proximity, and then **double click** on Buffer. In the buffer window then specify **INPUT** as the STREAMLINES from the map project. Specify something meaningful such as “Streambuffers_300” for the buffer **OUTPUT** with a distance of 300 feet and dissolve type **NONE**. This process will take approximately 12 - 15 minutes to generate buffers. Next do the same with “Streambuffers_35” for the buffer **OUTPUT** and 35 feet as the distance, again with dissolve type **NONE**. Allow program to generate buffers.*

The land cover data was then intersected with the stream buffers to trim the land cover data to only what was needed. This shapefile was then dissolved to simplify data to land cover type. From this stage, the pertinent data can be kept while the irrelevant data can be removed. For this case, residential, industrial and developed land uses were not considered and were therefore removed. In the attribute table a new field was added to calculate the areas of buffer areas.

This method relies on the land cover file which in the case for Bradford County was visually determined to be approximately 50 to 70 percent accurate with aerial land cover. The most noticeable deviation from aerial land cover for this file is for the brush/shrub land cover type. If this accuracy is deemed acceptable by the crediting agency this method would be less time consuming and more user friendly when accurate land cover data is available. The issue with this method is that buffered stream length can not take into account left and right bank, this is only possible through the ArcInfo license level.

It was then decided to try an alternative method, using two buffers one at 35 feet, which would be minimum credit, and one at 300 feet, which would be maximum credit in the buffer program. These buffers will give an outline for the land cover polygons that will be created.

*To create any river buffers the creator will then have to select all segments of the river lines and while these are selected run the buffer setup again with “Riverbuffer” or something similar as the **OUTPUT** with a more meaningful distance, for Bradford County a distance of 900 feet was used.*

Once creator has generated a section of buffer polygons, all left side polygons will have to be selected individually and a new shapefile will have to be created for each side. Doing this intermittently will save time and confusion when processing the data. For best results, it is simpler do each buffer side upon each watershed completion.

This should be done by a MERGE from the Data Management tool in the TOOLBOX from the General Folder. A dissolve would then be performed from the Generalization folder in the Data Management section of the TOOLBOX, creator would dissolve land cover. Once this is completed creator can add a field and calculate the geometry for the areas, this would give a composite area for each land cover simplifying your data.

