

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's Major Watersheds



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. A TMDL is the sum of the individual waste load allocations and load allocations plus a margin of safety. The wasteload allocation (WLA) represents the total pollutant loading allocated to point sources. The load allocation (LA) represents the total pollutant loading allocated to non-point sources.

For Pennsylvania and other headwater states, it is expected that 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.

As noted above, DEP anticipates that the Final Bay TMDL will include aggregate nutrient and sediment wasteload and load allocations for each of Pennsylvania's major basins that discharge to impaired waters of Chesapeake Bay. These include the Susquehanna, Potomac and Gunpowder Rivers and the Northeast and Elk Creeks. EPA draft allocations for nutrients and sediments issued in July and August of 2010 defined the Gunpowder River as the Western Shore watershed and the North East and Elk and Creeks as the Eastern Shore watershed. Consequently, Pennsylvania's major basins in the Chesapeake Bay TMDL are identified as the Susquehanna, Potomac, Eastern Shore and Western Shore. These basins are referred to as Pennsylvania's Chesapeake watershed, Chesapeake TMDL watersheds, or similar terms throughout this document.

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 divides 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 target 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 allocations represent the maximum amount of pollutant loading identified by EPA through the Chesapeake Bay TMDL. EPA proposed a range for 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) engaged stakeholders in a process similar to that undertaken in 2006 to refine our Chesapeake Bay Tributary Strategy. A Watershed Implementation Plan Management Team was convened and 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. DEP will continue to work with these groups after publication by EPA of the Final Bay TMDL.

Milestone Implementation and Tracking

The first key element of the strategy for reaching Pennsylvania's nutrient reduction goals involves the development of challenging, but attainable 2-year milestones. The milestones project the nutrient and sediment reductions that will occur over a two year period resulting from BMP implementation and facility upgrades. Progress in meeting the milestones is reported annually and measured by the Chesapeake Bay watershed model. These milestones will help focus program efforts and provide for short-term accountability for meeting Pennsylvania's goals. Simply put, these milestones are the 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 was estimated that the management practices targeted for implementation during this period would reduce nitrogen loads to Chesapeake Bay by 7.3 million pounds per year and phosphorus loads by 300,000 pounds per year. In August 2010, DEP requested EPA to modify Pennsylvania's 2011 milestone due to an over-estimate of nutrient management implementation levels. Regardless of any change to the milestone, attainment of the reductions will require a collective effort of agriculture, land development, and wastewater treatment facilities. Pennsylvania will use these 2-year milestones through 2025 as part of the 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, Pennsylvania is making progress.

An important component of demonstrating to EPA that Pennsylvania is 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, the Watershed Implementation Plan must fully account for what Pennsylvanians are achieving on the ground. DEP will work 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 the strategy for reaching Pennsylvania's nutrient reduction goals involves the implementation of new technologies. We are supporting efforts to implement both new technologies and established BMPs through the sale of environmental credits and the advancement of environmental markets.

DEP is working with the Pennsylvania Department of Agriculture and a number of companies looking to install various technologies such as manure treatment, 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 and ammonia 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 manure-to-energy projects 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 versions with enhanced technology and supplemental systems (solids separation, flocculation, etc.) to help ensure overall nutrient reductions are achieved. Manure-to-energy projects are just the first of many promising technologies that advance broad based environmental benefits.

Regardless of the many benefits these advanced technologies can produce, there is one limiting factor for all - financing. Depending on the project, 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. DEP has recommended that a Technology Fund be created to support development of manure to energy technologies, septic system de-nitrification technologies, and other innovative technologies. The suggested amount for this fund is \$100 million with 50% being provided by the Bay jurisdictions and 50% being provided by the federal government.

A fund of this magnitude could install potentially 4 to 8 projects each year with each project having the potential to remove close to 1 million pounds of nitrogen from the Chesapeake Bay. Pennsylvania believes that the federal government, Bay jurisdictions, and other key stakeholders must play a constructive role in advancing new technologies and tools.

While implementing manure-to-energy and other new technologies is a key element of Pennsylvania's WIP, DEP and EPA have come to recognize the nutrient reduction capability of these technologies is not adequately reflected in Chesapeake Bay watershed model results. It has cooperatively been agreed to that over the next twelve months, DEP will work with EPA to create a BMP efficiency that will better account for the potential reductions. DEP also agrees to verify the reductions with EPA over the two-year milestone periods to assure the anticipated reductions are occurring. If it is found that the technology projects are not providing the anticipated reductions, DEP agrees to work with EPA to assess where additional nonpoint source reductions may be generated.

Concurrently, DEP continues to work with Pennsylvania stakeholders to enhance the Nutrient Trading program. With the assistance of the DEP's partners, Pennsylvania has been able to build a model program that has generated interest across the country. 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

A key component for ensuring sustainability and transparency for the Nutrient Trading program has been the promulgation of regulations in 25 Pa. Code, Chapter 96, "Water Quality Standards Implementation." The Nutrient Trading Program regulations are found in Section 96.8, "Use of offsets and tradable credits from pollution reduction activities in the Chesapeake Bay Watershed." They were published in the *Pennsylvania Bulletin* and became effective on October 9, 2010. *See*, 40 Pa. B. 5790.

Pennsylvania's Nutrient Credit Trading Program is built upon the core elements described by EPA for a valid trading program as outlined by EPA in EPA's National Trading Policy in 2003. For example, credits can only be generated for nutrient reductions above and beyond those required for regulatory compliance. There are also caps on the total tradable credits generated by nonpoint sources at the excess level available in the watershed from best management practices (BMPs) beyond those needed to meet compliance goals.

To help facilitate the nutrient trading market, the Pennsylvania Infrastructure Investment Authority (PENNVEST) is implementing a component of Pennsylvania's Nutrient Trading program to encourage the trading of nutrient credits in the Susquehanna and Potomac watersheds. To reduce risks to market participants and to ensure a stable marketplace, PENNVEST will serve as a Clearinghouse for nutrient credit trading transactions. In this context, credit buyers and sellers will be contracting with PENNVEST rather than directly with each other.

There has been on-going participation in the program, with nine contracts having been signed. PENNVEST completed the first credit auctions on October 28 and 29 and November 4 and 5, 2010. As a result PENNVEST will enter into six contracts to purchase credits and two contracts to sell credits. While these are excellent examples of the effectiveness of the Nutrient Trading program, DEP is interested in continuing to promote its utilization and increase 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-chair. 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 developed with input from a variety of stakeholders. Over 125 individuals representing a broad range of organizations volunteered to participate on workgroups that provided on-going input throughout the development of the Phase 1 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 by March 31, 2011. Upon completion of the Phase 5.3 model, DEP will re-convene the Chesapeake Watershed Implementation Plan Management Team and its workgroups to consider 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. The Chesapeake Bay Program's Principal Staff Committee has had discussions with EPA regarding an extension on the date for submission of the Phase 2 WIP. Clearly, two months is not sufficient time to develop a more detailed plan with a revised model and to seek public input during its development.

While DEP is engaging with the WIP Management Team on the Phase 2 WIP, it will prioritize 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 approximately 183 significant domestic wastewater facilities and 30 industrial facilities are expected to comply by 2016.

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 of this success story:

- 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 collected 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).

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, after working with local partners, are to submit their Phase 2 WIPs in draft and final form to EPA by June 1 and November 1, 2011, respectively. This work cannot be initiated until EPA completes revisions to the Phase 5.3 Chesapeake Bay watershed model. EPA expects to complete this work by March 31, 2011. The Chesapeake Bay Program's Principal Staff Committee has had discussions with EPA regarding an extension on the date for submission of the Phase 2 WIP. Clearly, two months is not sufficient time to develop a more detailed plan with a revised model and to seek public input during its development.

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	

	Bay TMDL	Phase 1 WIP	Phase 2 WIP	Phase 3 WIP
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

DEP made it a priority to effectively involve the public in the development of the Phase I Watershed Implementation Plan (WIP). As defined in 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, DEP utilized various means to encourage and allow input and comments, including:

- o Participated in meetings of local government, associations, and other organizations;
- o Facilitated discussions at meetings of DEP's standing advisory committees;
- o Participated in EPA's public meetings on the TMDL; and
- o Posted draft documents and summaries to 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 DEP's most recent Chesapeake Bay Tributary Strategy. Discussions were held with 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.

A public comment period for the draft WIP was published in the *PA Bulletin* (Volume 40, page 5387), extending from September 24 to November 8, 2010. DEP received comments from close to 300 commentators which were considered as the WIP was 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, 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 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 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 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 DEP 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 DEP.

CBAC met on May 3, 2010, where the Management Team and workgroup structure were discussed in detail. CBAC also meet on October 4, 2010 where an update was provided on the draft WIP and the comments that EPA provided were discussed.

CBAC meeting materials are available on the DEP'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, DEP made presentations at meetings of interest groups, local governments, business, industry associations and other groups. Through these meetings, DEP 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. Throughout the process, EPA publicized information pertaining to the TMDL and public input on the Chesapeake Bay TMDL website (<http://www.epa.gov/chesapeakebaytmdl/>).

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.

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

In addition, EPA held four public meetings in Pennsylvania during the TMDL public review period. These meetings were also well attended. The meeting dates were:

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

Presentations and meeting materials are available at:

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

Section 5. **Nutrient and Sediment Load Targets**

Nutrient and Sediment Load Targets

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

Based on computer analysis, 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 to have Chesapeake Bay waters conform to water quality standards established for the Chesapeake Bay by Maryland.

Pennsylvania is committed to developing a Chesapeake Watershed Implementation Plan (WIP) that will meet the nutrient and sediment cap loads established for Pennsylvania. Pennsylvania does not, however, agree with the approach outlined in EPA's Draft Chesapeake Bay TMDL. In comments submitted to EPA on November 8, 2010, Pennsylvania objected to the imposition of "federal backstop measures" in the Draft Bay TMDL, including the establishment of individual wasteload allocations (WLAs) for all significant point sources, aggregate WLAs for other entities regulated by the NPDES, and aggregate load allocations (LAs) for nonpoint source sectors. If EPA is asserting that it has the legal authority to promulgate WLAs and LAs in the non-tidal states, it should establish gross WLAs and gross LAs for each major basin in the non-tidal states in the Bay TMDL, consistent with language in EPA Region III's correspondence dated November 4, 2009:

"At a minimum, EPA Region III intends to establish gross WLAs and gross LAs for each major basin in the non-tidal states in the Bay TMDL. These gross allocations would be based upon the point and nonpoint controls identified in the respective state tributary strategy. EPA recognizes that tributary strategies prepared by our partner states should provide the needed transparency on the planned controls by the state to achieve their aggregate allocated loading. It will be necessary for each non-tidal state to provide ... a detailed draft tributary strategy containing information on allocations to a level of detail similar to the tidal states. The Bay models will be utilized to confirm that the allocation of loadings is sufficient to attain water quality standards."

As a non-tidal state, it is Pennsylvania's position that individual or aggregate WLAs and LAs should not be required for individual point sources or sectors in the Bay TMDL. DEP has revised the terminology for sub-basin loads in WIP Table B2, and TMDL Appendix Q should be revised accordingly for the non-tidal states. It is DEP's position that the following terminology is appropriate for the non-tidal states:

- A. Replace the WLA terminology with WTL for Waste Target Load (representing point source target load) and replace the LA terminology with NTL for Nonpoint source Target Load (representing non-point source target load).

- Individual WTL are appropriate for the following sectors: Significant POTW's; Significant Industrial
 - Aggregate WTL are appropriate for the following sectors: CAFO, Insignificant Wastewater, MS4, Industrial Stormwater, Construction Stormwater, NPDES Resource Extraction
 - Aggregate NTL are appropriate for the following sectors: Non-CAFO Agriculture; Onsite septic; Non-MS4 Urban/Suburb Runoff; Forest, Non-NPDES Resource Extraction
- B. For each major basin, include a row in Table B2 that adds all of the WTL's into an aggregate WLA and adds all of the NTL into an aggregate LA for placement into the TMDL.

DEP anticipates that the Final Bay TMDL will include aggregate nutrient and sediment wasteload and load allocations for each of Pennsylvania's major basins that discharge to impaired waters of Chesapeake Bay. These include the Susquehanna, Potomac and Gunpowder Rivers and the Northeast and Elk Creeks. On July 1, 2010, EPA issued nitrogen and phosphorous draft allocations to the states. On August 13, 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. Consequently, Pennsylvania's major basins in the Chesapeake Bay TMDL are identified as the Susquehanna, Potomac, Eastern Shore and Western Shore, also referred to as Chesapeake TMDL watersheds in this section. The draft allocations and a comparison to 2009 Progress numbers from EPA Phase 5.3 watershed model are listed in the below table. It should be noted that figures in subsequent tables may slightly differ due to rounding.

Comparison of 2009 Loads to Draft Allocations

Total Nitrogen - Million pounds per year

Watershed	2009	Draft	Remaining
	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

Watershed	2009	Draft	Remaining
	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				
		Draft	Remaining	
Watershed	2009 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	

EPA Region III's November 4, 2009 guidance for WIP development directed the states to sub-divide 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, resource extraction and air deposition to open water.

The draft allocations were split-out to the major sectors using the projected 2009 sector loads estimated by EPA using the Phase 5.3 watershed model. The first step was to assign the existing NPDES permit cap loads to the wastewater facilities, also known as point sources. These allocations were developed for the 2006 Pennsylvania Chesapeake Bay Point Source Compliance Plan. The point source allocations were based on the percentage of the nutrient loads attributable to the point sources at the time the 2005 Chesapeake Bay Tributary Strategy was developed. These allocations were the basis for the individual cap loads that were assigned in the NPDES permits issued to each significant discharge facility in the Bay watershed. Retaining these point source cap loads maintains continuity with the permits and the implementation plans submitted to DEP to attain the required point source allocations.

In Pennsylvania's Draft WIP, 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, and applying that same percentage to the reductions necessary to meet Pennsylvania's draft allocations for nutrient and sediment. This methodology was based on input received from DEP's Chesapeake WIP Management Team, which included representatives of the major load sectors. The rationale behind this approach was that each sector should only be responsible for the percentage of reductions which equate to the percentage of their contribution of loads. The Draft WIP Table B2 was constructed based on this premise. (The methodologies used to develop the 2009 sectors loads are described later in this sections.)

Pennsylvania's Final WIP takes an alternative approach to sub-dividing major sector loads, with the exception being the point sources addressed in the 2006 Point Source Compliance Plan. The 2006 Point Source Compliance Plan remains in effect. The approach for other major sectors was revised in response to EPA comments that Pennsylvania must "correct discrepancies between PA's Table B2 and the WIP (watershed model) input deck." A result of EPA's finding was the imposition of the "high-level federal backstop Draft TMDL."

In an effort to address EPA's comments and urge EPA to remove the federal backstop Draft TMDL, DEP worked with stakeholders to strengthen its watershed model input deck and to

revise Table B2 to be reflective of the input deck. DEP also factored in concerns that EPA expressed regarding reasonable assurance and BMPs in the watershed model input deck. Sector target loads are no longer based on their percentage of contributing loads. Instead, sector target loads are based on Pennsylvania’s Final WIP watershed model input deck, which reflects implementation of the most cost-effective BMPs and new technologies currently accepted by EPA’s Phase 5.3 Watershed Model.

Air deposition presented a challenge. As stated in EPA’s Draft TMDL, approximately 25 to 28 percent of nitrogen delivered to the Bay is due to nitrogen deposition. Although Pennsylvania has some ability to address air deposition, the ability to address nitrogen in sectors like forest and air deposition to water is very limited.

Intensive stakeholder involvement was engaged to determine the maximum level of BMP implementation that could be reasonably expected for the various major sectors under current regulations and existing or projected funding levels and EPA input. The Final WIP watershed model input deck reflected the input of numerous workgroup meetings. The Waste Target Loads (WTL) and Nonpoint source Target Loads (NTL) included in the revised Table B2 were developed directly from that watershed model input deck.

Tables listing the Year 2009 major sector loads and the Year 2017 and 2025 Waste Target Loads (WTL) and Nonpoint source Target Loads (NTL) are below. EPA should use these target loads as a basis for establishing the WLAs and LAs for Pennsylvania’s major basins in the Final Chesapeake Bay TMDL Appendix Q.

NOTE: Below Tables will be completed after DEP develops its Final WIP watershed model input deck. A revised input deck was submitted to EPA on November 29.

**Pennsylvania Chesapeake Watershed
2009 Sector Load and Projected 2017 & 2015
Waste Target Load (WTL) and Nonpoint source Target Load (NTL)
Total Nitrogen Delivered (lbs/year)**

Sector	2009	Percent of Total Load	2017 Total Target Load	2017 WTL	2017 NTL	2025 Total Target Load	2025 WTL	2025 NTL	
Sector									
Agriculture									
CAFOs									
Forest									
Point Source									
Septic									
Urban									
MS4 Permits									
Construction									

Sector	2009	Percent of Total Load	2017 Total Target Load	2017 WTL	2017 NTL	2025 Total Target Load	2025 WTL	2025 NTL	
Permits									
Mining Permits									
Industrial Stormwater									
Air Deposition to Water									
TOTAL									

Pennsylvania Chesapeake Watershed
2009 Sector Load and Projected 2017 & 2015
Waste Target Load (WTL) and Nonpoint source Target Load (NTL)
Total Phosphorous Delivered (lbs/year)

Sector	2009	Percent of Total Load	2017 Total Target Load	2017 WTL	2017 NTL	2025 Total Target Load	2025 WTL	2025 NTL	
Sector									
Agriculture									
CAFOs									
Forest									
Point Source									
Septic									
Urban									
MS4 Permits									
Construction Permits									
Mining Permits									
Industrial Stormwater									
Air Deposition to Water									

TOTAL									

Pennsylvania Chesapeake Watershed
2009 Sector Load and Projected 2017 & 2015
Waste Target Load (WTL) and Nonpoint source Target Load (NTL)
Total Sediment Delivered (lbs/year)

Sector	2009	Percent of Total Load	2017 Total Target Load	2017 WTL	2017 NTL	2025 Total Target Load	2025 WTL	2025 NTL	
Sector									
Agriculture									
CAFOs									
Forest									
Point Source									
Septic									
Urban									
MS4 Permits									
Construction Permits									
Mining Permits									
Industrial Stormwater									
Air Deposition to Water									
TOTAL									

Pennsylvania Sector Methodologies for Developing Year 2009 Loads

Agriculture

CAFOs

The 9-30-09 list of CAFO facilities was used as the master list of CAFOs in Pennsylvania. DEP 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 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

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
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
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 Chesapeake TMDL watersheds using river 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 Chesapeake TMDL watersheds.

The CAFO load is expressed as an aggregate Waste Target Load (WTL) from all federally and state-defined CAFOs. All permit numbers are identified in Table B2.

Non-CAFO Agriculture

The non-CAFO agriculture load was 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 is expressed as an aggregate Nonpoint source Target Load (NTL) load in Table B2

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 was 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 were 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 were 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 Chesapeake TMDL watersheds. The MS4 load is expressed as an aggregate Waste Target Load (WTL) with individual permits numbers listed in Table B2.

Industrial Stormwater

An April 2010 list of industrial stormwater permitted facilities and associated outfall locations were used 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 county 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

County	Permits Per County	Acres Covered under Permits	County	Permits Per County	Acres Covered under Permits
Dauphin	48	140	Sullivan	1	1
Elk	4	22	Susquehanna	13	14
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 recompiled to the four Chesapeake TMDL watersheds. The industrial stormwater load is expressed as an aggregate Waste Target Load with individual permits identified in Table B2.

Construction Stormwater

This first step in estimating construction stormwater was 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 are 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 defined as the conveyance system, there is not 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

County	10-Year Average Construction Acres	County	10-Year Average Construction Acres
Cameron	0.8	Mifflin	288.8
Carbon	n/a*	Montour	193.6
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 Chesapeake TMDL watersheds. The construction stormwater loads are expressed as an aggregate WasteTarget Load identified in Table 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 DEP 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 were then recompiled to the four Chesapeake 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 load is expressed as an aggregate Waste Target Load in Tables B2.

Urban/Suburban Runoff – Non MS4

The non-MS4 urban/suburban runoff load was 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 is expressed as an aggregate Nonpoint source Target Load (NTL) in Table B2.

On-Site Septic

On-site septic loads were automatically derived as an output of EPA's watershed 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. The on-site septic load is expressed as an aggregate Nonpoint source Target Load (NTL) in Table B2.

Forest

Forest loads were automatically derived as an output of EPA's watershed model. The forest load is expressed as an aggregate Nonpoint source Target Load (NTL) in Table 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)
- 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, meadows, 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.

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 353 CAFOs under permit, 317 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 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, or 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 watershed 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. This section provides details on how growth in the future will be approached; and identifies several program initiatives that will be employed to address growth and related potential impacts.

Growth

The Wastewater section of the WIP provides details on how the Point Source Strategy and Sewage Facilities Planning process will address growth through a "no net nutrient increase" strategy. Specifically, new needs for sewage discharges from industrial 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 their 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 non discharge alternative such as employing recycle and re-use technology or land application.

The Agriculture section of this WIP indicates that DEP does not anticipate agricultural sector growth occurring because 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 for the nation show a decrease in acres planted which reinforces 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 evident in EPA's data and Pennsylvania's existing regulatory requirements which result in reduced loads of nutrients and sediments.

As a first step in considering the potential or expected stormwater effect from growth associated with new land development, the Stormwater section explains that it is important to understand that Pennsylvania's approach to stormwater is to eliminate or reduce any new, additional or increased discharge from development projects in an environmentally sound and cost effective manner. "No net increase" in nutrients or sediment from stormwater sources will be 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. In addition, Pennsylvania expects to achieve a reduction in nutrients and sediment from redevelopment activities. Under this scenario, 20 percent of the existing impervious surface conditions that will be disturbed must be considered as meadow in good condition or better.

In summary, the WIP demonstrates that Pennsylvania is taking a sensible and proactive approach to accounting for growth, as set forth in the various WIP sections. DEP anticipates that the program elements described above and in other sections will be sufficient to address growth while achieving Pennsylvania's nutrient reduction goals. DEP does not anticipate 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 reconsider this approach.

Program Initiatives

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 the Nutrient Trading Program through policy and regulation development 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 has been the promulgation of regulations in 25 Pa. Code, Chapter 96, "Water Quality Standards Implementation." The regulations replace DEP's policy document (Guidance Document Number 392-0900-001: *Final Trading of Nutrient and Sediment Regulation Credits – Policy and Guidelines*) ("Guidance"), which 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 regulations serve the same purpose. The Nutrient Trading Program regulations are found in Section 96.8, "Use of offsets and tradable credits from pollution reduction activities in the Chesapeake Bay Watershed." They were published in the *Pennsylvania Bulletin* and became effective on October 9, 2010. *See*, 40 Pa. B. 5790. The regulations codify, with some revisions, DEP's Guidance as it relates to the Chesapeake Bay.

The regulations do not create new compliance requirements as the Nutrient Trading Program is a voluntary program that provides economic incentives for increased pollutant reductions beyond those required by law. However, DEP's Nutrient Credit Trading Program is built upon the core elements described by EPA for a valid trading program. DEP used many of the concepts outlined by EPA in EPA's National Trading Policy in 2003. For example, credits can only be generated for nutrient reductions above and beyond those required for regulatory compliance. There are also caps on the total tradable credits generated by nonpoint sources at the excess level available in the watershed from best management practices (BMPs) beyond those needed to meet compliance goals. Additionally, in Pennsylvania's program, a credit may be used to comply with permit effluent limits for existing loadings or for offsetting new or expanded loading. An offset in Pennsylvania's program is a pollutant load reduction used only by the permittee that achieves the reduction.

Section 96.8 outlines 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. Specifically, the regulations include the following eleven subsections: Definitions; Chesapeake Bay water quality; Methodology; Eligibility requirements for the Chesapeake Bay; Certification requirements for the Chesapeake Bay; Verification requirements for the Chesapeake Bay; Registration requirements for the Chesapeake Bay; Use of credits and offsets to meet NPDES permit requirements related to the Chesapeake Bay; Water quality and TMDLs; Public participation; and Use of credits and offsets generally.

There are no Federal regulations for nutrient credit trading, although there have been several air quality-related trading programs administered by the EPA and involving many states, including the Commonwealth. Pennsylvania understands that EPA intends to undertake an evaluation of each Chesapeake Bay jurisdiction's trading and offset programs in 2011. DEP recognizes that changes may be needed to adjust for new delivery ratios, edge of segment factors and best management efficiencies based on the revisions to the model that will be completed in 2011; however, DEP does not anticipate that changes beyond those will be necessary.

Another important component to facilitate the nutrient trading market involves the Pennsylvania Infrastructure Investment Authority (PENNVEST). PENNVEST is implementing a component of Pennsylvania's Nutrient Trading program to encourage the trading of nutrient credits in the Susquehanna and Potomac watersheds. To reduce risks to market participants and to ensure a stable marketplace, PENNVEST will serve as the Nutrient Credit Clearinghouse for nutrient credit trading transactions. In this context, credit buyers and sellers will be contracting with PENNVEST rather than directly with each other. Regulated public and private waste water treatment plants, as well as developers and others, may purchase nutrient credits from PENNVEST, who in turn will purchase credits from credit generators and aggregators. These transactions will occur through periodic credit auctions as well as through bilateral agreements between credit generators and credit purchasers. DEP will still be responsible for the certification and registration of credits exchanged through the PENNVEST Nutrient Credit Clearinghouse.

As mentioned in the preceding paragraphs on nutrient trading, the Commonwealth's Chapter 96 trading 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 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 report 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 a sediment credit system 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.

Over the next year DEP will work with the Pennsylvania Builders Association to evaluate options to develop a stormwater offsetting option and with the municipalities to develop offsetting options for use with the MS4 permits. Both programs would be established in a manner similar to the Nutrient Trading Program in that policy and guidance will be developed prior to a regulation being enacted. A stakeholder group will also be used.

Given the appropriate flexibility, time, and tools, Pennsylvania is confident that the Commonwealth will continue to have nutrient trading and offsetting options that make sense to Pennsylvania stakeholders and restore Pennsylvania's local waters and the Bay.

Section 7. **WASTEWATER**

Current Programs and Capacity

Pennsylvania's 2006 *Chesapeake Bay Point Source Compliance Strategy* for permitting wastewater treatment facilities in the Chesapeake Bay Watershed is described below. Pennsylvania has already accounted for reductions in nutrient loads from its non-significant facilities through reductions from its significant facilities. The non-significant facilities are capped at their existing loads, and any future increase in load proposed must be completely offset by reductions at the plant or elsewhere in the watershed. The current estimated load (Table B-2 of the September 1 draft WIP) from non-significant sewage facilities is: TN = 2,198,406 lbs = 2,532,726 lbs x 0.868 adr (average delivery ratio) and TP = 185,967 lbs = 400,790 lbs x 0.464 adr. The current estimated load from non-significant industrial facilities is: TN = 690,664 lbs = 795,696 lbs x 0.868 adr and TP = 225,105 lbs = 485,141 lbs x 0.464 adr. An allocation for these amounts should be secured in the TMDL for those categories. Any proposed expansion by these non-significant facilities will result in a cap load being placed in their permit maintaining their existing load. This will ensure that the non-significant categories will not exceed their allocation.

I. Sewage Discharges

Permitting for existing significant sewage discharges is being 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 – significant point source sewage dischargers (design annual average daily flow on August 29, 2005 greater than or equal to 0.4 mgd): cap loads were placed in permits with effective dates for some facilities beginning October 1, 2010. Draft permits were issued as quickly 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. For the facilities in this phase:
 - 28 facilities have effluent limits based on the phased approach reflected in permits starting October 2010.
 - 44 will have effluent limits based on the phased approach reflected in permits starting October 2011.
 - All 63 will have effluent limits based on the phased approach reflected in permits starting October 2015.

- B. Phase 2 – significant point source sewage dischargers (design annual average daily flow on August 29, 2005 greater than or equal to 0.4 mgd): cap loads were placed in permits and most will become effective on October 1, 2012, and final permits with cap loads were mostly

issued by January 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. For the facilities in this phase:

- 10 facilities have effluent limits based on the phased approach reflected in permits starting October 2010.
- 29 will have effluent limits based on the phased approach reflected in permits starting October 2012.
- All 47 will have effluent limits based on the phased approach reflected in permits starting October 2015.

C. Phase 3 – significant point source sewage dischargers (design annual average daily flow on August 29, 2005 greater than or equal to 0.4 mgd): cap loads were placed in permits to become effective on October 1, 2013, and final permits with cap loads are planned to be issued no later than December 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. For facilities within this phase:

- 4 facilities have effluent limits based on the phased approach reflected in permits starting October 2010.
- 4 should have effluent limits based on the phased approach reflected in permits starting October 2013.
- All 73 should have effluent limits based on the phased approach reflected in permits starting October 2016.

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 will 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 will 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.
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. These facilities are listed below.

Permit No.	Permittee	County
PA0026743	Lancaster City	Lancaster
PA0026921	Greater Hazelton Joint Sewer Authority	Luzerne
PA0027405	Ephrata Borough Authority	Lancaster
PA0028142	PA National Guard – Fort Indiantown Gap	Lebanon
PA0087181	Ephrata Borough Authority	Lancaster
PA0032051	Granville TWP	Mifflin
PA0081574	Salisbury Township	Lancaster
PA0084026	Northwestern Lancaster County Authority	Lancaster
PA0247391	North Codorus TWP Sewer Authority	York
PA0028631	Mid-Cameron Authority	Cameron
PA0113298	Elkland Borough Authority	Tioga

- 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 by purchasing nutrient credits or generating 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 involved dividing the facilities 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 will be their current loads.
5. The cap loads for the fifth category will be their current loads reduced by 33 percent.

After applying the loads as outlined above, the phosphorus load still exceeded the allowable total load for significant Industrial Wastewater Facilities of 66,348 lbs/year of TP. Therefore the phosphorus 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 allocation 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, 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 its nutrient cap loads based on the following formula:

- Offsets for TN = (IW nutrient concentration after pretreatment (mg/l) – 6 mg/l) x 8.34 x IW flow in MGD x 365 days.
- 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 a report or plan and schedule for complying with those cap loads as 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.

Non Significant Industrial Dischargers and Non-Contact Cooling

Water Dischargers. A design flow based monitoring requirement has been published for facilities in the Compliance Plan for Industrial Waste Dischargers on the DEP’s Chesapeake Bay program webpage. Semiannual monitoring of source water is recommended for these dischargers. These monitoring requirements will be placed in their NPDES permits as they come up for renewal.

Facility / Wastewater Type	Design Flow	Effluent N Series & TP Monitoring Frequency*
Non-Contact Cooling Water with No Chemical Additives	All Flows	1/year
Non-Contact Cooling Water with Chemical Additives	< 0.1 MGD	1/year
	> 0.1 MGD	1/quarter
Agricultural and Related Products (SIC Codes 0111-0989 and 2011-2141)	< 0.1 MGD	1/month
	0.1 – 1 MGD	2/month
	> 1 MGD	1/week
Textile Mill and Related Products (SIC Codes 2211-2399)	< 0.1 MGD	1/month
	> 0.1 MGD	2/month
Lumber, Paper and Allied Products (SIC Codes 2411-2679)	< 0.1 MGD	1/quarter
	> 0.1 MGD	1/month
Chemicals, Plastics, Pharmaceuticals and	< 0.1 MGD	1/quarter

Facility / Wastewater Type	Design Flow	Effluent N Series & TP Monitoring Frequency*
Allied Products (SIC Codes 2812-2899)	> 0.1 MGD	1/month
Primary and Fabricated Metals Products (SIC Codes 3312-3510)	< 0.1 MGD	1/month
	> 0.1 MGD	2/month
Electric Services (Coal Pile Runoff and Other Wastewaters) (SIC Code 4911)	All Flows	1/month
Water Treatment Facilities (SIC Code 4941)	All Flows	1/quarter
Groundwater Cleanup Operations (Various SIC Codes)	All Flows	1/quarter
Landfill Leachate (SIC Code 4953)	< 0.1 MGD	1/quarter
	0.1 – 1 MGD	1/month
	> 1 MGD	1/week
N or P-Contaminated Storm Water	All Flows	1/quarter
All Other Wastewaters	< 1 MGD	1/quarter
	> 1 MGD	1/month

* More frequent monitoring may be required based on professional judgment.

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 contains milestones designed to document progress toward compliance in intervals of no less than one year. The final end point of the schedule is 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

As outlined in other sections of the WIP, for facilities subject to meeting limits for nitrogen, phosphorus and sediment, the Nutrient Trading program provides a cost-effective means to meet those limits by working with other facilities or with nonpoint sources, or both. The Nutrient Trading program helps the Commonwealth achieve its Chesapeake Bay nutrient reduction goals from the agriculture sector and provides a source of revenue to farmers and other property owners while advancing the restoration and protection of the water quality of the Chesapeake Bay.

V. Adaptive Management

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

VI. Permitted CSOs

Nutrient contributions from CSOs with approved Long Term Control Plans (LTCP), will be excluded from 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 mandated that dishwashing detergent contain virtually no phosphate by July 1, 2010.

The DEP has regulations promulgated to address the required nutrient credit trading, construction, operation and treatment 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 funding associated with the American Recovery and Reinvestment Act (ARRA). 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 work done overall.

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 this funding represented an enormous effort. In 2009 DEP reviewed 360 applications for ARRA 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. These reviews represented about four times the normal flow of work without any increase in staffing. The second round of 722 applications seeking \$1.9 billion was reviewed by DEP in the summer of 2010. Decisions on the award of those funds are pending.

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.

DEP is a national leader in the promotion of sustainable principles. The Task Force on Sustainable Water Infrastructure promoted concepts that were proposed in legislation in the fall of 2010. That legislation would, among other things, require all wastewater systems in the state to practice asset management. No other state in the country, to our knowledge, has pursued a comparable goal. DEP has also piloted "gap" financing concepts which EPA is applying in the 2012 Clean Watersheds Needs Survey. Pennsylvania's work in sustainable infrastructure is expected to have a long-term beneficial impact on wastewater treatment in the Commonwealth.

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 to consider the potential development of a Watershed NPDES Permit approach in order to facilitate implementation of the *Chesapeake Bay Point Source Compliance Strategy* and WIP. 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.

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 as the animal numbers and density increase.

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 the Natural Resource and Conservation Service (NRCS) to support Environmental Quality Incentives Program (EQIP) and Chesapeake Bay Watershed Initiative (CBWI) Best Management Practice (BMP) projects; targeted watershed implementation projects using federal 319 funding and Pennsylvania's Growing Greener program, and the state's Conservation Reserve Enhancement Program (CREP) effort. The Pennsylvania CREP program leads the nation with 205,250 acres enrolled, more than 180,000 of these acres in the Chesapeake Bay watershed. The Pennsylvania Resource Enhancement And Protection Program (REAP) which has provided nearly \$20 million in state tax credits to farmers that have agreed to implement certain conservation best management practices and/or implement no-till systems thru the purchase of no-till equipment.

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 that specifies 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 EPA-approved CAFO program has permitted 353 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 is 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).

These regulations were recently revised and published in the *Pennsylvania Bulletin* on August 21, 2010, with an effective date of November 19, 2010. The revisions require E&S plans for Animal Heavy Use Areas and require additional vegetative cover or BMPs for fields within 100 feet of a stream. Additionally, the revised regulations require an implementation schedule for all E&S plans and the implementation of these plans. A compliance strategy is currently under development for the implementation of these revised regulatory requirements.

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 if the animal density exceeds 2,000 pounds of live weight of animals per acre of land on the operation. The plan specifies the amount of nutrients that may be applied and the conditions where and when the manure can be spread. 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 for those facilities that are not required to have a plan. The law requires that nutrient management plans be developed and reviewed by certified nutrient management specialists. Nutrient management plans for regulated entities (CAOs) must be approved by the State Conservation Commission or a delegated conservation district at a public meeting after public notice and opportunity for public comment. 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.

Pennsylvania's nutrient management program is carried out through a concerted effort to support and assess research relating to phosphorus loss from crop fields in Pennsylvania in the late 1990's. During these years, Pennsylvania had the foresight to accumulate a significant body of research relating to the loss of phosphorus from crop fields.

The result of this research directed Pennsylvania to develop a Phosphorus-index (P-index) planning tool which was implemented in May of 2004 as a regulatory requirement for CAOs and CAFOs. This *Version 1* of the P-index provided a tool to assess where phosphorus loss from crop fields is most likely to occur, and provided for either phosphorus application restrictions or outright prohibitions to phosphorus applications (including manure applications) for fields identified as having a high potential for phosphorus loss to a water resource. This initial P-index tool was revisited and revised in 2007 in order to more effectively identify situations requiring detailed phosphorus application assessment, and to better reflect the science of how phosphorus moves over and within the landscape. Approximately 20 percent of the fields assessed using the current P-index planning tool are restricted in their application of phosphorus, either requiring application rates limited to phosphorus removal by the crop, or outright disallowing phosphorus applications to the assessed fields. Penn State has indicated to DEP that using P-saturation alone is expected to affect manure application rates on only seven percent of Pennsylvania's farm

fields, and those seven percent are not expected to be well targeted to where DEP actually expects phosphorus loss to streams (transport) to occur.

The P-index was refined in 2007 to include 11 factors, all having a direct impact on the loss of phosphorus to local water resources. These 11 factors are:

- soil test level of P (which directly correlates to P-saturation),
- amount of fertilizer applied P,
- fertilizer P application method,
- amount of manure applied P,
- manure application method,
- P solubility in the manure,
- soil loss from the field,
- runoff potential from the field,
- subsurface drainage class of the field,
- proximity to a stream, and
- modified connectivity (which addresses whether or not there are field drains or ditches that drain distant fields directly to streams).

Pennsylvania continues to maintain that relying solely on soil test phosphorus levels (or P-saturation levels) to determine manure application rates and procedures, is less effective than using the P-index which assesses all 11 factors that have a direct bearing on the movement of phosphorus on crop fields and its delivery to waters of the Commonwealth. The P-index is a much more effective tool than P-saturation alone at identifying fields and practices that are likely to cause phosphorus loss to water bodies. To move to using only P-saturation to address phosphorus loss from crop fields would be a significant step backwards in Pennsylvania's efforts to keep phosphorus out of streams.

The Pennsylvania P-index has built into its process soil test levels for phosphorus. When a field hits these soil test levels, either application is restricted to phosphorus removal rates, or phosphorus applications are disallowed altogether. The soil test levels where restrictions occur vary based on the other 10 factors included in the Pennsylvania P-index tool. The Pennsylvania P-index tool drives farmers to minimize or eliminate phosphorus build up in their fields in order to allow for the long term availability of the field for manure applications.

The Pennsylvania P-index planning tool, which became mandatory for CAOs and CAFOs in 2004, is being incorporated into revisions to the Manure Management Manual, which establishes manure management criteria for animal feeding operations (AFOs).

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. It is unlawful in Pennsylvania 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 1,000 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 and early 2011. The following 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 and had construction overseen and certified as meeting standards by a Professional Engineer. Some storage facilities 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. Revisions to the *Manure Management Manual* 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 manure management plans which 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 manure management plans under the *Manure Management Manual* need not be developed by certified specialists or approved by DEP unless requested by the DEP. These plans must also include maps that identify the fields, pastures and BMPs in the plan. A current, implemented and approved Nutrient Management Plan 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 must be available for inspection upon request. 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 receive other benefits. CAOs are agricultural operations with more than two AEUs 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. Voluntary nutrient management planning is also encouraged under the Act.

The SCC administers and enforces the Nutrient Management Act requirements. Existing CAOs had until October 1, 1998 to develop nutrient management 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 nutrient management plan. Expanding and new CAOs must get a nutrient management plan approved before commencement of operations. Nutrient management 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. For more than a decade, technical training programs have been offered for the certification of Nutrient Management Specialists, and for the 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 State 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 2,650 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 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 at a public meeting 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. Pennsylvania is expecting to revise its P-index in 2011 in order to reflect the most recent scientific findings relating to the delivery of phosphorus to waters of the Commonwealth.

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 353 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.

Nutrient Trading Regulations (25 Pa. Code § 96.8(d)). These regulations specify the baseline requirements that agricultural operations must meet before they can generate nutrient trading credits. For any nonpoint source, baseline shall be the current requirements in regulations applicable to the sources at the location where the credits or offsets are generated, and the pollutant load associated with that location. For agricultural operations, this includes compliance with the erosion and sedimentation requirements for agricultural operations in Chapter 102 (relating to erosion and sediment control), the requirements for agricultural operations under §91.36 (relating to pollution control and prevention at agricultural operations) and the requirements for agricultural operations under Chapter 83 Subchapter D (relating to nutrient management), as applicable.

25 Pa. Code § 96.8 (d) (3) specifies that:

(i) An agricultural operation must meet one of the following threshold requirements at the location where the credits or offsets are generated. For the purpose of this subparagraph the term “surface water” means a perennial or intermittent stream with a defined bed or bank, a lake or a pond.

(A) Manure is not mechanically applied within 100 feet of surface water. This threshold can be met through one of the following:

(I) There are no surface waters on or within 100 feet of the agricultural operation.

(II) The agricultural operation does not mechanically apply manure, and applies commercial fertilizer at or below agronomic rates contained in the current Penn State University Agronomy Guide published by Pennsylvania State University.

(B) A minimum of 35 feet of permanent vegetation is established and maintained between the field and surface water. The area may be grazed or cropped under a specific management plan provided that permanent vegetation is maintained at all times.

(C) The overall amount of pollution reduction is adjusted by at least 20%, which is to be applied during the calculation of the reduction amount when the credits are certified by the Department.

(ii) The Department may establish other threshold requirements necessary to ensure the effectiveness of the use of credits and offsets to meet legal requirements for restoration, protection and maintenance of the water quality of the Chesapeake Bay

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.

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.

When a conservation district provides the initial field presence and refers a matter for enforcement, DEP staff and the 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 a 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.

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.

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 formal 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. To address this staffing situation, DEP plans to hire additional DEP staff using Chesapeake Bay Regulatory and Accountability Program (CBRAP) grants, fund additional conservation district resources using future CBRAP grant funding, and modify delegation agreements with county conservation districts for the Nutrient Management program and Erosion and Sedimentation Control regulatory programs. (See "Strategy to Fill Gaps" section.)