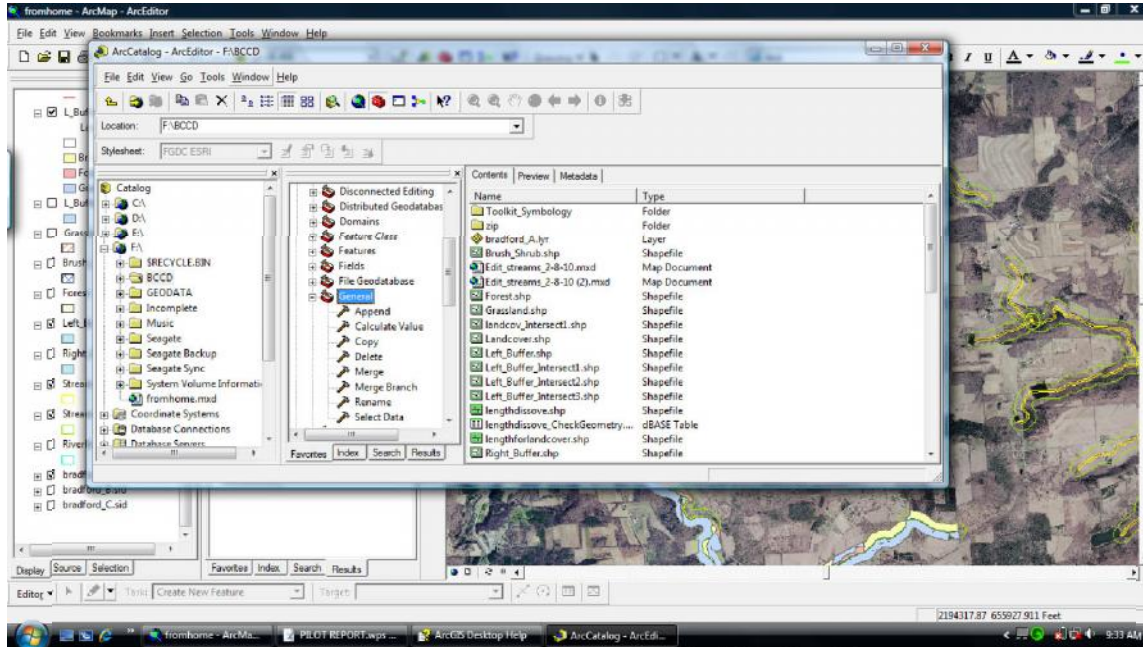


Figure 3. Screen shot for Merge tool

Continue this process for the both sides of the stream, each separately to create buffer areas. The next step is to then determine the lengths, you will need the buffers created in the last step to do this.

First, intersect buffer and stream lines, each side separate, by using the INTERSECT tool from the Overlay section in the Analysis tools from the TOOLBOX. This should carry forward all attributes created previously and will give length of segments.

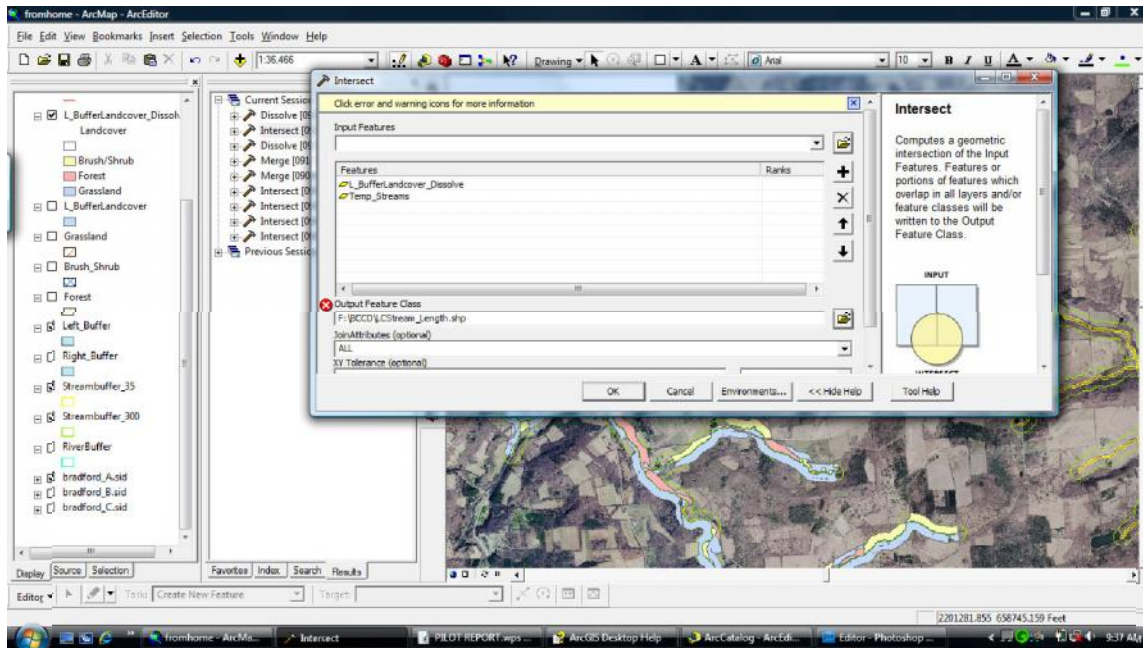


Figure 4. Screen shot for Intersect tool

Then perform another dissolve on the intersect just created to simplify data by land cover type. Add Field in attribute table for length and calculate geometry to get length for each land cover. By doing this for both sides, creator will be able to determine composite length for both sides over the length of the stream which is the desired result.