Commonwealth Agencies. Pennsylvania state government staffing for regulatory programs that address agriculture is found in two state agencies – DEP, the Department of Agriculture (PDA) and in an interdepartmental commission, the SCC.

PDA 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 and also administer Pennsylvania's certification programs for nutrient management, odor management and manure haulers and brokers.

DEP has approximately 15 staff that address the regulation of agriculture under the CAFO, E&S and nutrient management requirements. Staff are 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.

In addition, DEP has five Chesapeake Bay Field Representatives located in three DEP regional offices. These individuals are currently engaged in all aspects of the conservation district installation of BMPs under the Chesapeake Bay Implementation Grant Special Projects program, and the installation of stream bank fence under a separate DEP effort. These Bay Field Representatives provide technical support to conservation districts and farm operators, and they BMPs installed under the Chesapeake Bay Implementation Grant Special Projects. These five staff are also involved in all aspects of the Special Project and Technical Assistance grant process.

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 resources available to implement Pennsylvania’s agricultural programs are 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 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 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.

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 for 39 Watershed Specialists employed by county conservation districts in the Chesapeake Bay Watershed. Watershed Specialists report expenses and outputs quarterly to DEP and DEP includes specific outputs in the Scope of Work for each watershed specialist. In the Bay watershed, \$1,235,814 is spent each year to support these staff positions. These positions are required to attend annual training provided by DEP and Chesapeake Bay information is often a component of this annual training.

Non Regulatory Programs

The non-regulatory programs play a substantial role in protecting and improving Pennsylvania's waters, including 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. Pennsylvania plans to expand CREP to the Delaware River Basin in the near future.

CREP has been a significant success in Pennsylvania. Pennsylvania supports continuation of CREP in the next Farm Bill. Pennsylvania would also support any necessary modification of CREP requirements to allow the re-enrollment of existing CREP acres back into a CREP contract at the expiration of current CREP contracts.

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.

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 to the greatest extent possible. It is important to note that these conservation district staff are not enforcement/compliance positions, but are technical assistance providers.

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. These staff are required to attend annual training provided by DEP – the “All Bay Meeting” – to receive the latest information available on the Bay program, to discuss common problems and receive information on innovative projects undertaken by their peers. These positions are trained in PA's Nutrient Management program. Their work is reviewed annually by DEP staff and the county's Bay program is evaluated once every three years by DEP staff.

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.

BMPs installed under this program must follow NRCS standards. Since 2003, NRCS Practice Codes have been the standard for BMPs implemented under this program. The construction/implementation of these BMPs are certified by DEP staff upon completion. In addition, 10 percent of the practices implemented in previous years are reviewed annually to ensure that they are still functioning as installed. BMP implementation is reported to DEP quarterly and reported to EPA annually as part of the non-point source BMPs for the Bay watershed model purposes.

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 provided 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. The Chesapeake Bay watershed is a regional watershed priority under Growing Greener. This means that projects in the Chesapeake Bay watershed receive more “points” when project applications are scored/evaluated for funding.

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 66 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 63 County Conservation Districts who may participate in the Dirt and Gravel Road Maintenance Program (DGRP). \$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.

In order for any municipality to be eligible for a DGRP grant, the municipality is required to attend a 2-day Environmentally Sensitive Maintenance training session that teaches both sustainable road maintenance techniques and effective non-point source pollution controls. Since its inception, the DGRP, through the Penn State Center for Dirt and Gravel Road Studies,

has trained thousands of township personnel in these environmentally sensitive maintenance (non-point source pollution control) techniques.

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 FY 2008-09, \$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.

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 conservation staff equivalents each year to implement agriculture programs in county conservation districts. Note: This is 18 full time staff equivalents; funding 50 percent of staff cost for 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 Section 319 Nonpoint Source Program is a federal grant program administered by DEP. Funding comes from EPA through authority under Section 319(h) of the Federal Clean Water Act. Grants are provided to local sponsors to conduct projects that address nonpoint source polluted runoff and restore water quality in watersheds. These projects include agricultural BMPs that are included in Watershed Implementation Plans (WIPs) developed under 319 grants. Projects include stream bank fencing, wetlands restoration and stream bank restorations. BMP implementation in the Conewago watershed is an example of these projects. The DEP Water Planning Office staff coordinates with 319 grant staff to report any BMPs funded through 319 grants that result in nutrient 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 State Conservation Commission, conservation districts, and other cooperators in the Chesapeake Bay watershed. USDA offices in Pennsylvania entered into a Partnership Agreement in 1999 and NRCS routinely hosts monthly partnership meetings in their office with DEP, SCC, PACD and others to discuss new programs and solve common problems. The results of these partnership meetings include the “TAG Grant” engineers that provide engineering support for water quality projects. These TAG engineers are PACD employees that are funded by DEP and supervised by NRCS field offices. NRCS has provided essential engineering/technical service in the planning, design, implementation, and maintenance of BMPs. To supplement federal staff, in 2010 NRCS has entered into Technical Service Provider (TSP) agreements with 14 conservation districts in the Bay watershed to increase the number field staff to provide technical assistance for agricultural water quality projects. These TSP agreements provide \$491,200 per year to support additional staff. Many of these TSP agreements are coordinated with state Chesapeake Bay Implementation Grant funds to enhance the availability of staff to install BMPs and provide technical assistance. 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 includes nine municipalities which straddle 3 counties - Dauphin, Lebanon, and Lancaster.

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 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.

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 level that show a 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.

Gap Analysis

A 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, Pennsylvania 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 and the Capitol Area RC&D, 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.

A detailed analysis of these data, methodologies and estimation of additional agricultural BMPs is found under the Tracking and Reporting Protocols section of the WIP.

The results of the Lancaster and Bradford counties pilot study indicate that staff resources usually tasked with implementing BMPs may be better allocated to partially allocating some of their time to tracking the non-cost-shared BMPs. While these pilots utilized multiple methods for identifying “untracked BMPs,” one of the most successful methods was site visits by trained conservation staff. In Bradford county, former NRCS staff and certified Nutrient Management Planners visited farm operations and reviewed BMPs on-site. While time and labor intensive, this method obtained verified information on all BMPs on the farm.

There is also a project, implemented under a NRCS contract with the National Association of Conservation Districts, which has recently begun regarding the coordination of information on BMPs in the Bay. The results of this NRCS-NACD project are not yet available to assist Pennsylvania in the development of the WIP. Pennsylvania, along with the other Bay states, has begun to assist NRCS and NACD in this effort. The results of the Lancaster and Bradford counties pilot project have been shared with NACD and NRCS.

Based upon the results of the Lancaster and Bradford pilots and the NRCS and NACD project, Pennsylvania’s Conservation District Chesapeake Bay technicians will be given clear and 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. Chesapeake Bay technicians may not be the appropriate “collectors” of data on all BMP practices (e.g. annual crop practices like cover crops of no-till acres) but, given adequate guidance and training, Bay technicians may be very useful in collecting information on multi-year practices like mortality composters. This guidance and training could be provided as part of

the annual “All Bay” meeting, which will be held on January 5, 2011. This meeting is generally held in December or January, prior to the announcement of next year’s Chesapeake Bay Implementation Grant funding for conservation district Bay staff and Special Projects application period.

In addition, additional efforts are required to work with USDA’s National Agricultural Statistics Service 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.

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.

BMP Projections for Chesapeake Bay Implementation Grants. The Chesapeake Bay Implementation Grant program is an important source of funding for implementing many pollution mitigation measures throughout the Chesapeake Bay region, including many of the agricultural BMPs recognized by the Chesapeake Bay watershed model. The level at which different critical BMPs have been implemented since 2006 are shown in Table 1. Over the last four years this program, on average, has resulted in the implementation of 3,988 acres of nutrient management plans; 1,546 acres of conservation tillage land; 2,131 acres of cover crops; 57,176 feet of stream bank fencing; 78 acres of rotational grazing land; 1,335 feet of stream bank protection; 12 animal waste management systems; and 28 acres of barnyard runoff control. (Note: Additional mitigation activities were funded by this program other than those listed in this table, but those given are key ones that most directly relate to BMPs used by the Chesapeake Bay watershed model).

Table 1. BMP implementation by CBIG program.

BMP	2006	2007	2008	2009	Avg.	2017	2025
Nutrient management (acres)	5,007	1,645	3,497	5,803	3,988	31,904	63,808
Conservation tillage (acres)	677	2,666	291	2,548	1,546	12,364	24,728
Cover Crops (acres)	628	1,601	273	6,021	2,131	17,046	34,092
Stream Bank Fencing (feet)	38,841	145,667	17,925	26,271	57,176	457,408	914,816
Prescribed grazing (acres)	70	72	107	61	78	620	1,240
Streambank protection (acres)	1,695	2,161	685	800	1,335	10,682	21,364
Waste management (units)	23	8	9	8	12	96	192
Barnyard runoff control (acres)	9	1	1	3	4	28	56

From FY2005 through FY2008, the funding for the Chesapeake Bay Implementation Program has averaged \$1,097,050 per year. The funding for FY 2009 is \$1,384,101, and this level is expected to remain fairly constant in the future. Given that, the average rate of implementation

for the various BMPs shown in Table 1 was used to extrapolate the cumulative unit totals for each activity for the years 2017 and 2025.

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 in Lancaster and Bradford counties 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.

Beginning in July 2011, Chesapeake Bay Implementation Grant funds will be targeted to specific locations and to specific BMPs. DEP will 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 will 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. DEP will also target these funds to expand the compliance assistance outreach and planning programs in each Chesapeake Bay county to provide for additional compliance assistance for existing agriculture E&S and manure management requirements.

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.

DEP will revise Chesapeake Bay Technician's annual work plans for the 42 conservation district Bay technicians. These changes will occur with the July 2011-June 2012 contracts and will include specific tasks to improve tracking of BMPs and expand the compliance assistance outreach programs in each Chesapeake Bay county to provide for additional compliance assistance for existing agriculture E&S and manure management requirements. Working with the State Conservation Commission and the county conservation districts, changes to the Scope of Work will require these 42 staff to spend a portion of their time contacting all farms in their county to ensure that all farm operators are aware of their responsibilities under Pennsylvania's Erosion and Sedimentation Control regulations and the Manure Management Manual. These activities will include providing education materials on these requirements, providing planning support, and technical assistance for BMP installation. The actual workload and outputs will vary by county, based on number/type of farms, technical ability of staff and other factors, but

estimates of 100 farms per year per staff person is a reasonable expectation. In five years, about 21,000 farm operations – more than half the farms in the watershed – will be in compliance with their regulatory requirements.

PENNVEST Non-Point Source Project Funding

The expansion of nonpoint source (NPS) pollution funding in the Pennsylvania Infrastructure Investment Authority (PENNVEST) program is a significant change to the Clean Water State Revolving Loan Fund (CWSRF), which has primarily served “traditional” wastewater system needs in Pennsylvania. Applications for NPS projects were solicited beginning in April 2010. Staff is now doing outreach and considering changes to make the program more effective. The program guidelines can be seen at (http://files.dep.state.pa.us/Water/Drinking%20Water%20and%20Facility%20Regulation/DrinkingWaterPortalFiles/watersupply/municipalfinance/Program_Design_Summary_Applicant1.pdf). DEP serves as the technical advisor to PENNVEST.

PENNVEST has some experience with NPS funding, due to the successful program for on-lot septic system repair, the funding of a few Brownfields projects and three abandoned mine drainage projects. In addition, as a result of the American Recovery and Reinvestment Act (ARRA) requirements for “green” infrastructure projects, a large number of NPS stormwater, hydromodification and agricultural projects were funded in 2009. The new NPS program is largely founded on lessons learned in ARRA.

Program Goals. The primary goals of the NPS program are to: (1) improve water quality or protect existing exceptional value or high quality waters, (2) promote water conservation and energy efficiency and (3) promote economic development. It is premature to quantify the specific pollutant removals that will result from the program, but not unreasonable to believe they will be significant.

Sources of NPS Pollution to be Addressed. NPS pollution is typically the result of rainfall becoming contaminated with pollutants as it runs off the land surface into streams or infiltrates through soil into groundwater. The types of NPS pollution are highly varied, and are discussed in detail in “Pennsylvania’s Nonpoint Source Management Program Update” (October 11, 2008, Document Number 394-2000-002).

In PA, the three most significant causes of water quality impairment from NPS pollution are agriculture, stormwater, and abandoned mine drainage. Only projects that address these three causes are eligible for funding. They include. For the purposes of this program, stormwater projects were further defined as those projects that address water quality problems caused by “urban runoff”. In addition, this program will also encompass Brownfield remediation projects. The program will fund projects that construct Agricultural Best Management Practices, Urban Stormwater Pollution Control, Acid Mine Drainage Control, and Brownfield Water Pollution Reduction.

Agricultural Best Management Practices. Eligible agricultural work is limited to recognized US Department of Agriculture, Natural Resource Conservation Service (NRCS) best

management practices (BMPs). A list, in alphabetical order by practice name, with the practice code in parentheses, is available at: <http://efotg.nrcs.usda.gov/toc.aspx?CatID=12487>. The list also contains links to the practice standard (available in either Portable Document Format (PDF) or MS-Word), a conservation practice information sheet and the Conservation Practice Physical Effects (CPPE) worksheet for most practices, and job sheets for a limited number of conservation practices. The last column contains national templates for Statements of Work associated with each conservation practice. These national templates are provided in MS-Word and are intended for modification and adaptation by states. These Statements of Work outline deliverables for all conservation practices in the National Handbook of Conservation Practices (NHCP), as well as for comprehensive nutrient management plan development, conservation planning, and cultural resources compliance activities.

Urban Runoff Control. Eligible practices, as described in the DEP's Stormwater Best Management Practice Manual, include BMPs that transport, store, infiltrate or treat stormwater from existing developed areas. Projects will be recognized as serving developed areas either by reference to County Comprehensive Plans or through descriptions provided by applicants. The Manual is available at: <http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-8305>

Abandoned Mine Drainage (AMD) Control. Any project designed to reduce AMD volume or concentration, or treat AMD discharges is eligible, provided there is no entity with the continuing responsibility under applicable law to accomplish the work. Included are Surface Mining Control and Reclamation Act of 1977 (SMCRA) pre-1977 Abandoned Mine Land projects as well as those 1977 and later projects which remain incomplete despite bond forfeiture. A list of eligible practices is included in Appendix 1 of the PENNVEST NPS Program Guidelines.

Brownfield Water Pollution Reduction. Eligible projects include those on contaminated commercial/industrial sites whose purpose is to protect water or groundwater quality from contaminants on the site. A list of eligible practices is included in Appendix 2 of the PENNVEST NPS Program Guidelines.

PENNVEST actively funds Green Initiatives that promote and encourage environmental responsibility in our communities, that are creative, and that provide innovative, 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. Projections are that this will result in a new, additional \$5-10 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. \$1.8 million was awarded for agricultural projects in the Chesapeake Bay watershed. These projects were:

- 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.

- A \$291,000 loan to treat both hog and dairy manure at various farms to remove both nitrogen and phosphorous from the manure that farmers spread on their fields, thus reducing the contamination of the Chesapeake Bay watershed by these nutrients.
- 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.
- A \$213,000 loan to construct manure storage facilities to eliminate winter manure land applications and contamination of streams by nitrogen and phosphorous runoff.

At the PENNVEST meeting in November 2010, an additional \$22.242 million was awarded in grants and loans for several agricultural pollution reduction projects. There was over \$20 million awarded in grants to two large innovative technology projects - Energy Works in Adams County and Blair County Regional Digester (CARD) – and two “traditional” agricultural BMP projects in Chester and Lancaster counties. These projects were:

- \$1 million grant to Chester County Conservation District to construct facilities that will contain and compost animal waste from agricultural operations in West Fallowfield and Lower Oxford Townships. These facilities will reduce nutrient contamination of local streams and the Chesapeake Bay by controlling storm water runoff from these agricultural operations.
- \$240,594 grant to Lancaster County Conservation District to replace an undersized manure storage facility with a larger structure that will allow an agricultural operation to employ improved manure management practices that will reduce nutrient runoff into local streams and the Chesapeake Bay.

Innovative Prioritization Methodology. DEP put significant effort into the development of prioritization criteria. EPA staff provided useful insights. DEP did not however find that the priority systems that are currently in use by other states to be useful.

It is not surprising that limited effort has been made by other states, because EPA does not require prioritization of NPS projects. DEP and PENNVEST, however, felt that prioritization was important. The NPS program is expected to be financially and environmentally important in Pennsylvania. The fact that EPA rules now make grants (otherwise known as “principal forgiveness”) an option in the CWSRF program makes the use of the money all the more important. Grants serve to open the door to more and larger projects.

DEP and PENNVEST therefore proposed criteria that included consideration of cost/benefit, and created a means of applying that criterion in a simple, straightforward way. The belief is that it is not enough to calculate benefit; some projects can have large benefits but at extraordinarily large costs. The way to get the most benefit for the overall program investment is to consider both cost and benefit in the project selection process. See <http://files.dep.state.pa.us/Water/Drinking%20Water%20and%20Facility%20Regulation/DrinkingWaterPortalFiles/watersupply/municipalfinance/Project%20Rating%20System.pdf>. The

expected result is funding many small, highly beneficial projects, many of which will be in the Chesapeake Bay watershed.

PENNVEST Affordability Criteria. PENNVEST is required by statutory mandate to offer a level of subsidy that takes into consideration the affordability of the project. As a result, loans are offered at a variety of interest rates to some applicants. Grants are provided only when that level of subsidy is essential to project success. The program therefore gets more done than if an arbitrary subsidy is provided across-the-board. The effect of the policy is seen in the four July 2010 projects listed above.

Program Outreach. It is critical that DEP and PENNVEST communicate the availability of the program to potential applicants. That work is being done through presentations at conferences and meetings, through the *Pennsylvania Bulletin*, and the PENNVEST and DEP websites. PENNVEST and DEP staff have been trained so that they can help market the program.

DEP has a NPS program coordinator in its central office, and draws NPS expertise in support of the program from other DEP programs. DEP will fund a new full-time position utilizing Section 319 funding in 2010-11 to implement an outreach effort. This is necessary because 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 yet expert in non-point source projects, and already have a full point source and drinking water workload. The DEP Regional Offices have staff that is knowledgeable in technical aspects of non-point source activities, but lack experience in the PENNVEST website. They also have a full workload. A knowledge gap and a shortage of staff time therefore exists which, if not addressed, would have prevented this program from reaching its potential.

Therefore, a new position, called the Non-Point Source Program Application Developer (AKA “NPS Circuit Rider”), will be established. The role of this individual is to fill the knowledge gap and staff shortage discussed above, resulting in a greater number and quality of PENNVEST Non-Point Source applications.

The NPS Circuit Rider will be responsible for identifying and eliminating bottlenecks in the completion of high-quality PENNVEST NPS applications. The highest priority work will 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 Regional Office 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 Regional Offices.

Creative Support to the Trading Program. The NPS program can be used by wastewater systems to fund BMPs that satisfy all or part of the nutrient control obligation of the wastewater system. DEP and PENNVEST staff is promoting the concept in which a wastewater utility might, for example, collaborate with a County Conservation District (CCD). The CCD could provide agricultural expertise and serve as a contact with farmers, and the wastewater system could serve as the PENNVEST applicant. Alternatively the wastewater system could hire staff, or a consultant, to develop its own portfolio of credit-generating NPS BMPs.

NPS Program Improvements. The two biggest bottlenecks which are limiting applications appear to be: (1) the requirement that projects be ready to go to construction, and (2) the requirement that applicants use the PENNVEST website as the application medium.

- (1) PENNVEST policy has traditionally favored projects that are ready to go to construction. Planning and design costs are often reimbursed when construction funding is provided. That policy has been effective with wastewater and drinking water projects because the applicants for such projects have access to sophisticated expertise and a source of revenue to pay for the work. The policy also limits the number of administrative actions by PENNVEST and its applicants, and avoids the waste of funding that occurs if planning and/or design efforts fail to proceed to construction.

Conversely, the most cost-effective agricultural projects are frequently on small farms. Owners have limited means to do the planning and design work needed to satisfy the current PENNVEST requirement. Discussions are underway to deal with this problem.

- (2) The PENNVEST website applies state-of-the-art technology to the application solicitation, review and record-keeping process. PENNVEST continues to make changes to the website to accommodate NPS projects. That work, with support by staff, is expected to overcome current obstacles. Progress will be monitored and improvements will continue to be made.

In summary, the new NPS program is expected to make a significant difference in the Chesapeake Bay watershed. It will directly fund a significant reduction in nitrogen, phosphorus and sediment loads and it will support the trading program.

U.S. Department of Agriculture (USDA)

The Natural Resources Conservation Service (NRCS) and Farm Services Agency (FSA) have actively participated with DEP, the State Conservation Commission, conservation districts, and other cooperators since the inception of the program. PA-NRCS is addressing the TMDL issue through technical and financial assistance approaches. The CBWI priority areas and ranking strategies are used to target its financial assistance. From a technical assistance standpoint, NRCS is filling vacancies, training staff, and entering into agreements with partners to ensure that the priority areas have the staff and resource capacity to address the natural resource issues. In regards to the Watershed Implementation Plans (WIPs), NRCS has engaged Pennsylvania agency staff in efforts to ensure financial and technical assistance allocations are issued where the need for load reductions is the greatest. PA-NRCS is seeking assistance from NRCS National Headquarters to enable Performance Results System reports to make a distinction between general fencing and riparian fencing (note: riparian fencing receives higher points in the Bay model). NRCS and DEP believe the current priority areas (see CBWI map) are suitable for accomplishing load reductions. The average farm size in Pennsylvania is 124 acres, with a significant number of viable livestock operations. PA-NRCS is focusing its efforts on small and medium-size livestock and crop farms, as well as vegetable and fruit operations which are growing in number.