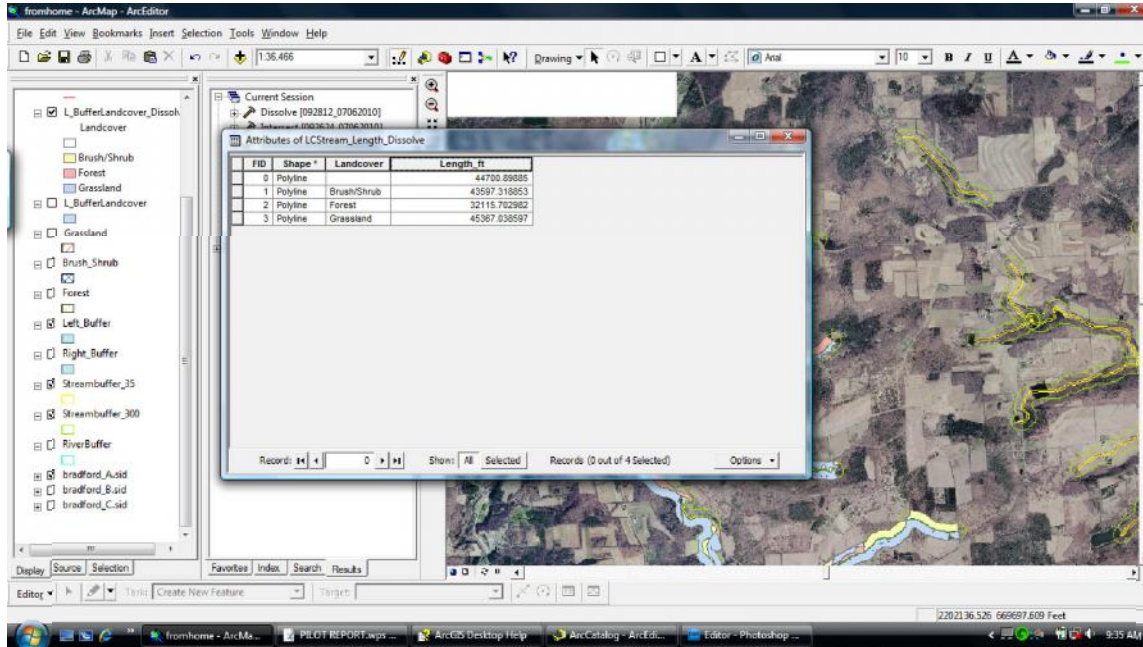


Figure 5. Screen shot of Attribute table from Dissolve

This process would be less complex with an ArcInfo license which allows creator to generate buffers for left and right stream banks. With this license the creator could build buffers for each stream side, and draw polygons or clip data to give areas on each stream side. These buffers could then be intersected with the stream lines to give length of buffered areas taking into account both left and right buffers.

More buffers can be created in order to differential between the distances a program would give ratings. Once these buffers are generated the creator could then begin creating polygons in a new shapefile. A shapefile for each land cover is necessary and then upon completion could be joined to give one file with multiple land cover attributes for a more user friendly map. This process is very time consuming and due to time constraints this project only gives a sampling of the buffers for the county.