Partnership agreements and contracts in the Bay Watershed total over \$3 million for work to be done in 2011 and much of that is in programs that qualify to meet the TSP goal. In FY2010 \$491,000 was provided to 14 county conservation districts to support TSP agreements. Work to be completed includes: conservation planning, training, outreach, and implementation of practices including traditional farm practices as well as dam removals, stream restoration and habitat development, bog turtle restoration, grazing assistance, feed management planning, energy development, pollinator development, and forested riparian buffer implementation.

Funding programs under the Farm Bill will be enhanced to address the nutrient and sediment load reductions required under the Chesapeake Bay program. These will include:

EQIP/CBWI: NRCS will work with producers to apply new conservation practices on four million acres of agricultural work lands in high priority watersheds by 2025 to improve water quality in the Chesapeake Bay and its tributaries. PA-NRCS is requesting \$23 million in 2011 to install agronomic, forest and livestock-related practices. In total, PA-NRCS estimates it will complete 300 contracts for vegetative practices, 200 contracts for agricultural waste-livestock, and 265 contracts for grazing/forest/organic. A specific project in this is the “Feed Management Initiative.” Using Farm Bill funds, NRCS projects that it will offer \$1.0 million to sign up 40 farms in FY 2011. Sign-up starts in November 2010 with final contracts by April 2011. NRCS will use its existing Practice Code 592 for contracting purposes for this sign up.

Farm and Ranch Land Protection Program (FRPP): NRCS will work with state agency and producers to protect additional acres of lands throughout the watershed. There is a large demand for farmland preservation in the Commonwealth of Pennsylvania. In FY 2011, PA-NRCS will allocate approximately **\$4 million of FRPP funds**. PA-NRCS’ target is to protect 41,000 acres in FY 2011. It is expected that the State and county FY 2011 allocation for farmland preservation will be approximately \$20 million and \$17 million, respectively.

Wildlife Habitat Incentives Program: NRCS will work with producers to restore 181,440 miles of riparian forest buffers and restore historical fish passage migratory routes by opening an additional 1,000 stream miles by 2025. PA-NRCS estimates that it needs approximately \$800,000 to complete 48 stream bank and dam removal projects this year to assist restoring historical fish migratory routes, as specified in the E.O. (181,499 miles of riparian miles; 1,000 stream miles). For upland habitat projects, PA-NRCS estimates that they need an additional \$500,000.

Wetlands Reserve Program (WRP): NRCS will work with producers to restore 30,000 acres of non-tidal wetlands and enhance the function of an additional 150,000 acres of degraded wetlands by 2025. In FY 2011, PA-NRCS will allocate \$4,160,000 for wetland restoration work throughout the state, with a focus in the Chesapeake Bay Watershed. NRCS anticipates enrolling 20 bog turtle easements in FY 2011 at a cost of \$1.6 million and 300 acres of non-bog turtle easements in PA at a cost of \$1.9 million.

Training for Field Staff: Training for field staff is a priority, as PA-NRCS has experienced a significant influx of field employees. There are 56 total employees in the Southeast PA field offices. Eighteen of the 56 are new hires this fiscal year. Because there are so many new hires

in the counties within the Chesapeake Bay Watershed and in order to prepare for the Executive Order mandates and the new Conservation Delivery Streamlining Initiative (CDSI), PA-NRCS has launched a number of trainings to prepare new staff to meet increased planning and contract workload. These include Farm Basics 101 under a \$30,000 contract with the Pennsylvania State University, “Boot Camp” for new NRCS and conservation district staff under a \$100,000 contract with the PA Association of Conservation Districts (PACD), and “Quality Conservation Program Delivery” training under a \$40,000 contract with PACD.

Feed Management Initiative: PA-NRCS is creating a Feed Management Funding Pool, totaling \$1 million. It will present a webinar for the field staff to inform its employees about this funding pool. PA-NRCS has also held a meeting with feed and nutrition consultants and livestock groups to highlight this funding pool and strategize ways to promote initiative enrollment. Specifically, PA-NRCS will be working in the high phosphorus watershed priority areas to promote this initiative, and will place brochures at feed mills, FSA offices, dairy cooperatives, etc. The focus will be on beef and dairy operation.

Bog Turtle Initiative: The PA-NRCS Bog Turtle Initiative is well underway. PA-NRCS and the USFWS partnership anticipate that 20 participants will sign up in FY 2011. NRCS has produced brochures and handouts to disseminate to interested parties and partners. PA-NRCS has set up a team throughout the State to implement the WRP. The Team approach has enabled PA-NRCS to obligate three times more funds in the WRP than it has ever obligated in PA and also set new records for both easement acreage and number of contracts enrolled.

Wildlife Habitat Training: PA-NRCS is hosting two trainings (one for field staff and one for partners) on Farm Bill program flexibilities and constraints. This training will occur on November 16. The joint training will occur with FSA. Attendees will include The Nature Conservancy, American Rivers, TSP’s, PA Fish and Boat Commission, land conservancies, and others. More than 100 participants are anticipated to attend.

Plain Sect Initiative: PA-NRCS has made personal contact with bishops in the Plain Sect community to provide more outreach to Amish and Old Order Mennonite producers. PA-NRCS is also working with Trout Unlimited to potentially partner with this organization to install stream bank fencing. PA-NRCS also conducts one-on-one outreach through an agreement with the Lancaster County Conservation District to employ one full time Plain Sect outreach position. Many NRCS, RC&D and District offices have the Plain Sect community as their major outreach target since Plain Sect members now farm in about 25 counties, many of which are located in the Bay watershed.

On-the-Job Training Initiative: PA-NRCS is proposing a SWAT team training approach. Because NRCS has so many new employees, PA-NRCS is using a SWAT team to work one-on-one with employees to teach them to plan and improve contract delivery. The SWAT training team will go to Lancaster, Franklin, Cumberland and potentially Berks, York and Adams counties.

NRCS will also implement several innovative efforts in FY 2011, including continued promotion of core practices Bay-wide using a combination of CBWI and EQIP funding; innovative cover

cropping using legume-based covers to reduce inorganic N fertilizer applications; adaptive nitrogen management by better timing of N applications according to in-season testing; High-Boy Covercrop Seeder innovative technology; and the Conewago Creek Showcase Watershed. Activities in the Showcase Watershed include Agricultural Research Service (ARS) Dry Manure subsurfer unit for manure injection that is scheduled to be in Conewago this fall; completion of farmer surveys by conservation district staff to identify needs; detailed Soil Survey to map small hydrologic areas not viewable in current soil survey; collaboration with USGS on monitoring by sharing data to inform gage site selection; local visioning team efforts and successful integration of local partners and recruitment of community involvement; and the development of Conservation Decision Support tool by Zedex.

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 manure to energy projects such as 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 which 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. Manure-to-energy projects are just the first of many promising technologies that advance broad based environmental benefits.

To access the potential reductions for these projects, DEP worked with EPA to have an interim BMP established. This was necessary to allow for recognition in the WIP of the nutrient reductions associated with manure processing technology efforts. This could be accomplished with a new placeholder BMP, or utilization of an existing BMP from the Watershed Model. However, it was not possible to design a "one-size-fits-all" BMP, because each technology is different. At the same time, the technologies do share a common element: they reduce the amount of nutrients available for application in the watershed.

In simplistic terms, an approach was approved to allow jurisdictions to review each technology and calculate the amount of reduced nutrients, employing critical requirements such as reducing by the amount of replacement nutrients. Because the net amount of nutrients no longer applied in the watershed has the same effect as transporting those nutrients out of the watershed, each jurisdiction would calculate a "tons of manure equivalency" that would then be reported to the

Chesapeake Bay Model as the Manure Transport BMP. The advantage of this approach is that an existing Chesapeake Bay Model BMP could be employed.

While implementing manure-to-energy and other new technologies is a key element of Pennsylvania's WIP, DEP and EPA have come to recognize the nutrient reduction capability of these technologies is not adequately reflected in Chesapeake Bay watershed model results. It has cooperatively been agreed to that over the next twelve months, DEP will work with EPA to create a BMP efficiency that will better account for the potential reductions. DEP also agrees to verify the reductions with EPA over the two-year milestone periods to assure the anticipated reductions are occurring. If it is found that the technology projects are not providing the anticipated reductions, DEP agrees to work with EPA to assess where additional nonpoint source reductions may be generated.

Regardless of the many benefits these advanced technologies can produce, there is one limiting factor for all: financing. Depending on the project, 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.

DEP has called for an annual investment fund, financed by the federal government and Bay states, to be developed to support manure-to-energy technologies, septic system de-nitrification technologies, and other innovative technologies throughout the watershed, including at least one per year in Pennsylvania. The suggested amount for this Technology Fund \$100 million with 50 percent to be provided by the Bay jurisdictions and 50 percent to be provided by the federal government. A fund of this magnitude could install potentially 4 to 8 projects each year with each project having the potential to remove at least 1 million pounds of nitrogen from the Chesapeake Bay. Pennsylvania believes that the federal government, Bay jurisdictions, and other key stakeholders must play a constructive role in advancing new technologies and tools.

DEP held a meeting on October 27, 2010 to gauge interest in the development of the Technology Fund. As an outcome of that meeting, key follow-up items, as well as suggestions and issues to be addressed were identified related to establishment of the Technology Fund. Since that meeting DEP has been and will continue to work with stakeholders to discuss the items raised at the meeting.

Pennsylvania anticipates that specific elements of the Technology Fund could be outlined, drafted and potentially established during the two-year 2011-2012 legislative session. Detailed discussions will continue in early 2011.

As the Technology Fund is developed and established, DEP will continue to support the development of new technologies through the promotion and expansion of the Nutrient Trading Program. Pennsylvania's existing Nutrient Trading program has already proved a viable option for municipal treatment plants and communities that must reduce their nitrogen and phosphorous discharges. DEP continues to work with Pennsylvania stakeholders to enhance the Nutrient Trading program, as detailed in other sections of this plan.

Regulatory Efforts

Achieving clean water within the Chesapeake Bay Watershed, while maintaining the economic viability of Pennsylvania farms and farm families, is the goal of the proposed Chesapeake Bay Agricultural Water Quality Initiative. The objective of this Initiative 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. The Chesapeake Bay Water Quality Initiative represents a coordinated and comprehensive outreach and compliance and enforcement strategy for all farm operations in the Chesapeake Bay watershed, including small dairies and other livestock operations. The Chesapeake Bay Agricultural Water Quality Initiative's five primary components are:

- Continue Existing Regulatory Program
- Evaluate and Modify Regulatory and Administrative Tools
- Basin-wide Component to Achieve Agricultural Compliance with State Regulatory Requirements
- Targeted Watershed Approach to Assess and Achieve Agricultural Compliance
- Monitor and Evaluate Progress and Effectiveness of the Assessment and Compliance Initiative

A copy of the October 2010 Proposed Chesapeake Bay Agricultural Water Quality Initiative is attached in Appendix 5. The following paragraphs provide key information relevant to the WIP, while additional details are provided in Appendix 5.

Continue 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 CAFO requirements and the Nutrient Management program is an ongoing effort.

Pennsylvania currently has 353 CAFO operations under permit. 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. To enhance compliance, Pennsylvania plans to expand training and outreach to the agricultural community to increase compliance with Chapter 102 and manure management requirements to prevent future spills, chronic runoff problems and excessive soil erosion. As examples, in Spring of 2011, DEP will partner with PA-NRCS offices to provide training for NRCS staff on Pennsylvania's agricultural E&S program and in February 2011 will discuss the *Manure Management Manual* with Pennsylvania poultry and swine producers.

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. Pennsylvania's regulatory requirements under Chapter 83, Chapter 91 and Chapter 102 provide an adequate regulatory structure to address all farm operations. Pennsylvania has begun efforts to improve these regulatory efforts discussed below. However, at this time, Pennsylvania is not considering revisions to requirements for erosion and sedimentation control, nutrient management plans, and manure management plans to incorporate additional agricultural implementation measures described in EPA's *Section 502 Guidance for Federal Land Management in the Chesapeake Bay Watershed* that are not already included in our regulatory programs. Pennsylvania will commit to consider this federal guidance as Pennsylvania evaluates and modifies our regulatory and administrative tools.

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 became effective November 19, 2010.

Revisions to Chapter 102 require a written E & S Plan 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. Animal Heavy Use Areas can be trampled stream areas and E&S plans can include BMPs to address these areas.

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. All E&S plans must contain an implementation schedule, the schedule must be implemented, and all BMPs must be maintained and operational. Other revisions involved including "equine activity" in the definition of "Agricultural operations", and requiring an E&S plan and the implementation of BMPs to limit soil loss from accelerated erosion.

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 the *Manure Management Manual* and Land Application Supplement have been initiated to address Pennsylvania's existing *Manure Management Manual*. The DEP began development of these revisions in 2009 and 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.

Revisions to this manual were published in the August 14, 2010 PA Bulletin. A 90 day public comment period allows for public review and comment on these substantial revisions. The public comment period for these revisions closed on November 12, 2010. 1548 comments were received. The Manual is a DEP Technical Guidance Document, not a regulation, but these technical guidance documents are required to be drafted and revised in a public process. After the close of the public comment period, DEP will review the comments, edit the Manual as appropriate and prepare the final Manual and Comment/Response Document. DEP will engage both a technical committee – made up of DEP, SCC, NRCS and Penn State staff - a small workgroup of DEP's Agricultural Advisory Board. This workgroup includes members of the technical committee, as well as Chesapeake Bay Foundation, PA Farm Bureau, PennAg Industries and others. This Manual will then be presented to the Agricultural Advisory Board and published in the PA Bulletin as a final technical guidance document. (It is important to note that the Agricultural Advisory Board is a legislatively established advisory group to DEP that is required by statute to review DEP policies applicable to agriculture. Its membership is

established by the legislature and is made up of farm owners/operators and industry representatives appointed by the Governor.)

Under 25 Pa. Code § 91.36(b) a permit or approval from DEP 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*;
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, DEP 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 DEP 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. (A detailed review of the Manual and its relationship to the WIP is provided in Appendix 6.)

Specific considerations were included in the revisions to the *Manure Management Manual* regarding the winter application of manure. As noted in the existing *Manure Management Manual*, winter application of manure is the least desirable, but there is not an outright ban on winter applications in the current *Manure Management Manual* or the proposed revisions. In the proposed revisions to the *Manure Management Manual*, farmers that choose to apply manure in the winter will need to follow the following criteria:

1. The maximum application rate for the winter season is 5,000 gallons of liquid manure or 20 tons of dry manure per acre. As an alternative maximum rate, a farmer can choose to calculate and apply manure to the phosphorus removal rate for the coming year's crop.
2. An additional setback of 150 feet is required from an above ground inlet to an agricultural drainage system (such as inlet pipes to pipe outlet terraces) if surface water flow is toward the above ground inlet.

3. All fields must have at least 40 percent crop residue at application time or an established and growing cover crop, hay, or pasture crop. The 40 percent cover provision would generally exclude application to corn silage fields that do not have an established cover crop, corn grain fields where a significant portion of the fodder has been removed, and soybean fields. Fields with a cover crop or sod crop should be used first.
4. Because slope is an important factor, all winter application must be done consistent with an agricultural erosion and sediment pollution control plan meeting the requirements of 25 Pa. Code Section 102.4(a) of the DEP regulations. Manure may not be applied during winter on fields with slopes greater than 15 percent (“A”, “B” or “C” slopes).

These winter spreading restrictions in the draft revisions to the *Manure Management Manual* were the subject of most of the comments received to date. Nearly all commentators were concerned about the operational aspects of restricting winter application, citing the timeliness/ability to spread manure in the short window of spring season or the rutting/soil compaction that would occur in wet years. There is also the consideration of the practicality / affordability of construction of additional manure storages at a time of limited federal/state cost share funding and the economic state of the dairy industry. Given limited cost-share funding, increasing nearly all of the manure storages to six or nine months capacity to meet a winter application ban is unattainable. Managing the winter application of manure with specific and rigorous requirements is the best solution for Pennsylvania, and we believe that the draft revisions to the *Manure Management Manual* accomplish this.

The Pennsylvania P-index planning tool, which became mandatory for CAOs and CAFOs in 2004, is being incorporated into revisions to the *Manure Management Manual* which establishes manure management criteria for AFOs . The revisions to the *Manure Management Manual* will require all fields to be planned addressing both phosphorus and nitrogen. The manual is proposed to address phosphorus on all AFOs using any one of three planning methods:

1. If no soil tests available, limiting manure application rates to phosphorus crop removal, with a 150’ manure application setback
2. If soil tests are available and the soil test P levels are less than 200 ppm phosphorus, limiting manure application rates to nitrogen crop removal, along with a 150’ manure application setback, (you cannot use this planning option if soil test levels for phosphorus are 200 ppm P or greater)
3. If soil tests are available you may use the P-index to determine application rates and setbacks.

Training and outreach have been initiated to support changes to the Chapter 102 regulations and *Manure Management Manual*. Six training sessions for DEP and conservation district staff were held between September 14 and October 10, 2010. Information on the new regulatory requirements of Chapter 102 and the proposed revisions to the *Manure Management Manual* were provided as part of this training. An additional session on the *Manure Management Manual* revisions was provided to conservation district staff at the E&S Annual Training on October 27, 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. Pennsylvania does not expect to expand its approved CAFO program to small dairies. Pennsylvania’s regulatory requirements under Chapter 83, Chapter 91 and Chapter 102 provide an adequate regulatory structure to address all farm operations, including small dairies.

Basin-wide Component to Achieve Agricultural Compliance with State Regulatory Requirements

This section was added to the proposed Chesapeake Bay Agricultural Water Quality Initiative since it was first reviewed by EPA in January 2010 and represents an effort to ensure compliance with existing programs referenced in EPA September 27, 2010 correspondence on Pennsylvania’s WIP deficiencies.

Pennsylvania recognizes that an increased effort is needed to inform agricultural operations of their regulatory responsibilities, and opportunities to go beyond regulatory compliance through out the Chesapeake Bay watershed. Additionally, accountability is needed to ensure agricultural operations are complying with regulatory requirements basin-wide.

The first component of this effort is to provide the agricultural community information regarding regulatory requirements. DEP, in cooperation with local, state, and federal partners, will develop and implement a communications and outreach strategy that will ensure the distribution of information to farmers about: the intent and implementation of the Agricultural Water Quality Initiative, baseline regulatory compliance, Chesapeake Bay goals, going beyond baseline compliance, trading, importance of safeguarding onsite drinking water sources, technical and financial assistance, and identification and reporting of non cost-share voluntary BMPs. The first steps in this have been initiated with PA-NRCS and with the on-going preparation of fact sheets and other materials that can be provided to agricultural producers regarding Pennsylvania's requirements. DEP has also discussed with PA-USDA NASS about utilizing NASS' mailing efforts to provide information on agricultural compliance requirements and will do so when appropriate information is available.

An important and underutilized mechanism for outreach to the agricultural community is DEP's Agricultural Advisory Board. The Agricultural Advisory Board (AAB) is legislatively established advisory group to DEP that is required by statute to review DEP policies applicable to agriculture. Its membership is established by the legislature and is made up of farm owners/operators and industry representatives appointed by the Governor. DEP will better engage the AAB to provide education/outreach materials to the producer groups they represent and encourage significant information sharing regarding new technologies, BMP installation and industry issues. This effort would lead to problem solving for significant issues like the use of soil phosphorus, phytase use and other manure management issues that impact all of PA agriculture or specific industry sectors, like the poultry industry. One such effort has begun with the current chairman of the AAB to better account for and verify the use of phytase in the swine industry. PennAg Industries is working with its members in the swine industry, and will report to DEP data confirming the swine phytase use reductions DEP uses in Bay Model runs. This reporting will continue on an annual basis to verify phytase use. Additional cooperation agreements could be established between DEP and the AAB to provide problem solving in the dairy, beef, vegetable, poultry and crop farm interests represented on the AAB. This will be discussed at the next AAB meeting, tentative scheduled for December 15, 2010.

The second component of this effort is to develop and implement a strategy to increase compliance with baseline regulatory requirements. DEP proposes to maximize site visits by engaging conservation districts, local federal agencies, and DEP regional staff in implementing a prioritized site assessment process at selected agricultural operations. DEP also will be proposing revisions to delegation agreements with conservation districts under the E&S and nutrient management programs. Delegation agreements are the mechanisms by which DEP delegates responsibilities to county conservation districts for the implementation of state programs and regulatory authorities. These are, basically, contracts between DEP and the conservation district to undertake state regulatory programs. DEP has had delegation agreements with Required Output Measures (ROMs) with conservation districts for the E&S program for many years. However, the existing delegation – and most importantly the ROMs – has no language or requirements to address compliance with the agriculture sections of the regulations. With the revisions to the E&S regulations, DEP will be working with the State Conservation Commission and the county conservation districts to negotiate new ROMs for the E&S program and DEP plans to include agricultural compliance in these ROMs.

These changes will be a significant game-changer and will clearly highlight that county conservation districts have the authority and responsibility to address agricultural E&S issues. A similar change to the existing Nutrient Management delegation agreement, to include responsibilities for manure management under Chapter 91.36 is also possible, but the issue of revising this delegation agreement will not be considered until after the revisions to the *Manure Management Manual* are complete and additional funds for conservation districts are made available. Again, like the agriculture E&S requirements, no delegation authority currently exists for manure management and this addition provides county conservation districts with the authority and responsibility to address manure management that they may not have considered in the past.

Another aspect of this component to develop and implement a strategy to increase compliance with baseline regulatory requirements is conservation district compliance/enforcement policies. In January 2010, DEP's Chesapeake Bay Program Technician /Engineer Funding Announcement required all districts that receive funds for Chesapeake Bay Technicians to submit a written description of how the district addresses complaints regarding on-farm pollution incidents and agricultural compliance. These written descriptions were required to be submitted prior to or with the first quarter invoices for reimbursements under the Chesapeake Bay Program. (Note – these were due September 15, 2010.) Districts could submit an existing agricultural compliance policy or a plan may be submitted to meet this requirement. An objective of the Chesapeake Bay Technician position was allowed to include the development of a policy / procedure to address complaints and agricultural compliance issues under Chapter 102 (agricultural erosion and sediment control) and Chapter 91.36 (manure management planning.) These documents have been submitted by all Chesapeake Bay counties and are being reviewed. Based upon these submissions, DEP plans to develop a “Model Agricultural Compliance Policy” and will require each district to have an Agricultural Compliance Policy to continue to receive Chesapeake Bay Program Technician funding. July 1, 2011 is the next start date for Chesapeake Bay Program Technician contracts, but this may be too soon for development of a “Model Agricultural Compliance Policy” and successful implementation. A July 2012 date for implementation of these compliance policy requirements may be more reasonable. Development of this model agricultural compliance policy has not yet begun, but it may include:

- Respond to and investigate all agricultural water quality complaints;
- In each case, personnel will include the development and implementation of a manure management plan (MMP) and agricultural erosion and sediment pollution control (E&S) or conservation plan, if not already in place, as these are requirements of all farming operations;
- Require mitigation efforts if there is a pollution event;
- Utilize a “3 strikes you’re out” approach to compliance, if there is not an identified pollution event;
- Coordinate with or referral to other State and Federal Agencies; and
- Utilize the complaint investigation and follow-up process to provide one-on-one education to the farm operations.

The third component of this effort to increase compliance with existing requirements is to increase field presence to increase compliance. One aspect of this is to identify and engage Conservation District Bay Technicians, Engineers, Nutrient Management Specialists and

Watershed Specialists (as appropriate) to assist in the implementation of aspects of this Initiative. This will be accomplished through revisions to work plan outputs associated with DEP grants and delegation agreements to the CD.

Working with the State Conservation Commission and the county conservation districts, changes to the Scope of Work will require these 42 staff to spend a portion of their time contacting all farms in their county to ensure that all farm operators are aware of their responsibilities under Pennsylvania's Erosion and Sedimentation Control regulations and the *Manure Management Manual*.

Another example would be the revision of the contracts with conservation district nutrient management technicians to address manure management compliance activities under DEP's Chapter 91.36. By including this in the existing delegation agreements, Pennsylvania will increase compliance inspections on small farms and increase compliance with Manure Management requirements in 36 Chesapeake Bay counties. Nutrient management technicians currently implement Pennsylvania's Act 38 Nutrient Management regulatory program. The revisions to the *Manure Management Manual* closely track the regulatory requirements of this program and the knowledge, skills and training of these Nutrient Management Technicians mirror those necessary to implement the compliance activities for manure management. Again, working with the State Conservation Commission and the county conservation districts, DEP would like to revise the existing Nutrient Management Delegation Agreements to specifically include Chapter 91.36 activities. However, DEP will not go forward with proposing this change for manure management until adequate funding is available. To address this, Pennsylvania plans to utilize future Chesapeake Bay Regulatory and Accountability Program (CBRAP) grants to expand technical resources necessary to implement the *Manure Management Manual*. The expectation is that EPA will grant Pennsylvania \$2,000,000 in 2011 and, for the next five years, \$400,000/year will be made available to conservation districts to increase staff capacity. These funds will be used to supplement and/or expand existing Nutrient Management Technician capabilities.

In addition to increasing county conservation district field presence, DEP must increase its own field presence to generate increased compliance. The FY2010-2011 CBRAP grant provided funds to support four new DEP 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. The enforcement activities of these staff will be consistent with existing compliance procedures and the aspects of the Chesapeake Bay Agricultural Water Quality Initiative. If these staff are engaged in targeted watershed efforts with conservation district staff, they will utilize an escalating enforcement process (known as the "3 strikes you're out" approach described in

Section I of Chesapeake Bay Agricultural Water Quality Initiative – See Appendix 5) unless a pollution discharge is occurring that requires a more immediate compliance response. If these staff are responding to a complaint or performing inspections outside of a targeted watershed effort, these staff will consider any and all compliance tools available including NOV's, field orders, compliance orders, CO&A's, and requiring permits. This approach, to apply any and all compliance tools available, is consistent with existing compliance and enforcement procedures.

In addition, Pennsylvania may also utilize existing DEP Chesapeake Bay Field Reps to assist in aspects of the Chesapeake Bay Agricultural Water Quality Initiative. These five staff, located in three DEP regional offices, currently are engaged in all aspects of the conservation district installation of BMPs under the Chesapeake Bay Implementation Grant Special Projects program and the installation of stream bank fence under a separate DEP effort. The limited amount of Special Projects funds in the Chesapeake Bay Implementation Grant may lead to curtailment of the DEP stream bank fence program for several years and provide the staff time dedicated to that specific BMP to be utilized to address agricultural compliance issues. DEP plans to re-focus these staff resources to provide outreach/education and to address agricultural inspections. It is projected that these staff could accomplish up to 100 inspections per year. These staff may also be tasked with other activities that could include better tracking of specific BMPs from existing CAFO permit data or verifying non-cost shared BMPs in a fashion similar to their current effort on BMPs that are cost-shared through the Special Project Agreements.

In conclusion, there is a substantial opportunity – and commitment – to undertaking actions that achieve agricultural compliance with state regulatory requirements. This component of the Chesapeake Bay Agricultural Water Quality Initiative identifies significant number of staff that may be available to support this effort:

- 7 Conservation District E&S staff (this is 10 percent of current district E&S staff);
- Conservation District Chesapeake Bay Technicians;
- Conservation District Nutrient Management Technicians;
- 4 DEP CBRAP Compliance Staff; and
- DEP Chesapeake Bay Field Representatives.

The actual workload and outputs will vary by county, based on number/type of farms and other factors, but estimates of 100 farms per year per staff person are a reasonable expectation. Using 100 farms per person and the staff listed above, it is reasonable to expect that, in five years:

- Conservation District E&S staff can address 3,500 farm operations to be in compliance with their agricultural E&S regulatory requirements;
- Conservation District Chesapeake Bay Technicians can address 18,000 farm operations – about half the farms in the watershed – and inform them about compliance with their regulatory requirements;
- Conservation District Nutrient Management Technicians can inform 19,000 farm operations about their regulatory requirements and address the manure management planning requirements for many of these operations;
- DEP CBRAP Compliance staff can perform 2,250 compliance inspections and 500 compliance actions; and

- DEP Chesapeake Bay Field Representatives can perform 2,500 compliance inspections.

The estimate of 100 farms per staff person is anecdotal data, based on Union County Conservation District's proposed plan to reach all 520 farms in their county in five years. Other proposals, such as Lancaster County's proposed effort to have conservation plans on all 5,000 farms by 2015 or Chesapeake Bay Foundation's estimates of about 70 farms per person per year. Using 100 farms per staff person may be aggressive, but even using the other estimates of 70 farms per year, the expectation is that all 40,000 of the estimated farms in the watershed could be in baseline compliance in 7 years.

In addition, compliance activities will be initiated by NRCS and the private sector conservation and nutrient management planners. However, it is difficult enough to estimate conservation district and DEP staff outputs – those that may be directly or indirectly controlled by the Commonwealth. Estimates of compliance efforts by others are even more difficult to calculate given the time constraints of WIP preparation. However, there is an expectation of effort, particularly by NRCS. NRCS provides \$3 million to Technical Service Providers, of which \$491,000 is provided to 14 conservation districts in the Chesapeake Bay watershed. NRCS and DEP are coordinating development of information that NRCS staff will have available to provide to producers on Pennsylvania's agricultural E&S and manure management requirements, and will be conducting training for NRCS staff on PA's agricultural ES&S requirements in Spring 2011. Pennsylvania also has a robust private sector planning industry, with 64 people certified as Commercial Nutrient Management Planners under Act 38. Some of these private sector planners were involved in development of plans in the Watson Run Pilot in Lancaster County.

Targeted Watershed Approach to Assess and Achieve Agricultural Compliance

In addition to a basin-wide effort to increase compliance, DEP will engage in a comprehensive 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. Please note that these watersheds will be small – 20 square miles/20-50 farms – to allow for successful implementation with limited resources. The Conewago Initiative, while outstanding, is not a particularly good comparison for this effort because of the size of the Conewago watershed and the large-scale efforts, involving significant staff and financial resources that can not be expected in the targeted watersheds selected for this component of the Chesapeake Bay Agricultural Water Quality 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.

A specific staffing needs analysis for this effort has not been developed, as this may depend on the location of watershed selected and available staff resources in that area. However, a preliminary analysis projects that two new staff positions – one each from DEP regional office and Conservation District Office – would be assigned to address each targeted watershed. Staff to address the targeted watersheds will be utilized from existing DEP and conservation district staff, particularly the new DEP CBRAP field staff. Funds for additional staff to support this effort will be sought from federal sources (e.g. CBRAP or NRCS TSP funds). If three watersheds are targeted, an additional six staff would be required. Using the 2010 CBRAP grant submission, about \$82,000 per staff position would be required annually. Total annual funding of \$492,000 would be required to provide new, dedicated staff to support this targeted effort in three watersheds per year.

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.

Monitor and Evaluate Progress and Effectiveness of the Assessment and Compliance Initiative

As this initiative is implemented, a workgroup of key partners will meet on a periodic basis to discuss progress of the Chesapeake Bay Agricultural Water Quality Initiative. These discussions will be used to make revisions, enhance the initiative and evaluate its potential for implementation outside the Chesapeake Bay watershed. Information gained through this initiative may also help in identifying the need for future regulatory revisions or statutory changes to ensure water quality protection.

Implementation Considerations

This Agricultural Water Quality Initiative is an ambitious effort requiring cooperation and resources from local, state, and federal partners as well as the agricultural operations to meet the common goal of improved or restored water quality of our local Pennsylvania streams as well as the Chesapeake Bay. Implementation of existing and revised regulatory requirements will be a high priority; as will the expansion and/or re-focusing of staff in DEP and county conservation districts. It is also important to note that this Initiative is still in draft form. DEP recognizes that significant documentation, program revisions and resources must be developed and implemented before full implementation can be completed. In addition, adequate public review and input by stakeholders will be a part of this development process. But, implementation of various components has been completed (for example, Chapter 102 regulatory revisions; NRCS TSP Agreements with 14 conservation districts). Other components have been initiated (ex. *Manure Management Manual* revisions; DEP Regional Office staffing increase using the CBRAP.) Progress will be monitored at the end of each 2-year milestone period with a mid-course evaluation and recommendations for adjustment, if needed, in 2016.

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 data 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. Data reporting through the NEIEN system is expected to meet the requirements and timelines established by EPA for future reporting.

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.

Estimation of Additional or Under-Reported BMPs

Pennsylvania believes that the number of BMPs currently used in the Chesapeake Bay watershed model may be significantly underestimated due to the fact that BMPs not funded (or cost-shared) via various state and federal programs are not included. To address this issue of "under-reporting", an attempt was made to re-calculate the level of implementation for an assortment of BMP categories for which additional data were available. Estimates of additional BMPs were primarily based upon an evaluation of the results of two BMP surveys recently completed for Bradford and Lancaster Counties, as well as a conservation tillage survey recently completed in the Capital Area region. These surveys were supplemented via an analysis of county-level crop information for the year 2007 available from the National Agricultural Statistics Service (NASS) of the USDA. Copies of the Bradford and Lancaster County surveys are included in Appendix 2 and 3 to this document. Copies of the procedures used for the Capital Area study are also included in the appendix. Results from each survey that are relevant to this particular analysis of additional BMPs are summarized below.

Bradford County Survey

The state of Pennsylvania recently funded a project in Bradford County for the primary purpose of developing various procedures for estimating the number of funded vs. non-funded BMPs currently in place in that county with the expectation that similar procedures could be used for such an assessment in other counties of the state.

As described in the Bradford County report, a number of survey techniques were used. Based on the survey, conducted in late 2009 and early 2010, it was estimated that about 18 percent of the farms and approximately 17 percent of the farmland acres in the county were surveyed. Units of BMP implementation were reported for a number of commonly-used activities, and an estimate of the split between government-funded and nongovernment-funded were provided for many of them. Practices for which survey information was used to estimate the extent of additional agricultural BMPs in other counties within the state for the current analysis are given in Table 1.

Table 1. Results of Bradford County Agricultural BMP Survey.

Practice	Data Reported	% Not Cost-Shared
No Till	6,039 acres	85%
Cover Crop	3,335 acres	74%
Manure Storage	81 units	43%
Stream Fencing	79 farms/339 acres	51%
Rotational Grazing	74 farms/4,679 acres	88%

Lancaster County Survey

Similar to the Bradford County project, this survey was also funded by the State of Pennsylvania. The primary purpose of this survey was to determine the extent of Core Four Conservation Practice implementation in Lancaster County. Upon completion of the project, it was estimated that 15.7 percent of the farmland within the county had been surveyed. The key result used in the current analysis is the estimate for the extent of cover crops in the county. In this case, there were 24,710 acres of small grain cover crop identified in the survey. If extrapolated to the entire county, this would result in a total of about 157,389 acres (i.e., $24,710 / 0.157 = 157,389$).

Capital Area Transect Study

The Capital Area Resource Conservation and Development (RC&D) Council completed a transect survey of tillage practices within a 7-county region in 2010. This survey was conducted using survey procedures developed by the Conservation Technology Information Center (CTIC) and refined for use in Pennsylvania. This survey evaluated the extent to which five different tillage practices were used in the region. The results are summarized in Table 2.

Table 2. Tillage implementation (%) by type

County	No Till <30%	No Till >30%	Ridge Till >30%	Mulch Till >30%	Red. Till 15-30%	Conv. Till <15%	Average
Adams	1.82	56.77	0.20	1.62	10.71	28.89	60.40
Cumberland	9.40	39.32	0.00	0.00	8.55	42.52	48.72
Dauphin	12.15	52.23	0.00	0.40	3.85	31.38	64.78
Franklin	5.15	71.36	0.22	1.57	9.17	12.53	78.30
Lancaster	4.89	48.07	0.00	0.00	15.68	31.36	52.95
Lebanon	2.38	56.28	0.00	0.22	26.19	14.94	58.87
York	2.02	69.64	0.00	3.85	14.57	9.92	75.51
Region	5.40	56.18	0.06	1.10	12.63	24.63	62.75

Note: “Average” above is mean of four tillage types (excluding “Conv. Till” and “Red. Till”)

Estimation of Additional Agricultural BMPs

Results from the three studies cited above, along with county-level data from NASS on crop type, were used to estimate the extent to which selected BMPs were being used in counties within the Chesapeake Bay watershed. Differences between newly-estimated acreage values and previously-estimated values (i.e., previous 2009 estimates) were assumed to be due to under-reported or un-reported BMPs that are likely being implemented without the use of funding from various state and federal government programs. Procedures utilized for making these estimates are described below.

Cover Crops. Previous estimates for 2009 of the number of “cover crop” acres within each county were primarily based on NASS estimates of winter wheat. However, since there are other small grains that may be used as cover crops, it has long been suspected that current cover crop acres were being significantly under-reported. Consequently, new data on cover crop extent available from the Bradford and Lancaster surveys cited previously were used to re-calculate current acreage estimates for this BMP.

In the Bradford County study, 3,335 acres of cover crops were identified in a survey that covered about 17 percent of the farmland within the county. Based on these results, it can be inferred that there are approximately 19,618 acres of cover crops in the county (i.e., $3335 / 0.17 = 19,618$). According to recent NASS data from 2007, there are 32,000 acres of row crops and 1,100 acres of small grains in the county. Subtracting the latter from the former would suggest that 30,900 acres of tilled land are available for further use of cover crops. (There were no acres of “No Till” land reported for 2009). Based on the above data, it appears that cover crops are presently being used on about 63 percent of the available land (i.e., $19618 / 30900 = 0.63$).

In the Lancaster County study, it was determined that there were 24,710 acres of cover crops in a survey area that covered about 15.7% of the farmland within the county. Similar to Bradford County, it can be inferred that there are approximately 157,389 acres of cover crops in the county (i.e., $24710 / 0.157 = 157,389$). According to recent NASS data, there are 208,900 acres of row crops and 17,400 acres of small grains in the county. In 2009, there were also 3,798 acres reported for “No Till” land. Subtracting the acres of “small grain” and “no till” from the acres of “row crops” suggests that 187,702 acres of tilled land are available for further use of cover crops. In this case, it appears that cover crops are presently being used on about 84 percent of the available land (i.e., $157389 / 187702 = 0.84$). These results, along with those for Bradford County, are summarized in Table 3.

Table 3. Cover crop summary for Lancaster and Bradford Counties.

	Lancaster	Bradford
% Farmland Surveyed	15.7	17
Survey Estimate (acres)	24,710	3,335
County-wide Estimate (acres)	157,389	19,618
Available Land (acres)	187,702	30,900
% Available Land Used	84	63

It has been suggested that the cover crop estimates described above may be inflated due to inclusion of commodity crops and vegetative cover other than small grains in the Bradford and Lancaster County surveys. These assertions cannot be confirmed or refuted based on the narratives associated with either of these surveys. Consequently, a conservative approach to estimating total cover crop extent within Pennsylvania’s Bay watershed counties was used. Specifically, current cover crop acres included in the last model run were increased by a factor of 10 percent for counties other than Bradford and Lancaster, with the resulting increase attributed to un-reported (i.e., privately funded) implementation. For Lancaster and Bradford Counties, percent estimates of cover crop utilization were discounted to 50% of the survey estimates shown in Table 3 (i.e., $84 / 2 = 42$ percent, and $63 / 2 = 32$ %, respectively), and these estimates were then multiplied by the amount of available land (derived from NASS data) as shown in Table 4.

The results based on this increase are also shown in Table 4. As can be seen from this table, the previously-estimated values for 2009 account for about 21 percent of the total land available ($190,714 / 896,010 = 0.212$); whereas the estimates based on the conservative approach used increases this extent to about 28 percent. This more recent estimate conforms more closely with anecdotal evidence on the extent of cover crops within the Susquehanna Basin in Pennsylvania, which is believed to be much higher than other regions in the Chesapeake Bay region.

Conservation Tillage. Increased estimates for conservation tillage (i.e., the “*ConserveTill_hwm_acres*” category) were primarily based on the results of the Capital Area

transect survey discussed above. In this case, the “Average” values shown in Table 2 were used to estimate the total acres of conservation tilled land in each of these counties. These values represented the total amount of tilled land excluding “conventional till” and “reduced till” land. For each of the seven counties represented in the transect survey, the corresponding “average” value was multiplied by the total “Pre-BMP” acres of tillable land (i.e., the sum of the “hwm” and “hom” acres given for 2009). For the remaining counties (with the exception of Bradford as described later), the average “regional” implementation value from the transect survey (i.e., 62.75 percent) was used to calculate the conservation tillage estimates. In cases where the newly-calculated estimate resulted in a lower value than the 2009 value, the 2009 value was used.

For Bradford County, another estimate based on that county’s survey was used. Specifically, it was determined via the survey that there were 6,039 acres of “no till” land in the area assessed. However, it was not clear from the study whether this land met the “Continuous No Till” definition used in the Chesapeake Bay model. Consequently, for the purposes of the current analysis, it was assumed that these acres were in conservation tillage. From the survey results, it can be inferred that there are approximately 35,524 acres of conservation tillage in the county (i.e., $6039 / 0.17 = 35,524$). However, since this total is greater than the amount of “Pre-BMP” acres of tillable land (i.e., “hwm” and “hom”) estimated for the county in 2009 (i.e., 27,168), the new estimate was set equal to 90 percent of the available land (i.e., $27,168 * 0.90 = 24,451$).

The results of the new conservation tillage analysis are shown in Table 5. Based on the data presented, it can be seen that the previously-calculated vales for 2009 accounted for about 47.2 percent of the “Pre-BMP” conventionally-tilled land available (i.e., $670,544 / 1,420,483 = 0.472$), whereas the estimates based on the Capital Area and Bradford County surveys suggest that about 70 percent of the available land is using some type of conservation tillage (i.e., $987,769 / 1,420,483 = 0.70$). Similar to the results for cover crops, it is believed that this statewide estimate for conservation tillage adoption is quite reasonable, and may even be somewhat low based on anecdotal evidence from several sources. For example, a draft report just released by USDA (2010) on

Table 4. Estimates of cover crops based on Lancaster and Bradford county data.