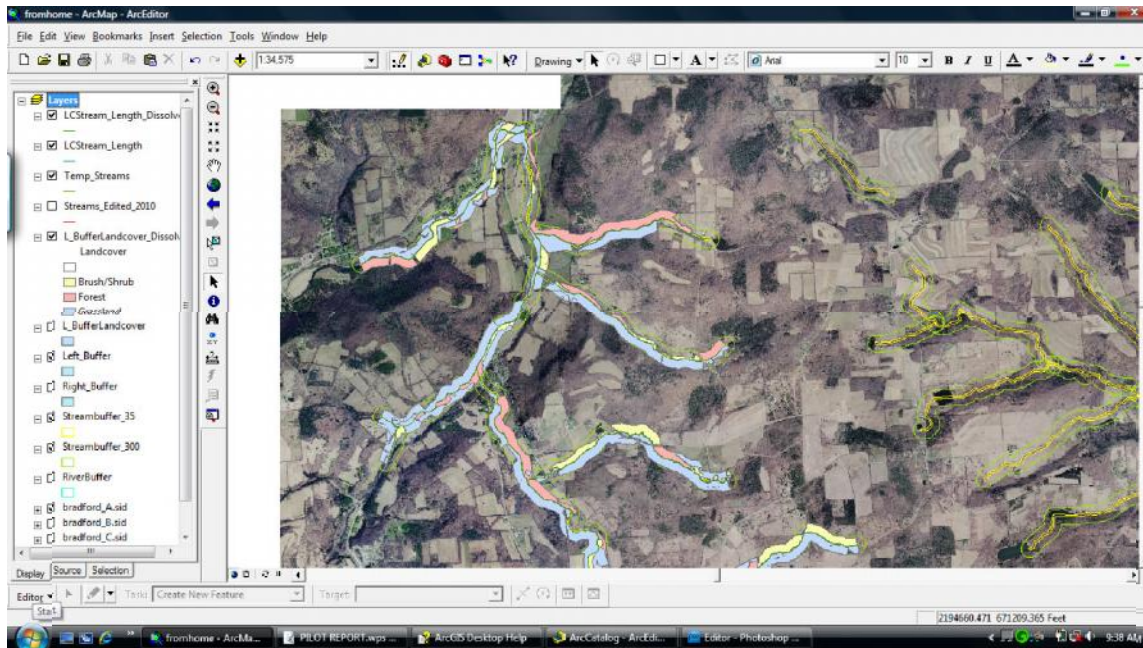


Figure 6. Sample area screen shot

SAMPLE RESULTS:

For the sample area the total length was 110,817.85 feet of streams, the left bank buffered lengths consist of 43,97.32 feet of Brush/shrub, 32,15.70 feet of Forest, and 45,67.04 feet of Grassland. These buffers also consist of 420.33 ac of Brush/Shrub, 467.49 ac of Forest and 709.68 ac of Grassland for the left bank.

Through continued work this project will cover the entire county.

Appendix 3.
Lancaster County BMP Study

Project Final Report

Chesapeake Bay Special Project Grant

Lancaster County BMP Pilot Study

July 13, 2010

Submitted by
Lancaster County Conservation District

Executive Summary

This report examines the efficacy and reliability of conducting a farm based survey. This survey was designed to determine the extent of Core Four Conservation Practice implementation, as defined by the Natural Resources Conservation Service, on 270 farms (5 percent) in Lancaster County. The two main goals of the project were to generate actual data of implemented conservation practices and to explore survey techniques that would enable the District to collect the most accurate data.

Surveys were either mailed electronically or mailed through the postal service to 1,414 Lancaster County farmers. Additionally, 70 farmers were personally interviewed by District staff. The District received 379 responses which totaled 66,574 acres. The District included all 379 responses in the data set used in this report.

The Core Four Conservation Practices reported by survey participants are:

- (1) 34,329 acres of continuous no-till, plus an additional:
 - a. 8,536 acres no-till corn
 - b. 3,313 acres no-till soybeans
 - c. 2,411 acres no-till small grain or cover crop
 - d. 450 acres no-till hay
 - e. 29 acres no-till tobacco
 - f. 5 acres no-till vegetables
- (2) 32,700 acres were reported to have a growing crop covering the ground during the winter months.
 - a. 24,710 acres small grain cover crop
 - b. 4,800 acres permanent pasture
 - c. 3,190 acres permanent grass hay
- (3) 74% of the farms with streams had grassed or wooded buffers equal to or greater than 30 feet in width
- (4) 62% of the farms reported possessing a type of manure management plan
 - a. 35% had either an Act 38 or a Manure Management Plan.
 - b. 25% had Crop Consultant annual manure and fertilizer recommendations
 - c. 2% had an NRCS 590

According to the aerial buffer survey, a total of 42.4 miles of 2nd order streams were assessed. Among the surveyed miles, approximately 28.9 miles have a 35 foot riparian buffer and 13.5 miles are either not buffered or do not fit the buffer criteria. These data show a 2:1 ratio in favor of buffered 2nd order streams in Lancaster County.

I. General Information

Organization: Lancaster County Conservation District
1383 Arcadia Road, Room 200
Lancaster, PA 17601
717-299-5361 x 5
<http://www.lancasterconservation.org/>

Implementation Partners for the Project:

1. Kathleen V. Schreiber, Ph.D., Dept. of Geography, Millersville University
2. Marjorie D. Toohey, Eastern Coordinator, Pennsylvania Farm Bureau
3. Jennifer Reed-Harry, PennAg Industries Association
4. Rebecca Ranck, Environmental Coordinator, Wenger Feeds

Project Dates (as established in the grant agreement):

March 1, 2010 – June 30, 2010

II. Scope of Work

The Lancaster County Conservation District conducted a survey of farming operations in Lancaster County. The survey was designed to determine the extent of Core Four Conservation Practice implementation, as defined by the Natural Resources Conservation Service (NRCS), on 5% of the farms in Lancaster County. Copies of the paper survey and cover letter are attached. (Appendix 1)

III. Objectives

The goals of this pilot project are as follows:

1. Generate actual data of Core 4 Conservation Practices used on Lancaster County agriculture operations to be eventually used in the Chesapeake Bay Model.
2. Explore survey techniques that would enable the District to collect the most reliable information efficiently while considering cultural tendencies and the need to provide anonymity.

IV. Methodology

1. Survey Assumptions

The LCCD identified assumptions that would be both beneficial and detrimental to a survey of the agriculture population of Lancaster County. The following assumptions were made:

- a) Sending out surveys will only achieve approximately 10% returns.
- b) Sending out surveys is time consuming and expensive.
- c) SurveyMonkey™ will generate a large response.

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- d) SurveyMonkey™ is a great tool to tabulate responses.
 - e) The Plain Sect community will not fill out and return surveys
 - f) If surveys are mailed, a self- addressed envelope must be included.
 - g) If surveys are mailed, postage must be included.
 - h) The survey should be succinct, concise, and fit on one page.
 - i) Use a lot of check boxes and require very little writing.
 - j) District staff can take time out of their schedule to accomplish all the surveys required.
 - k) District staff members do not have time in their schedule during the spring season to complete any surveys.
 - l) The District can accomplish this project independently.
 - m) The District can convey the importance of this survey.
 - n) The survey should only include certain conservation practices.
 - o) The District would be able to generate surveys for 270 Lancaster farms or approximately 5% of the estimated 5,000 farms in Lancaster County.

2. Methods

Before the District got started, personnel from Pennsylvania Farm Bureau, PennAg Industries Association, and Wenger Feeds offered their assistance. These organizations participated by promoting the survey through several mediums of communication (Appendix 2), providing email and mailing addresses to the District, and offering technical assistance such as survey design and general input from their collective experiences. The following is the means by which LCCD executed this project:

- a) The District chose three routes of data collection: 1) electronic invitation and response 2) paper invitation and response and 3) personal invitation and paper response.
- b) Contact information used to conduct this survey was accumulated through PFB, PennAg, the LCCD, and Wenger Feeds. A total of 1156 paper surveys were mailed, 258 e-mails were sent, and approximately 70 personal interviews were conducted.
- c) The District created an account on SurveyMonkey™ with a survey that mirrored the paper survey.
- d) Both the link to SurveyMonkey™ and a PDF of the survey was available on the District website. The e-mails explained the survey and the importance of collecting the information. The e-mail recipient was directed by a link to the District website to another link that would take them to the electronic survey. The District website also had an explanation of the survey for those who accessed the survey directly through the website. All recipients were also encouraged to provide a copy of the survey to their neighbors and family farmers who may not have been contacted directly.