County	2009 Acres ¹	Available Acres ²	Estimated Acres ³
Adams	14,072	30,823	15,479
Bedford	5,179	27,865	5,697
Berks	2,312	NA	2,543
Blair	3,799	34,981	4,179
Bradford	2,951	30,900	12,978
Cambria	1,358	NA	1,4494
Cameron	0	300	0
Carbon	0	NA	0
Centre	5,931	33,128	6,524

County	2009 Acres ¹	Available Acres ²	Estimated Acres ³
Chester	5,124	NA	5,636
Clearfield	3,010	NA	3,311
Clinton	2,182	12,000	2,400
Columbia	3,649	21,610	4,014
Cumberland	9,669	45,858	10,636
Dauphin	9,998	26,000	10,965
Elk	0	NA	0
Franklin	10,921	73,450	12,013
Fulton	2,242	11,800	2,466
Huntingdon	6,093	31,600	6,702
Indiana	294	NA	323
Jefferson	6	NA	7
Juniata	3,020	23,167	3,322
Lackawanna	216	NA	238
Lancaster	23,875	187,702	60,065
Lebanon	8,002	NA	8,802
Luzerne	5,131	NA	5,644
Lycoming	4,363	27,004	4,799
McKean	0	NA	0
Mifflin	3,079	21,386	3,387
Montour	800	10,289	880
Northumberland	4,182	49,913	4,600
Perry	6,250	26,500	6,875
Potter	1,570	NA	1,727
Schuylkill	6,677	NA	7,345
Snyder	4,280	22,879	4,708
Somerset	589	NA	648
Sullivan	236	3,000	260
Susquehanna	1,070	6,100	1,177
Tioga	1,687	12,900	1,856
Union	2,334	20,952	2,567
Wayne	0	NA	0
Wyoming	1,216	6,200	1,338
York	23,377	97,703	25,715
Totals	190,714	896,010	253,319

Notes: (1) Previously-submitted vales for 2009; (2) Derived from NASS data; (3) New estimate based on discounted implementation rates for Bradford and Lancaster Counties, and average increase of 10 percent over previously-reported acres for the remaining counties.

Table 5. Estimates of conservation tillage acres based on Capital Area transect data.

County	2009 Acres ¹	Available Acres ²	Estimated Acres ³	Approach
Adams	38,921	74,593	45,054	A
Bedford	15,242	41,399	25,978	B
Berks	47,646	13,574	47,646	D
Blair	12,243	31,023	19,467	B
Bradford	7,112	27,168	24,451	C
Cambria	9,379	12,902	9,379	D
Cameron	0	713	447	B
Carbon	0	5	3	B
Centre	15,569	43,725	27,437	B
Chester	26,099	21,417	26,099	D
Clearfield	1,427	6,193	3,886	B
Clinton	4,958	14,952	9,382	B
Columbia	15,110	49,926	31,329	B
Cumberland	22,251	68,082	33,170	A
Dauphin	17,993	35,590	23,055	A
Elk	503	480	503	D
Franklin	36,091	106,565	83,440	A
Fulton	4,172	13,043	8,184	B
Huntingdon	9,723	27,913	17,515	B
Indiana	14,920	3,809	14,920	D
Jefferson	4,393	53	4,393	D
Juniata	11,393	28,264	17,736	B
Lackawanna	54	2,986	1,874	B
Lancaster	87,969	233,728	123,759	A
Lebanon	19,245	55,136	32,459	A
Luzerne	2,273	16,265	10,206	B
Lycoming	11,765	37,816	23,730	B
McKean	558	1	558	D
Mifflin	12,339	30,562	19,178	B
Montour	5,362	14,188	8,903	B
Northumberland	29,850	74,288	46,616	B
Perry	14,230	37,489	23,524	B
Potter	2,594	5,225	2,594	D
Schuylkill	17,006	23,701	17,006	D
Snyder	14,899	38,708	24,289	B
Somerset	15,813	2,209	15,813	D
Sullivan	67	4,157	2,609	B
Susquehanna	315	7,251	4,550	B

County	2009 Acres ¹	Available Acres ²	Estimated Acres ³	Approach
Tioga	2,382	13,317	8,356	B
Union	12,526	31,384	19,693	B
Wayne	584	111	584	D
Wyoming	1,259	6,316	3,963	B
York	104,249	164,256	124,030	A
Totals	670,544	1,420,483	987,769	

Notes: (1) Previously-submitted values for 2009; (2) Based on sum of “hwm” plus “hom” acres; (3) New estimate based on (A) use of actual percent estimate from the transect study, (B) use of regional value of 62.75 percent implementation from the transect study, (C) use of data from Bradford County survey, or (C) use of 2009 value because estimated value is less than 2009 value.

conservation practices in the Chesapeake Bay region states that “*Reduced tillage is common in the region: 88 percent of the cropped acres meet criteria for either no-till (48 percent) or mulch till (40 percent). All but 7 percent of the acres had evidence of some kind of reduced tillage on at least one crop.*” Additionally, results just released by USDA/NASS states shows that almost 78 percent of the tilled land within the state of Pennsylvania during 2009 used either “No-Till” or some other form of conservation tillage.

(USDA, 2010. Assessment of the Effects of Conservation Practices on Cultivated Cropland in the Chesapeake Bay Watershed. Draft report by NRCS/CEAP, 161 pp.)

(Note: For modeling purposes, the value of 987,769 acres derived above was assumed to be the maximum amount of conservation tillage acres. In preparing the model input deck, a number of these acres were converted to “land retired”, “continuous no-till”, or “carbon sequestration” acres based on future state program goals and objectives).

Manure Storage. The Bradford County study identified 81 storage units as a result of the survey, and determined that 43 percent of these were not cost shared. For the current analysis, this information was used to estimate additional acres of “AWMSLivestock_afo” land within each county. This was accomplished by dividing the previous estimate for this category by 0.57 (i.e., 1.00 – 0.43). If this estimate exceeded the amount of “available” land (i.e., the “pre-BMP” acres of “afo” land), the estimate was re-set to the number of “afo” acres. Since the previous estimate was based entirely on cost-share data, any increase was assumed to be due to unreported “non-cost share” implementation.

As part of this initiative, DEP will work with Conservation District Bay Technicians to develop ways to refine the gathering of this data and improve interim estimates. One possibility is to integrate this data into a survey that could be conducted on-site during other activities, such as

technical assistance visits. During the gathering of data, if the date of establishment of the facility cannot be confirmed to be prior to 2005, it will not be included for Chesapeake Bay purposes. If it cannot be determined that the facility is built to NRCS standards, a discount rate of 50 percent or more could possibly be applied and reflected in the reporting of acres to the Watershed Model for this BMP.

Stream Fencing. As a result of the Bradford County survey, it was determined that 51 percent of the acres along streams protected by stream fencing were not cost shared. This estimate was subsequently used to increase the amount of acres for “PastFence_trp” land in 2009 for each county by dividing the previously reported value by 0.49 (i.e., $1.00 - 0.51$). This calculated value was then checked against the value of available pasture land in each county (in this case, pre-BMP “pas” acres for 2009). If this estimate exceeded the amount of available land, the estimate was re-set to the number of “pas” acres. Since the previous estimate was based entirely on cost-share data, any increase was assumed to be due to un-reported “non-cost share” implementation.

As with Manure Storage, DEP will work with Conservation District Bay Technicians to develop ways to refine the gathering of this data and improve interim estimates. One possibility is to integrate this data into a survey that could be conducted on-site during other activities, such as technical assistance visits. During the gathering of data, if the date of establishment of the facility cannot be confirmed to be prior to 2005, it will not be included for Chesapeake Bay purposes. If it cannot be determined that the facility is built to NRCS standards, a discount rate of 50 percent or more could possibly be applied and reflected in the reporting of acres to the Watershed Model for this BMP.

It should also be noted that DEP conducted an analysis that indicated that as many as 6500 acres of stream bank fencing could occur due to regulatory changes in Chapter 102. It also reviewed NRCS PRS reports. Other sources of stream bank fencing include CBIG funding, Growing Greener and NRCS funding. DEP is committed to refining and finalizing an approach for future data collection efforts in consultation with Pennsylvania stakeholders, EPA, NACD, the Chesapeake Bay states and all interested parties.

Rotational Grazing. In the Bradford County survey, it was determined that 88 percent of the acres used for rotational grazing were not cost shared. To make an initial estimate of additional non-cost share acres of rotational grazing land, the previously reported value for “UplandPG_pas” land was divided by 0.12 (i.e., $1.00 - 0.88$). If the sum of this value plus acres previously reported for “UpPrecIntRotGraze_pas” land exceeded the amount of land available for this activity (i.e., the amount of pre-BMP pasture [pas] land for 2009), then this value was reset to the amount of “pas” land. Since the previous estimate was based entirely on cost-share data, any increase was assumed to be due to un-reported “non-cost share” implementation. This approach resulted in an initial estimate of 347,540 total acres of rotational grazing land. Based on the believe that this initial estimate may be too high, a conservative estimate of 174,000 acres was submitted for the latest WIP run

To evaluate whether this revised estimate was reasonable, data were assembled from NRCS PRS reports available on the web for the years 2006-2010. During this period, NRCS had funded the implementation of an average of about 4,523 acres per year of rotational grazing (i.e., Prescribed

Grazing) within Pennsylvania’s Chesapeake Bay counties. Based on this average, it can be estimated that approximately 67,841 additional acres will be established over the next 15 years (i.e., up through 2025). For the 2009 progress run, 46,923 acres were reported (all of which were cost-shared). By extension, this would suggest that NRCS funding will have established a total of 114,764 acres by 2025 (i.e., 46,923 + 67,841). As reported elsewhere in Pennsylvania’s WIP, it is expected that 9,916 additional acres of rotational grazing land will be funded by the year 2025 through the Chesapeake Bay Implementation Grant and Growing Greener programs. Adding this to the previous total of 114,764 suggests that there will be 124,680 “cost-shared” acres by 2025.

Based on the results of the Bradford County survey described above, and other anecdotal evidence, it is known that there is a substantial amount of “privately-funded” rotational grazing land in the region as well. The Bradford County survey suggests that this portion could be as high as 88 percent of the total. In the interest of being conservative, an estimate of 174,000 acres was submitted for the latest “reasonable assurance” WIP run. This number assumes a “privately funded” estimate of about 28 percent, which is less than one-third the estimate reported by the Bradford County survey.

Estimation of Additional Urban BMPs

In addition to estimating increases in agricultural BMP usage as described above, results from the Bradford County survey were also used to estimate other urban BMP usage that may have been missed due to under-reporting (primarily due to exclusion of projects not funded by “cost-share” programs in previous reports to EPA). In Bradford County, the survey described earlier was also conducted to estimate the extent of various urban BMPs currently implemented by all municipalities within the county. Forty-five (45) out of fifty-one (51) municipalities responded to this survey, and the results are summarized in Table 6. The results reported for two of the BMPs listed in the table (stream bank protection and street cleaning) were used to estimate the extent to which these particular BMPs have been implemented within Chesapeake Bay counties. Descriptions of how these estimates were derived are provided below.

Table 6. Results of Bradford County Urban BMP Survey

Practice	Data Reported
Dirt and Gravel Roads Protected	108,100 feet
Stream Bank Protection	6,245 feet
Street Cleaning	1,092,696 feet/year
Municipal Sewage Connections	5,709

Stream Bank Protection. Within the Chesapeake Bay watershed model, stream bank protection (stream restoration) in urban areas is allowed on both impervious and pervious land (i.e., categories “imh”, “iml”, “puh”, and “pul”). For 2009, no units (feet) were reported for any of

these land use categories. However, it is known that municipalities around the state have installed this BMP at various levels either via government-funded initiatives or on their own. Consequently, the results of the Bradford County survey project were used to estimate the extent to which this particular BMP has been applied in other areas.

In Bradford County, it was determined via the survey that approximately 6,245 feet of stream bank protection have been implemented by 45 municipalities. Since 45 out of 51 municipalities responded, it was estimated that this total represented 88.24 percent of the county's urban land area (i.e., $45/51 = 0.8824$). In 2009, the amount of "pre-BMP" urban land in the county was given as 10,409 acres (i.e., the sum of "imh", "iml", "puh", and "pul" land acres). Therefore, for the purposes of this analysis, the stream bank protection units given earlier (6,245 feet) were assumed to have been implemented for an urban area of approximately 9,185 acres (i.e., $10,409 \times 0.8824 = 9,185$). From this result, an estimate of the linear feet of stream bank protection per acre of urban land was calculated as $6,245 / 9,185 = 0.68$ feet/acre. This last value was subsequently used to estimate the feet of steam bank protection for the four categories of urban land ("UrbStrmRest_imh_feet", "UrbStrmRest_iml_feet", "UrbStrmRest_puh_feet", and "UrbStrmRest_pul_feet") in the other counties based on the "pre-BMP" acreage values for these categories.

Street Cleaning. Within the Chesapeake Bay watershed model, street cleaning (street sweeping) can take place only on impervious urban land (i.e., categories "imh" and "iml"). For 2009, no units (acres cleaned/year) were reported for either of these land use categories. However, it is known that municipalities around the state engage in this particular activity at various levels. Consequently, the results of the Bradford County survey project were used to estimate the extent to which this particular activity is used in other areas.

In Bradford County, it was determined via the survey that approximately 1,092,696 feet of streets are cleaned annually by 45 municipalities in the county, and that this amount represented about 88.24 percent of the county (see above discussion). Using an average estimate of urban street width of 24 feet, the linear feet of streets swept can be converted into acres of streets swept annually via the following equation:

$$(1,092,696 \text{ feet} \times 24 \text{ feet}) / (43,560 \text{ ft}^2/\text{acre}) = 602 \text{ acres of streets}$$

In 2009, the amount of "pre-BMP" impervious urban land in the county was given as 2,147 acres (i.e., the sum of "imh" and "iml" land acres). Therefore, for the purposes of this analysis, the street cleaning units given above (602 acres/year) was assumed to have been implemented for an urban area of approximately 1,895 acres (i.e., $2,147 \times 0.8824 = 1,895$). From this result, an estimate of the acres of streets cleaned per acre of impervious urban land was calculated as $602 / 1,895 = 0.318$ acres/acre. This last value was subsequently used to estimate the acres of streets cleaned per year for the two categories of impervious urban land in the other counties ("StreetSweep_imh_acres" and "StreetSweep_iml_acres") based on the "pre-BMP" acreage values for these categories.

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, stream channel migration, 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 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 that is more protective than the recommended federal standards. Pennsylvania regulation requires 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 frequent rainfall 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.

DEP continues to increase its focus on managing 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.

It is important to note that within previous versions of the Chesapeake Bay Program watershed model (model), BMPs were evaluated cumulatively based on the relative effectiveness of the BMPs and the impact of land use changes. Results from the model represented the simulated cumulative impact of all the BMPs and land use changes in reducing nitrogen (N), phosphorus (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. In Pennsylvania, integration of stormwater programs and improved BMP implementation and reporting has resulted in improved urban stormwater runoff conditions such that it does not present as significant of cause of water quality impairment to Pennsylvania's portion of the Chesapeake Bay watershed overall. The 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. Success of this watershed implementation plan for stormwater and the associated reductions will be realized and achieved by integrating resources and focusing these resources toward activities and programs that will achieve the greatest nutrient and sediment reduction.

Statutory Authorities

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. NPDES Permits for Stormwater Discharges Associated with Construction Activities and Erosion and Sediment Control Permits are included in this notification process.

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

Regulatory Authorities

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 DEP's rules and regulations. The regulation requires erosion and sediment control Best Management Practices (BMPs) on all earth disturbance activities. 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 DEP or a county conservation district that has been delegated that authority, for review and approval before the project may begin. 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.

Revisions to the current regulation became effective on November 19, 2010. The revisions codify PCSM requirements. For example, they require long-term operation and maintenance of PCSM BMPs; include antidegradation implementation provisions for PCSM; update agricultural planning and implementation requirements for animal heavy use areas; and establish requirements for riparian buffer and riparian forest buffer provisions 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). Except for oil and gas, timber harvesting, agricultural plowing and tilling, and 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. DEP's Chapter 92 regulations provide the baseline regulatory requirements for implementation of the federal NPDES program.

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 also demonstrate compliance with these antidegradation regulations.

Policies and technical guidance

Comprehensive Stormwater Policy

The Comprehensive Stormwater Management Policy Document # 392-0300-002 (2002) 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 federally mandated NPDES permitting programs and DEP's Act 167 planning program. The formal policy establishes a framework to integrate all of DEP'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. 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. As a matter of implementation the policy emphasizes the reduction of stormwater runoff generated by development and other activities through the minimization of impervious cover, the use of low impact development designs, and the use of innovative stormwater BMPs that provide infiltration, water quality treatment, and otherwise more effectively manage the volume and rate of stormwater discharges. These stormwater BMPs and planning practices are advanced through DEP's Act 167 stormwater management planning program, the implementation of the NPDES Stormwater Discharge Associated with Construction Activity Permit program, and NPDES MS4 permits.

Procedurally, erosion and sediment control and post construction stormwater management plans to control discharges both during and after earth disturbance are required under the NPDES General and Individual Permits for Stormwater Discharges Associated with Construction Activities, and Erosion and Sediment Control Permits pursuant to DEP's Chapter 102 regulations. Sections 102.4(b)(6) and 102.8(h) of Pennsylvania's Chapter 102 regulation establish criteria to meet these regulatory standards, so that persons involved in the development of erosion and sediment control and post construction stormwater management plans can demonstrate compliance. These NPDES permits require post construction stormwater management plans that are based on detailed information and analysis. The plans must include a predevelopment site characterization, and an assessment of soil and geology including infiltration studies. The plans also must include an analysis that demonstrates that the PCSM BMPs will meet the volume reduction and water quality requirements specified in an Act 167 stormwater management watershed plan.

DEP requires that the analysis of no net change (comparing pre-construction runoff volume to post construction runoff volume) for the 2-year/24-hour storm event includes the following minimum criteria:

- (i) Existing predevelopment non-forested pervious areas must be considered meadow in good condition or its equivalent except for repair, reconstruction or restoration of roadways or rail lines, or construction, repair, reconstruction or restoration of utility infrastructure when the site will be returned to existing condition.

- (ii) When the existing project site contains impervious area, 20 percent of the existing impervious area to be disturbed must be considered meadow in good condition or better, except for repair, reconstruction or restoration of roadways or rail lines, or construction, repair, reconstruction, or restoration of utility infrastructure when the site will be returned to existing condition.

The Chapter 102 regulations also contain exceptions and allow for an alternative approach. However, if the applicant chooses the alternate approach, the applicant may demonstrate to DEP that it is not practicable to satisfy the requirements. This alternate approach is acceptable only when the applicant demonstrates to DEP that the alternative will either be more protective than required or will maintain and protect existing water quality and existing and designated uses by maintaining the site hydrology, water quality, and erosive impacts of the conditions prior to initiation of any earth disturbance activities. DEP ensures this by reviewing the alternative proposed to determine that the stormwater volume reduction and water quality treatment will be maximized to the extent practicable to maintain and protect existing water quality and existing and designated uses.

The peak rate of stormwater discharges for the 2, 10, 50, and 100-year/24 hour events must be managed in a manner not to exceed preconstruction rates in order to prevent the physical degradation of receiving waters, such as scour and stream bank destabilization and flooding potential. Permittees are also required to employ additional water quality treatment BMPs, where necessary, to ensure protection of existing uses and the level of water quality necessary to protect those uses.

Riparian Forest Buffer Guidance

In 2009, DEP 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. The manual provides design criteria for minimum widths and composition of riparian forest buffers and information on management of riparian forest buffers that are required under Chapter 102 regulations. In addition, the *Riparian Forest Buffer Guidance* has been identified in Chapter 102, Section 102.11, as providing the recommended design, construction, and maintenance standards necessary for complying with Section 102.14 Riparian Buffer Requirements. The guidance was published in the November 27, 2010 edition of the *Pennsylvania Bulletin*.

The recent Chapter 102 regulation revisions establish criteria for riparian buffers and mandatory provisions for the use of riparian buffers as a stormwater BMP. Riparian buffers are useful in mitigating or controlling point and nonpoint source pollution by both keeping the pollutants out of the waterbody and increasing the level of instream pollution processing. When riparian buffers are utilized as a component of an integrated management system including nutrient management along with E&S control practices, buffers produce a number of beneficial effects on the quality of water resources. Riparian buffers can be effective in removing excess nutrients and sediment from surface runoff and shallow groundwater,

stabilizing streambanks, and shading streams and rivers to optimize light and temperature conditions for aquatic plants and animals. Riparian buffers provide significant flood attenuation and storage functions within the watershed. They prevent pollution both during and after earth disturbance activities, and provide natural, long-term sustainability for aquatic resource protection and water quality enhancement. Under the Chapter 102 regulation 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 must protect an existing riparian forest buffer, convert an existing riparian buffer to a forest riparian buffer, or establish a new riparian forest buffer. Reasonable assurance will be attained since the regulations include riparian forest buffer criteria (composition, zones, width, and management requirements), mandatory requirements for all buffers, identification of activities authorized in or precluded from buffers, and reporting requirements on the establishment or protection of buffers.