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- e) The e-mail invitations were performed by the District. The e-mail was sent using a group, but to provide anonymity, the group was inserted as a BCC or blind carbon copy so the recipients did not know who else may have received the same e-mail.
 - f) The paper invitations were sent through a mailing service. The mailing list service standardized three different address formats, filled out the paperwork to bulk mail at USPS, printed envelopes, and folded and stuffed the cover letter and survey that were provided by the District. Using the mailing service proved to be more time efficient and cost effective.
 - g) 14 District staff members were asked to complete 5 surveys each for Plain Sect farmers during the course of their regular activities. A total of 70 surveys—or 26% of the target goal—were completed. This targeted approach was to overcome the assumption that few Plain Sect would complete and return a survey. Since Lancaster has a high percentage of Plain Sect farms, this was an attempt to generate a representative sample.
 - h) SurveyMonkey™ allows users to manually enter data into the survey. The District entered the returned paper surveys into the SurveyMonkey™.

V. Findings

The District received a very good response from the invitations, from which the paper mailing produced a vast majority of the response. The following will summarize and analyze what appeared to be successful and ineffective during our survey. This section will also summarize the data that was collected by the survey.

Successes and Failures

- a) The assumption that SurveyMonkey™ would be the preferred method of survey participation was incorrect. Only 26 responses out of 379 were entered directly into SurveyMonkey™ by participants.
- b) The assumption that SurveyMonkey™ would be a good tool to organize data was correct. Data entry and analysis were made easy through this program.
- c) The assumption that surveys only generate 10% returns was incorrect in this case. In fact, the response rate was approximately 26%. The explanation of the importance of the survey provided by the cover letter; the enthusiastic support provided by agriculture organizations and agribusinesses; and the positive comments from the general public were keys to the success. Newsletters were also a large factor in the successful response because they gave advance notice and supported the survey.

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- d) The assumption that a survey mailing is time consuming and expensive was incorrect for this survey. By using the bulk mail service, the total cost of mailing 1,156 pieces was \$427.09.
 - e) The assumption that self-addressed, stamped envelopes must be sent along with the survey has been shown to be correct and incorrect, respectively. We sent self-addressed envelopes with the survey using #10 District envelopes and #9 plain envelopes (they fit into the #10's without folding) with the District address. The return address was also the District's. Although the District did not attach postage, the response to the mailed survey was 30.5%. Therefore, it may not be necessary to include postage.
 - f) The District used a survey that was only one page in length and used as many check boxes as possible. Writing was confined to numbers or very short answers. The survey was concise and succinct.
 - g) The goal was to generate 270 responses or 5% of the estimated 5,000 farm operations in Lancaster County. The District received 379 responses or 7.6% of the total County operations.
 - h) An assumption that the District could successfully complete this task independently was incorrect. The cooperation with other organizations and the respect they hold in the community led to the success of the survey.
 - i) This survey was performed during the busiest time of the year for the District. Staff could not have visited 379 farms and completed an extensive survey. However, the staff was able to visit a limited amount of farms using a succinct survey. The District found that individual interviews, e-mail, and mail seemed to be a successful combination.
 - j) While planning to conduct these surveys, use personal experience with other surveys in order to determine what would be successful.

Summary of Data

Agriculture BMPs (Core Four)

The goal was to generate 270 responses or 5% of the estimated 5,000 farm operations in Lancaster County. The District received 379 responses or 7.6% of the total County operations. If we used a commonly accepted figure of 78 acres for the average farm in Lancaster County, we would expect 21,060 acres reported for 270 farms. The survey actually received data on a total of 66,574 acres for an average of 176 acres per response. As published in the Lancaster Chamber of Commerce "Lancaster County Farming Facts, 5th edition," the total acreage of farmland is 425,336 acres. According to our data, the District has collected information on 15.7% of the farmland in Lancaster County. The following is a summary of data collected in the survey. A complete list is attached to this report. (Appendix 3)

- 1) 34,329 acres of continuous no-till (NT) acres

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- 2) 24,710 acres of small grain cover crop
 - 3) 4,800 acres of permanent pasture
 - 4) 3,190 acres of permanent grass hay
 - 5) 7,568 acres of other hay
 - 6) Crops and acres that are not continuous no-till
 - a. Corn -- 108 producers NT 8,536 acres
 - b. Soybeans – 77 producers NT 3,313 acres
 - c. Small grain or cover crop - 42 producers NT 2,411 acres
 - d. Hay – 20 producers NT 450 acres
 - e. Tobacco – 4 producers NT 29 acres
 - f. Vegetables – 1 producer NT 5 acres
 - g. Other crop – 18 producers NT 372 acres

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Which watershed is your agriculture operation (or the majority of your operation) located in?

Answer Options	Response Percent	Response Count
7G	28.8%	109
7J	43.5%	165
7K	27.7%	105

Nutrient Management Plan (a plan that provides you with recommendations for manure and commercial fertilizer applications to crops. Do you have a nutrient management plan?)

Answer Options	Response Percent	Response Count
NO	22.7%	86
Yes, Act 6	4.5%	17
Yes, Act 38	14.5%	55
Yes, Manure Management Plan	20.3%	77
YES, NRCS 590	1.6%	6
Yes, not sure	11.6%	44
Yes, Crop Consultant annual manure and fertilizer recommendations	24.80/0	94

Answer Options	Response Percent	Response Count
I do not use No-Till	17.9%	68
I use no-till to establish some crops.	41.2%	156
I use no-till to establish all crops my crops	41.2%	156

Aerial Surveys of Buffers

A total of 42.4 miles of 2nd order streams were surveyed randomly throughout Lancaster County. Of these, 28.9 miles contained 35 foot riparian buffers and 12.5 miles were either not buffered or did not fit the buffer criteria. (Appendix 4)

VI. Additional Comments and Recommendations
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VII. Reporting using the CBP-23

- a. The current CBP-23 cannot be used for reporting purposes due to 1) the anonymity of the producers 2) the lack of information on technical assistance and 3) the inability to verify that the BMPs meet the PA Technical Guide specifications.
- b. A document similar to the CBP-23 that could be used to report BMP survey data may be beneficial and could be submitted with the Districts' quarterly reports.

VIII. Time and Resources needed for Survey Project

- a. The survey is a one page short survey designed mostly of check boxes and fill in the blank answers. The actual survey takes approximately five to seven minutes to complete. District staff performed on site surveys during their regular trips and duties in the field. Based on the assumption that a cold call introduction would include an explanation of the survey and its importance, the introduction and the survey could take between 15 and 20 minutes. Travel time depends on the proximity of the farms to the District office and the efficiency of the surveyor.
- b. If the District chooses to use a mailed survey, it is strongly suggested to contract with a mailing service. The District will need to provide a mailing list, envelopes, letterhead, and the survey. This is the most efficient, cost effective way to deliver a mass mailing. District personnel would not have been able to perform this task quickly and inexpensively.
- c. SurveyMonkey™ is also a useful tool. The electronic responses the District received were minimal; however, SurveyMonkey™ can be used to transfer information from paper surveys. Entering the information takes between one and two minutes per survey. Once the information is entered, the data is tabulated for analysis. The District is able to download the raw information into Excel to produce tables and graphs. The data in the Excel program is important because those who are charged with providing information for the Bay model will have the information in a usable form.
- d. The cost of 2 months of SurveyMonkey™, the mailing service, paper and letterhead, envelopes and mileage to deliver materials to the mailing service totaled \$582.59.
- e. The Aerial Buffer Survey was conducted by aerial photography only. The restricted amount of resources led to a time consuming and challenging evaluation of a limited number of streams. Knowing that the resources in Lancaster County may exceed the quantity and quality available in most other counties, the viability of this project is uncertain throughout the state of Pennsylvania. The cost of the aerial survey was contracted at \$2,500.00.

Appendix 4.
**Target Load and Reduction Tables by
Source Segment for 2017 and 2025**

Provided as an Excel Spreadsheet Attachment

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