As a result of these requirements, approximately 7,000 miles of HQ and EV streams in Pennsylvania's portion of the Chesapeake Bay watershed have the potential for 150 foot riparian buffers or forest riparian buffers to be incorporated. It is important to note that the riparian buffers and riparian forest buffers are required above and beyond other stormwater BMPs that are required to be implemented to meet the regulatory standard of no net change in volume and rate. Therefore incorporation of buffers required by the Chapter 102 regulation will provide additional estimated reductions of 838,000 pounds per year of nitrogen, 11,000 pounds per year of phosphorus, and 12,000 tons per year of sediment in addition to the reductions that will be achieved by other stormwater BMPs implemented on site.

Funding for planting buffers is available through Growing Greener II funds, TreeVitalize, and the federal Conservation Reserve Enhancement Program (CREP). Since its inception, Pennsylvania's Growing Greener program has resulted in the implementation of many pollution mitigation measures throughout the Chesapeake Bay region, including many agricultural and urban BMPs. For example, based on data from 2006-2009, Growing Greener has planted 36,770 feet of riparian buffers. In addition, there is funding available through TreeVitalize which will also advance the installation of buffers into the future. TreeVitalize will also be of importance with the establishment of urban tree canopies. Advancing urban tree canopy coverage is a Chesapeake Executive Council directive (No. 03-01) that expands Riparian Forest Buffer Goals to meet Executive Order 13508 for the Protection and Restoration of the Chesapeake Bay. The Chesapeake Executive Council recognizes that tree canopy cover in urban areas can offer analogous water quality benefits and functions as riparian forest buffers. To attain the goals set forth in the directive, Bay states and the District of Columbia must gain commitments from communities to analyze the canopy and develop plans to preserve and increase tree canopy. These funding sources, along with other grant programs such as ones run by the National Fish and Wildlife Foundation, will help advance the implementation of BMPs over the next 15 years.

Erosion and Sediment Control and Stormwater Management BMP 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. DEP 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 being finalized and will be published by January 2011.

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

NPDES Stormwater Construction and Erosion and Sediment Control Programs

DEP is responsible for implementation of a statewide program for issuing NPDES Permits for Stormwater Discharges Associated with Construction Activities. DEP's program requires 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.

Game changer: The amendments to DEP's Chapter 102 regulations that were effective on November 19, 2010, codify existing practices and permit requirements related to post construction stormwater management; provide incentives and requirements for more protective and sustainable practices such as riparian buffers and riparian forest buffers in HQ and EV watersheds; require certification and record drawings for PCSM BMPs depicting what was actually constructed onsite; and require that the PCSM BMPs be operated and maintained in perpetuity or until the land use changes. This maintenance responsibility remains if the property transfers, therefore justifying the need for a covenant that runs with the land. In addition to the regulatory standards established by Chapter 102, reasonable assurance for compliance and meeting the target load reductions will be obtained since Chapter 102 regulations require a demonstration that the project will not cause increased volume or rate of stormwater runoff. This requirement is satisfied through a comparative stormwater management analysis demonstrating that post construction runoff does not exceed pre-construction rate and volume, and that any post construction discharge will not degrade the physical, chemical or biological characteristics of the surface water. The demonstration is conducted and provided by the permit applicant under the permit application process. DEP or conservation district will review and determine whether the applicant's demonstration meets the regulatory requirements. This extra level of detail provided

by DEP's enforceable regulatory program provides reasonable assurance that the target load reductions will be achieved.

The revised Chapter 102 regulation requires a pre-construction meeting on-site unless the permittee is notified in writing that a meeting is not required. Permittees, co-permittees, operators, and licensed professionals or their designees responsible for the earth disturbance activity including implementation of E&S and PCSM plans and critical stages of implementation of the approved PCSM plan must attend a preconstruction meeting. The revised regulation also includes requirements for reporting, recordkeeping, licensed professional oversight of critical stages, and final certification by the licensed professional. Department or conservation district staff will inspect the site prior to confirming termination of permit coverage, thus ensuring that the site is stabilized from the earth disturbance and that the appropriate post construction BMPs have been installed. This requirement alone will result in an estimated 1,500 inspections a year within the Chesapeake Bay watershed confirming PCSM BMP implementation. These requirements will provide assurance that BMP installation is consistent with approved plans and permits. Certification by a licensed professional that the post construction stormwater BMPs have been installed according to plans under the approved permit, and inspection by Department or conservation district staff provides reasonable assurance that the BMP will provide the expected effectiveness and performance.

DEP has established policies and procedures for compliance and enforcement actions. One such policy that has been established by DEP is "Standards and Guidelines for Identifying, Tracking, and Resolving Violations for: Erosion and Sediment Control Program, National Pollutant Discharge Elimination System (NPDES) Stormwater Construction Program, Dam Safety Program, Waterways Management Program, and Wetlands Protection Program", Document Number: 363-4000-002. This document summarizes the compliance and enforcement methods employed by DEP and delegated conservation districts for the Erosion and Sediment Control, NPDES Stormwater Construction, Dam Safety, Waterways Management Program, and Wetlands Protection Programs. To ensure effective compliance and enforcement coordination among DEP programs that are delegated to conservation districts the following general procedures will be utilized:

- Delegated conservation districts and DEP will work together and support each other to achieve compliance with regulatory requirements through education, voluntary compliance efforts, and enforcement efforts.
- DEP will establish policies and procedures for compliance and enforcement actions implemented jointly by DEP and delegated conservation districts.
- The appropriate Department regional office will address requests for compliance and enforcement assistance by delegated conservation districts.
- When a delegated conservation district receives a complaint or other information regarding an activity that falls within its delegated authority, the delegated conservation district will generally pursue voluntary compliance prior to taking formal enforcement action. In addition, delegated conservation districts within their ability will provide coordination assistance and complaint referrals to DEP or other appropriate agency, for circumstances beyond their delegated authority.

- Delegated conservation districts will coordinate potential compliance or enforcement action involving regulated activities that falls within their delegated authority with the appropriate Department regional office.
- Delegated conservation districts and DEP will work cooperatively by focusing resources in an effective manner that will protect public health, safety, and the environment.

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

DEP, along with delegated conservation districts, employs a variety of compliance and enforcement tools and processes to gain compliance with the Chapter 102 and the NPDES stormwater construction programs. Initial efforts generally are directed toward providing compliance assistance to the regulated community to achieve voluntary compliance. 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, DEP and conservation districts take increasingly aggressive compliance steps such as notices of violation, compliance orders, and civil and criminal penalty assessments.

Guidelines for Compliance and Enforcement Action:

- Types of Inspections-the following types of inspections are conducted:
 - Administrative: Any review of required compliance monitoring reports where written findings of compliance are made. These reviews are also used by Department to summarize the inspections performed and violations noted by conservation districts when cases are referred for action.
 - Routine: Any inspection of a regulated facility or activity, where either the entire project site or only a part or portion of the project is inspected. A routine inspection may take place during any regulated activity or in follow-up of a previous inspection. A final inspection of a regulated activity is also considered a routine inspection.
 - Complaint: Inspection conducted in response to a complaint or referral from a citizen, organization or governmental agency, including inspections conducted as a result of an emergency response condition.
- Inspection Procedures - DEP or delegated conservation district has the statutory authority under the Clean Streams Law 35 P.S. 691.305 or the Dam Safety and Encroachments Act 32 P.S. 693.16, to enter the site to conduct an investigation or inspection and require monitoring where necessary. DEP or delegated conservation district will:

- Schedule an inspection with the owner, operator, permittee or other responsible person; or conduct unannounced inspections.
 - Review file documents including permits, plans, reports, correspondence, and other background information.
 - Make reasonable efforts to determine the identity of responsible persons that are unknown at the time of inspection.
 - Provide the owner or other responsible party the results of an inspection or, when applicable, a copy of a written inspection report within 14 calendar days of the inspection.
- Coordination procedures with other Department or Agency Programs
 - When appropriate, DEP or delegated conservation district should initiate intra-agency coordination for projects involving conditions originating from an activity that is also regulated by another Department program.
 - For conditions that fall outside DEP's or delegated conservation district's jurisdiction, the matter will be referred to the appropriate local, state, or federal agency when applicable.
- Types and Frequency of Inspections-Generally, monitoring and inspections of regulated activities and the documentation of site conditions and violations of applicable laws and regulations should be conducted as follows:
 - Administrative: Conducted on an as-needed basis.
 - Routine: Inspection frequency is generally based on, but is not limited to, the following factors: project complexity; presence of sensitive environmental resources; continuing violations or demonstrated ability or lack of intention to comply with a Department regulation, permit or order, or other Department policy.
 - Complaint: Conducted on an as-needed basis.
- Enforcement Priorities-Enforcement actions may be taken on each significant violation until compliance is achieved. In determining what enforcement action is appropriate, consideration will be given to the following:
 - Has the violation caused significant environmental harm or significant risk to the public?
 - Did the permittee or other responsible person voluntarily report the violation?
 - How quickly and aggressively did the permittee or other responsible person act to correct the violation?
 - How long did the violation last?
 - Will the compliance or enforcement action be a deterrent to future non-compliance?
 - Has the permittee or other responsible person realized a tangible financial benefit as a consequence of violation?
 - Were the violations the result of accidental, willful, reckless or negligent actions?
 - Does the violator have a prior history of non-compliance within the past three years?
 - Did the violations result in a threat to protection of life, health, property, or the environment?

Enforcement priorities generally will be 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.

DEP 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.

DEP program data and reporting within the Chesapeake Bay watershed for 2008 indicates that DEP and conservation districts conducted a total of 10,243 compliance inspections (out of a statewide total of 16,775) on permitted and non-permitted sites and investigated 1,439 citizen complaints (out of a statewide total of 2,432) concerning possible Chapter 102/NPDES construction activity violations. This represents approximately 60 percent of the total statewide inspection and complaint production. As a result of compliance inspections and complaint investigations, the majority of activities are in compliance. Only 56 cases of noncompliance were necessary to be referred by conservation districts to DEP for resolution of violations. 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. DEP has established an eFACTS Program Compliance and Enforcement Guidance Document to provide consistent accounting of compliance and enforcement activities in the Chapter 102/NPDES and Chapter 105 programs. DEP regional office personnel also enter enforcement actions referred to DEP by a delegated conservation district to support the enforcement action. All final or resolved actions of DEP, including actions completed by delegated conservation districts will be entered into the eFACTS database within 10 working days of receipt of the final document.

The inspections identified above occurred prior to the fee increase that was effective on November 19, 2010. DEP expects that the new increase in fees will provide an opportunity to sustain the current rate of inspections. Although the fee increase does not cover the total cost of the program, including any potential staff increases, the revised regulations include requirements for DEP to review the adequacy of established fees at least once every 3 years and provide a written report to the EQB. The report will identify any disparity between the amount of program income generated by the fees and the costs to administer these programs, and contain recommendations to adjust fees to eliminate the disparity, including recommendations for regulatory amendments.

Lastly DEP plans to hire four additional staff using Chesapeake Bay Regulatory and Accountability Program grants. Under this grant program approximately ten percent of the four staff member's time will be available for stormwater management inspections and compliance inspections. To supplement this effort DEP will utilize ten percent of two Department central office engineer staff member's time, to conduct stormwater management inspections and compliance. These staff will target 5 percent of the estimated 1,500 permitted activities conducted each year to evaluate compliance with long-term operation and maintenance obligations. DEP will also discuss modification of delegation agreements with county conservation districts for additional opportunities for stormwater management inspections and compliance.

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. Act 167 also has a broader scope than the limited application of the MS4 permit. 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 DEP 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 DEP, to withhold payment of all funds to the municipality from the General Fund. Historically, DEP 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.

DEP’s *Standards and Guidelines for Identifying, Tracking, and Resolving Violations of the Storm Water Management Act* document # 363-4000-003 June 3, 2006 provides guidance on identifying whether a violation of Act 167 has occurred; notifying the violator that a violation has occurred; tracking and resolving the notice of violation; and taking an enforcement action. DEP has encouraged voluntary compliance with the Act 167 program due to lack of staffing, however if the municipalities fail to enact an ordinance, then it becomes an enforceable provision under the Act by DEP or another third party.

MS4 Program Compliance and Enforcement

Pennsylvania has 206 municipalities with MS4 permit coverage within the Chesapeake Bay watershed. Each new (first-term) MS4 permittee is required to submit an annual report each year to DEP. Each MS4 permittee that is renewing coverage in subsequent years must submit periodic progress reports (end of the 1st and 3rd years of renewed coverage, and a summary report shall also be submitted for any subsequent permit renewal). The annual or periodic progress report requirement is a permit condition and serves as a narrative effluent limitation for the discharge. MS4 permittees may be subject to compliance or enforcement action for failing to

conduct the following: obtain a permit, submit an annual or periodic progress report, or not adhering to the requirements of their MS4 permit. DEP's regional staff enforces these requirements by reviewing annual or periodic progress reports and performing inspections. DEP provides 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 or periodic progress reports.

DEP or a delegated conservation district is responsible for implementation of the statewide program for issuing NPDES Permits for Stormwater Discharges Associated with Construction Activities. Permittees may rely on DEP's program to satisfy all requirements under this Minimum Control Measure (MCM) since the state program fully satisfies the federal regulatory requirements established at 40 CFR §122.34(b)(4) for construction site stormwater runoff control. The state regulations and state permitting program are designed to reduce pollutants in stormwater runoff from all construction sites in Pennsylvania that are 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 or development or sale that involves one (1) or more acres. The state program is established in state regulations at 25 Pa. Code Chapter 102. 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, while maintaining program consistency and water quality protection.

When MS4 permittees choose to rely on DEP'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 their own local program to implement these MCMs, the permittee continues to be responsible for compliance with the terms and conditions of all other requirements of the permit. There is reasonable assurance of achieving these requirements because it is the regulatory standard established by Department's rules in Chapters 93, 96 and 102.

MS4 permittees choosing not to rely on DEP's statewide program for issuing NPDES Permits for Stormwater Discharges Associated with Construction Activities must develop, implement, and enforce a complete stormwater 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. MS4 permittees implementing their own programs must implement the following measures to satisfy this MCM and comply with the regulatory requirements at 40 CFR §122.34(b)(5):

- Develop a written program to satisfy all required components of MCM #4 and #5 (Construction and Post Construction Management.)
- 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 water quality 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 projects.

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 DEP or by a delegated conservation district.

Once the Final Chesapeake Bay TMDL has been approved and issued, all stormwater planning and implementation must be accomplished consistent with the TMDL target load reductions. Any compliance options available under the TMDL or target load reduction, including BMP implementation or offset/credit options, are fully applicable.

The renewal of the MS4 general permit (PAG-13) contains a requirement that MS4 permittees (new or existing) must have a TMDL implementation plan consistent with any approved TMDL applicable to the receiving waters for discharges from the regulated MS4s. MS4 permittees must demonstrate that they are implementing redevelopment practices and other BMPs that provide reasonable assurance that the regulated MS4s are not causing or contributing to the impairment. In order to demonstrate this reasonable assurance of not causing or contributing to the impairment, DEP recommends that MS4s utilize and rely upon Pennsylvania's program of flow management (volume and rate of stormwater), where a comparative pre-construction and post construction stormwater management analysis that evaluates the volume of stormwater runoff from a 2-year/24 hour storm event is used. Additionally, water quality treatment BMPs must be employed where necessary to ensure the protection and maintenance of water quality. Similarly, the rate of stormwater discharges must be managed to have no net change in volume and rate, thus preventing the physical degradation of receiving waters and increased flooding potential. For regulated activities where redevelopment is proposed, and when the existing project site contains impervious area, 20 percent of the existing impervious area to be disturbed must be considered meadow in good condition or better, except for repair, reconstruction or restoration of roadways or rail lines, or construction, repair, reconstruction, or restoration of utility infrastructure when the site will be returned to existing condition. DEP has not been able to develop an estimate of the number of redevelopment activities that may occur. DEP believes, however, that substantial reductions will be achieved due to redevelopment and the required incorporation of retrofit BMPs.

Furthermore DEP will utilize an adaptive watershed management approach which will allow the MS4 permittees and other stakeholders to identify BMPs and commit to target load reductions where water quality improvements are required. This approach would include implementation of watershed restoration, encourage multiple municipalities to work jointly in order to pool resources and target larger restoration efforts, and allow for offsetting or trading opportunities. Using this watershed-based planning and implementation method will increase effectiveness throughout the watershed, with each municipality sharing in the water quality improvements

from the projects that are implemented. One example of this approach that is being considered is that of the Lancaster County Clean Water Consortium (Consortium). The Consortium believes that Pennsylvania's Watershed Implementation Plan could be realized by emphasizing solution-oriented approaches, including identifying and implementing the most cost-effective and environmentally sound BMPs through the use of a MS4 watershed overlay permit. This watershed overlay permit would establish a watershed or county-wide coordinated protocol with specific tools to assist Lancaster County municipalities in meeting MS4 permit requirements. Under this approach the Consortium would be able to assist municipalities and other stakeholders in integrating not only the MS4 permittee responsibilities but also identify other opportunities for BMP installation, load reductions, and other prospects for nutrient, sediment, and stormwater credits. Such an adaptive and iterative approach will allow DEP to gather more data, monitor the effectiveness, and evaluate the results in implementation and progress in meeting the target loads. In this way DEP can direct permittees to create programs and implementation plans that achieve progress toward the target load reductions.

For new discharges, if no TMDL target load allocation or other compliance option is available, MS4 permittees may acquire offsets or credits to achieve a no-net increase or decrease in the pollutant loading into the watershed or impaired segment, provided that this acquisition is in accordance with the provisions of DEP's Chapter 96.8, as amended or updated, and no localized problem with water quality standards will result.

In addition, DEP will require MS4 permittees that do not have local waters that are impaired or have a TMDL to target retrofit efforts as necessary to address the target load reductions established for Pennsylvania. MS4 permittees that are within the Chesapeake Bay watershed that are discharging to any waterway that is failing to attain one or more designated uses at the time of application but a TMDL has not been established for those waters, the MS4 permittee must demonstrate that their discharge does not cause or contribute to exceedances of water quality standards. In addition, they must identify and implement additional BMPs. These additional BMPs will be used to demonstrate progress toward implementing the target loads through reductions in volume and rate, or other water quality improvements entering their regulated system. MS4 permittees may choose from low cost, sustainable BMPs or management approaches and technologies that infiltrate, evapotranspire, capture and reuse stormwater to maintain or restore natural hydrologies. MS4 permittees will inform DEP on these efforts as part of the reporting requirements established in the MS4 permit. MS4 permittees that discharge to EV or HQ waters, where the waters are attaining their designated use at the time of the application will not be required to identify or implement additional BMPs as long as their discharge does not cause or contribute to exceedances of water quality standards.

Funding

Pennsylvania Infrastructure Investment Authority (PENNVEST)

PENNVEST has created a new non-point source (NPS) program which is designed to fund BMPs for urban stormwater pollution control. For more information see the discussion of the program in Section 8 of this WIP.

Pennsylvania Stormwater Management Act - Act 167

Counties are required to develop Comprehensive Stormwater Management plans. Funding has generally been available from DEP to cover 75 percent of the cost of those plans. The Act requires municipalities to enact and implement ordinances to regulate development in a manner consistent with the county's approved plan and the Act. Act 167 also authorizes funding to support municipal implementation of ordinances adopted under the Act 167 plan.

Conservation District Cost Share

Through delegation agreements, DEP cost shares 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 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 DEP to administer the program related to permit reviews, inspections, technical assistance, and program oversight. At this point, it cannot be determined if the increase in fees will adequately offset additional compliance/enforcement activities, training or associated management tasks for DEP or conservation districts that may be needed to be conducted as a result of the EPA TMDL for the Chesapeake Bay. DEP will review the adequacy of the fees established in the Chapter 102 regulations at least once every 3 years and provide a written report to the Environmental Quality Board. The report will identify any disparity between the amount of program income generated by the fees and the costs to administer these programs, and contain recommendations to adjust fees to eliminate the disparity, including recommendations for regulatory amendments. In addition, conservation districts can charge additional fees to meet their increasing costs and have been charging review fees above and beyond the permit filing fee under the Conservation District Law (3 P.S. §859(2)).

Section 106 of the CWA

The CWA authorizes 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." Section 106 funding addresses state-wide activities. The current level of 106 funding is not sufficient to cover DEP's costs for implementing the programs identified in Section 106, including wet weather/stormwater discharge programs.

Staffing

Pennsylvania has taken an integrated approach to stormwater management, and coordinates 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.

An example of this training is currently under development through an initiative being funded jointly by DEP and State Conservation Commission. Specifically, the Pennsylvania Association of Conservation Districts (PACD) will be developing and executing two one-week training sessions. These training sessions will be for conservation district staff as well as state program staff who provide technical assistance on erosion and sedimentation control and stormwater management programs. One week of training will be geared to newer employees with little or no experience and the other will consist of advanced training targeting staff that has intermediate experience. This hands-on training of classroom instruction and field exercise will provide up to 80 E&S technicians a strong foundation of knowledge to enhance their knowledge and skills. This training will begin in 2011.

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:

- 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. The requirement of a site specific analysis and design based on a no-net change for the 2-year/24-hour event is more protective than the federal Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act that only recommends capture based on the average annual rainfall. In Pennsylvania that would equate to approximately 1.5 inches of rainfall in a 24-hour period rather than the approximate 3.0 inches of rainfall for the 2-year/24 hour event. This requirement alone should provide reasonable assurance that Pennsylvania's approach applies pre-construction hydrology (meadow condition or better) to post-construction hydrology criteria to maintain, reclaim, restore, and protect not only the commonwealth's waters but also the Chesapeake Bay.

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.

Volume control BMPs include but not limited to:

- Infiltration;
- Bioretention
- Rain Gardens
- Vegetative Roofs
- Constructed wetlands; and
- Natural/manmade structures that replicate natural hydrology.

DEP's volume control and water quality requirements 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. The end result is local water quality protection as well as less sediment mobilized by erosion and reaching the Bay. 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 down-gradient 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 DEP'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 DEP, 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 DEP 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.

DEP 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.

One of the top priorities of the Pennsylvania State Water Plan is the development and evaluation of a framework and incentives for integrated water resources planning to meet this statewide goal. Currently, DEP and DCNR are working on a pilot project that may serve as a model for integrated stormwater and green infrastructure planning within an urbanized area. Green infrastructure consists of strategically planned and managed networks of natural lands, working landscapes and other open spaces that conserve ecosystem values and functions and provide associated benefits to human populations. It is noted that detailed green infrastructure planning and implementation can be a key to reducing volume and pollutant discharges from both combined sewer overflows (CSO) and municipal separate storm sewer systems (MS4), while at the same time creating livable and attractive communities.

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 a project. Therefore “no net increase” in nutrients or sediment from stormwater sources will be 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

DEP’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 county-wide, 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.

DEP also proposes to implement innovative approaches for stormwater management including watershed permitting; and offset/trading initiatives; and continued pursuit and support of legislation for integrated water resources planning. Legislation currently proposed (HB 1390) would 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; supplement Act 167 and allow municipalities to integrate planning and implementation efforts for stormwater, flood management, source water protection, and other provisions.

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. As discussed earlier in this document, the revised Chapter 102 regulation provide game changing opportunities for effective stormwater management through the requirements for an on-site pre-construction meeting; reporting; recordkeeping; licensed professional oversight of critical stages; and final certification by a licensed professional. Not only do these requirements provide assurance that BMP installation is consistent with approved plans and permits, but they also provide assurance, via certification of the licensed professional and inspection by Department or conservation district, that the BMP will be effective and sustainable into the future.

A strong, sustainable stormwater management program that is rooted in sound science and reasonable regulation is one of DEP's highest priorities. DEP has conducted extensive outreach and trainings on the revised Chapter 102 regulations, MS4 public meetings, and Chapter 105 wetlands assessment trainings. 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. DEP's revised Chapter 102 regulations provide the framework for baseline regulatory design, implementation, and long-term operation and maintenance requirements for stormwater BMPs.

Lastly, in contrast to our traditional approach of managing "hard" or "grey" infrastructure, sustainable resource management can often be achieved at lower cost by managing our "green" infrastructure as shown through cooperative partnerships with various groups. Once such progressive effort is the Paxton Creek Watershed and Education Association. Along with the Susquehanna River Basin Commission (SRBC) they are working in partnership on a three year project to develop and promote an innovative and cooperative stormwater management approach for Pennsylvania communities, addressing stormwater impacts on a watershed basis. For more information on the stormwater efforts undertaken, please visit the following website: <http://www.srbc.net/programs/paxton/PCWEA.asp>. 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. Examples of integrated approaches include working with the Lancaster County

Stormwater Consortium and several pilot projects including the York county Integrated Water Resources Plan and Lycoming County's Act 167 plan.

Quantifiable

Procedurally, post construction stormwater management plans that are required under DEP's Chapter 102 regulations for NPDES Permits for Stormwater Discharges Associated with Construction Activities and Erosion and Sediment Control Permits, 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 reviewed and approved by DEP.

To meet these requirements, 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 Chesapeake Bay TMDL but are included in an overall reduction goal for the land use activity. The MS4 permit has six MCMs and each MCM requires implementation of several BMPs. DEP believes that implementation of BMPs will address the TMDL numeric limits. The revised MS4 permit requires implementation of BMPs related to redevelopment, riparian buffers, and enacting a stormwater management ordinance (Act 167 ordinance). It is presumed that the initial MCMs implemented through the MS4 NPDES permits will result in lasting improvements to the watershed. These additional requirements include, but are not limited to, retrofits, updated local ordinances, riparian buffers, sustainable BMPs, and opportunity for trading/offsetting.

DEP contracted with the Pennsylvania State University (Penn State) to develop a Geographic Information System (GIS)-based watershed modeling tool (MapShed) which is able to provide an analysis of pollutant loads in MS4 areas. To support sediment analyses related to MS4 load allocations, baseline/reference flow and load duration curves have been developed. MapShed is a predictive tool that allows users to demonstrate compliance with the TMDL and potential load reductions based on the implementation of BMPs and the associated costs. The software will be available on the internet for free.

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.

Gamechanger: Effective November 19, 2010, Chapter 102 includes requirements for a licensed professional or their designee to be present onsite during critical stages of construction to provide oversight and inspection of PCSM BMP installation. The critical stages may include the installation of underground treatment or storage BMPs, structurally engineered BMPs, or other BMPs as deemed appropriate by DEP or a conservation district.

Enforceable

DEP encourages volunteer compliance through compliance assistance, training programs and outreach, 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. DEP is focusing efforts on compliance and enforcement of new MS4 permittees and MS4 renewals, and enforcing existing requirements for construction and redevelopment (no net change in volume of runoff) under existing permits and the Chapter 102 regulations.

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 DEP'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 Not all 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 and Compliance

- o Improve stormwater site tracking, data gathering, and reporting of practices.
- o Increase staff capabilities and resources for compliance and enforcement and to collect the information.
- o Urban stormwater practices have been under reported by Pennsylvania to EPA Chesapeake Bay Program. As a result, the Chesapeake Bay Program Model has underestimated the actual expected treatment of stormwater management practices within the Commonwealth. DEP began reporting stormwater BMPs in 2006. Even with DEP underreporting, model results still have shown a decrease in nutrient and sediment loads from PA urban sources when compared to 1985 levels. DEP would expect that the overall results will demonstrate further reductions from regulatory requirements and expanded BMPs, and with improved tracking and reporting of BMP implementation.
- o Scenario Builder for the Watershed Model only allows one stormwater BMP per acre. Staff has developed 'surrogate' BMP lists in deck runs to best represent Pennsylvania's program and realistic BMP implementation for stormwater.

BMP maintenance and establishment

- o Establishment of a monitoring program to inspect or monitor operation and maintenance of existing BMPs
- o Identification and prioritization of existing developments with no stormwater controls as potential targets for stormwater retrofit.

Funding

- o The current level of funding under Section 106 of the CWA is not sufficient to cover DEP's costs for implementing the programs identified, and obligations required, by EPA.
- o The current financial burdens facing counties and municipalities may impede development or updates of future Act 167 plans, MS4 permits and implementation of stormwater requirements.
- o Encourage innovative approaches to stormwater implementation and retrofit. For example, the Lancaster County Clean Water Initiative is developing a series of programs around clean water which in part has been funded by a Pennsylvania Department of Labor and Industry grant awarded to the Lancaster County Workforce Investment Board. These programs include the Lancaster County Roof Greening Project which has converted more than 51,000 square feet of impervious area (roof tops) to pervious area by installing vegetated roofs; a residential stormwater outreach and education program which is conducting rain barrel workshops in an effort to educate residents about the nature of stormwater pollution; development of a green infrastructure plan to include a comprehensive strategy for managing stormwater using Green Infrastructure; establishment at the Warwick Township Municipal Campus, a stormwater BMP demonstration site; and Urban Nutrient Management Education, which has been promoting an adult education program that demonstrates proper property maintenance including fertilizer application, animal waste removal and soil conservation.

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. Some of these approaches suggested through public comment include:

Compliance

- Identify and facilitate targeted training for professional stormwater staff, elected officials and the public on stormwater requirements, and provide technical assistance to aid elected officials in identifying areas and opportunities for retrofitting or trading/offsetting to address existing stormwater problems. This approach should 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. This is further examined in the following sub-section.
- Encourage and support legislation that would specifically authorize municipal authorities to create watershed-based stormwater utilities or authorities, to charge user fees, and support Act 167 revisions, analyze and develop a watershed permitting approach, and manage and oversee local stormwater management facilities and practices.

- It has been suggested in workgroup meetings and in the public comments that Act 167 should be revised given engineering, science, and policy that have advanced dramatically since passage of the enabling legislation. It was suggested that Act 167 focus more on planning, ordinance development and ordinance implementation rather than solely on planning. Another suggestion was that plans and ordinances require implementation of activities that achieve and maintain measurable water quality improvements. Others suggested revisions that require municipalities to maintain a list of waivers and variances that they grant from the ordinances and regulations implementing Act 167 plans, and that audits be conducted periodically to ensure that such waivers and variances are not being granted improperly. This effort would require legislation.
- As mentioned earlier in this section, DEP will utilize an adaptive watershed management approach that will allow the MS4 permittees and other stakeholders to identify BMPs and commit to target load reductions where water quality improvements are required. Over time this may lead to a stronger watershed permitting process involving a solution-oriented approach that includes the adoption of low impact development (LID) requirements, tree and urban/suburban woodland protection ordinances, and retrofitting programs. It has been highlighted to DEP that through public-private partnerships municipalities could gain some control over private land contributing to the MS4 system, clearing the way for retrofits to be implemented on private land, and regional stormwater facilities to be constructed on public or private land. However resources are needed to provide incentives and also to provide reasonable assurance. This effort would require a regulatory revision.
- Another approach that would advance stormwater management consistency and implementation would be the establishment of stormwater authorities. The intent would be to establish a comprehensive and coordinated approach to water management that focuses on water resource protection and restoration efforts, encourage a more comprehensive approach to reducing flood damages, streamline government responsibilities, and conserve state funds through the integrated management of water resources. This effort would require legislation. Legislation of this nature could broadly seek to update the existing stormwater management requirements to remediate existing stormwater problems, propose an approach to water resource management that integrates existing programs, and allow DEP and local governments to more efficiently utilize existing resources as well as leverage new resources. Such legislation would also empower local governments by authorizing the development of local financing mechanisms in the form of water management authorities for the continued management of stormwater and integrated water management, and it would empower counties to take an even more proactive role in the implementation of water resources management. Such an approach may allow for scarce Department funds to be spread for other uses as sustainable funding streams are created to enable local entities to collect fees and generate revenues dedicated to planning, constructing, monitoring, maintaining, improving, expanding, operating, inspecting and repairing public and private stormwater management infrastructure.
- Increase compliance and enforcement of stormwater requirements by drafting a revised policy document similar to the “Pennsylvania’s Proposed Chesapeake Bay Agricultural Water Quality Initiative Policy “. This effort would be developed by outlining, very similar to this WIP, the efforts that are required for compliance for general and individual NPDES permits, 167 plans and MS4 permits. Such a comprehensive policy could provide education to the local governments, advance reporting, and assist with the targeted approach that has

been discussed throughout this section and others. It is anticipated that such a policy could take at least a year to develop which could occur in conjunction with the development of Phase 2 of the WIP.

- Work with EPA on opportunities to build on the CBRAP initiative.

Urban Nutrient Management

The Chesapeake Bay Program outlines that Urban Nutrient Management “involves the reduction of fertilizer to grass lawns and other urban areas. The implementation of urban nutrient management is based on public education and awareness, targeting suburban residences and businesses, with emphasis on reducing excessive fertilizer use”. Through the WIP, Pennsylvania intends to increase the use of this best management practice in two ways. The first is through the development of an urban nutrient management program and the second is by improving the use and reporting of the practice by working with groups such as the Pennsylvania Golf Course Owners Association (PGO) and commercial lawn care companies to track the nutrient and land/water management activities currently completed in the Commonwealth.

In the Input Deck that was run for the September 1, 2010 draft WIP the implementation rate for Urban Nutrient Management increased from 0 percent to 30 percent. In part this increase was due to new information that was learned through the drafting process and provided by PGO. Specifically, PGO reported that there are many golf course superintendents that already follow some guidance related to nutrient management on occupied land, and that BMP implementation and reporting could be enhanced through outreach and education. Coupling this new information with a review of the acres of pervious urban land in the model compared to the acres of applicable golf courses in the bay watershed, it was determined that golf courses occupy almost 17 percent of the urban land mass. DEP therefore concluded that over time greater reporting and improved BMP implementation could be gleaned from this industry.

The other reason for the increase in the urban nutrient management BMP is that DEP seeks to develop a program related specifically to nutrient management on urban land. This program will include two main components, education and legislation. Each component will be developed through a broad based stakeholder process. The education would be geared to homeowners with the focus on the importance of proper fertilizer application techniques to reduce the amount of nutrients applied while maintaining adequate plant health, limiting soil erosion, and minimizing nutrient losses. Education would also be designed for professional applicators. The second component would focus on reducing phosphorus that is applied and sold by commercial lawn services, retailers, landscapers, turf growers and other nonagricultural entities. Both components would not just focus on the Pennsylvania portion of the Bay watershed but would be statewide.

Pennsylvania’s program could be built from examples of other state programs, incorporating existing Pennsylvania programs and providing funding for appropriate staff and program implementation. For example, many programs that currently exist across the country generally limit the application of fertilizers that contain phosphorus to lawns, golf courses and other mowed grassy areas (turf), while exempting agricultural lands and all phosphorus based product application on newly seeded lawns and lawns where soil tests show that product is needed.

Additionally, the PDA Bureau of Plant Industry (BPI) already has routine interactions with lawn care companies through *its* pesticide program. These companies must be certified, keep records and comply with other pesticide rules and regulations. BPI routinely spot checks trucks and vehicles to ensure that recordkeeping and other requirements are being met. Golf courses are also subject to these pesticide rules and regulations, and BPI has routine interactions with this industry. BPI also administers the fertilizer labeling laws and routinely inspects manufacturers, wholesalers and retailers that sell fertilizer materials. The purpose of this program is to ensure that nutrient claims made on the package are accurate. The program also includes a product registration requirement that helps to fund these efforts.

The Pennsylvania program would not be designed to be overly restrictive but instead could be designed to reduce the amount of nutrients in the watershed that reach local streams. Some basic concepts that the stakeholders would expand upon include:

1. Limiting the application of phosphorus-containing fertilizer to lawns, golf courses, and other mowed grassy areas (turf).
2. Exempting the application of fertilizer to lands used for agricultural production.
3. Exempting the use of animal manure that is mechanically dried, ground, or pelletized, or otherwise processed to a finished sewage sludge product (do not discourage alternative uses of manure).
4. Allowing the use of fertilizer containing phosphorus to establish grass during the first growing season, or when reseeded is needed.
5. Allowing application of fertilizer containing phosphorus to golf courses and other areas if a soil test or other measures indicate the area is deficient in phosphorus.
6. Prohibiting the intentional application of turf fertilizer, manure that is mechanically dried, ground, or pelletized, and finished sewage sludge product to an impervious surface; requiring a person who spills any of these substances onto an impervious surface to immediately remove it.
7. Regulating the retail sale of turf fertilizer containing phosphorus unless the fertilizer is sold for one of the purposes for which it is authorized (labeled) to be used, such as new lawns, reseeding, or where a soil test demonstrates a need.

Another component of the Urban Nutrient Management program could be to coordinate and seek consistency between the Chesapeake Bay jurisdictions related to the type of data sources considered by the CBPO in developing fertilization of non-agricultural lands. Currently a number of sources are utilized directly or indirectly to formulate the nutrient applications, including the Association of American Plant Food Control Officials (AAPFCO) for non-agricultural fertilizer sales. PA would seek to have the data be focused more on usage and not necessary wholesale sales data.

Pennsylvania anticipates that this could be outlined, drafted and potentially established during the two-year 2011-2012 legislative sessions. Detailed discussions on the development of this program will begin early 2011. Enhanced tracking and reporting of BMPs will be pursued upon publishing the WIP.

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.
- Identify opportunities to improve the tracking of practices. It is important to note that many volume control BMPs are currently being installed as advancements of sustainable, green infrastructure, but improvements are not often reported for other environmental projects. This is one area where reasonable assurance can be improved upon related to installed BMPs on urban land.
- Identify partnering opportunities 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 County’s Act 167 stormwater plan includes specific references to DEP’s Stormwater BMP Manual and the County has a zoning ordinance that requires 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. As highlighted in Section 6, discussions on this program have begun and will continue over the next year to analyze a framework for a program.

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.
- Development of enhanced practices that supplement or replace existing practices.
- Engage the appropriate stakeholders to identify new and revised BMPs, and pollutant removal efficiencies for BMPs such as urban tree planting, canopy establishment, and stream 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 a 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 it is assumed 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 Pennsylvania were to retrofit each of the 759,221 septic systems in the Bay watershed, at most Pennsylvania would see 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.

Reasonable Assurance for Septic System Connections

Pennsylvania's Final watershed model input deck does include projected septic system connections, as these are annually funded by USDA Rural Development program and PENNVEST. EPA comments on Pennsylvania's Draft WIP included a statement that the Draft WIP did not clearly justify 21 percent reduction in septic loads compared to 2009. The following provides the methodology used in making the projections.

PENNVEST regularly provides low interest loan and grant funds to municipalities and municipal authorities to correct stream and groundwater impairment problems created by malfunctioning on-lot septic systems and wildcat sewers. These types of projects are ranked relatively highly by DEP, which does the technical rankings for all of PENNVEST's applications. Projects addressing these problems are probably the single most common type of wastewater construction project funded by PENNVEST.

Pennsylvania's watershed model input deck projects a reduction from 3,290,423 lbs. (2009) to approximately 2,614,045 lbs. (2025) for TN. This is a reduction of 20.6 percent. Septic system connections through 2025 were estimated using the yearly rate of hook-ups reported by USDA's Rural Development Program and information provided by the PENNVEST Program. For the four years between 2006 and 2009, the average yearly rate of implementation was determined to be about 6,490 hookups per year. This rate over the next 15 years and the 2009 total of 44,000 hookups already reported results in a projection of about 141,400 hook-ups through 2025. Additionally, since 2006 PENNVEST has connected 7 wildcat systems to treatment facilities, resulting in additional nutrient reductions.

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 posted throughout the Bay region, provide technical support to private forest landowners and communities. RCF and service-forester 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.

Brook Trout

Presidential Executive Order 13508, Strategy for Protecting and Restoring the Chesapeake Bay Watershed, singles out brook trout as an indicator species of the health of the upper Bay watershed. Pennsylvania has undertaken numerous projects to conserve and restore brook trout habitat, led by the Fish and Boat Commission and partners such as DCNR and Trout Unlimited. Recently DCNR completed a new Brook Trout Conservation Plan to promote conservation and restoration of brook trout on state forestlands, some of the best habitat remaining for this keystone species.

While restoration of brook trout is not a recognized best management practice per se, many of the practices used to restore habitat for brook trout – riparian buffers, bank stabilization, dam removal, and tree planting for shading – *are* recognized BMPs for protecting water quality for the Chesapeake Bay. We will encourage the Bay Program science team to help the state correlate trout stream restoration practices with reduced sedimentation loads and lower water temperatures.

Pennsylvania's 2.2 million acres of well-managed State Forest land provide critical habitat for brook trout and thousands of stream miles. This is especially important considering The Eastern Brook Trout Joint Venture (EBTJV) has identified and mapped Pennsylvania as having the greatest number of subwatersheds with brook trout classified as reduced (118), severely reduced (507), extirpated (449), and unknown (218) (EBTJV, *Conserving the Eastern Brook Trout: An Overview of Status, Threats, and Trends*). Pennsylvania Bureau of Forestry therefore, has a unique responsibility to conserve and protect this keystone species.

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.

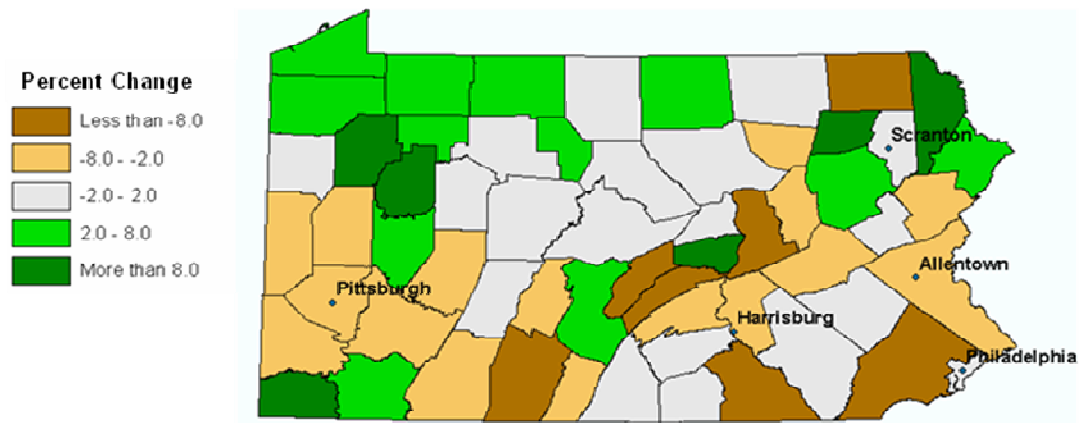


Figure 5.—Percent change in area of forest land, Pennsylvania, 1989 to 2004.

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.

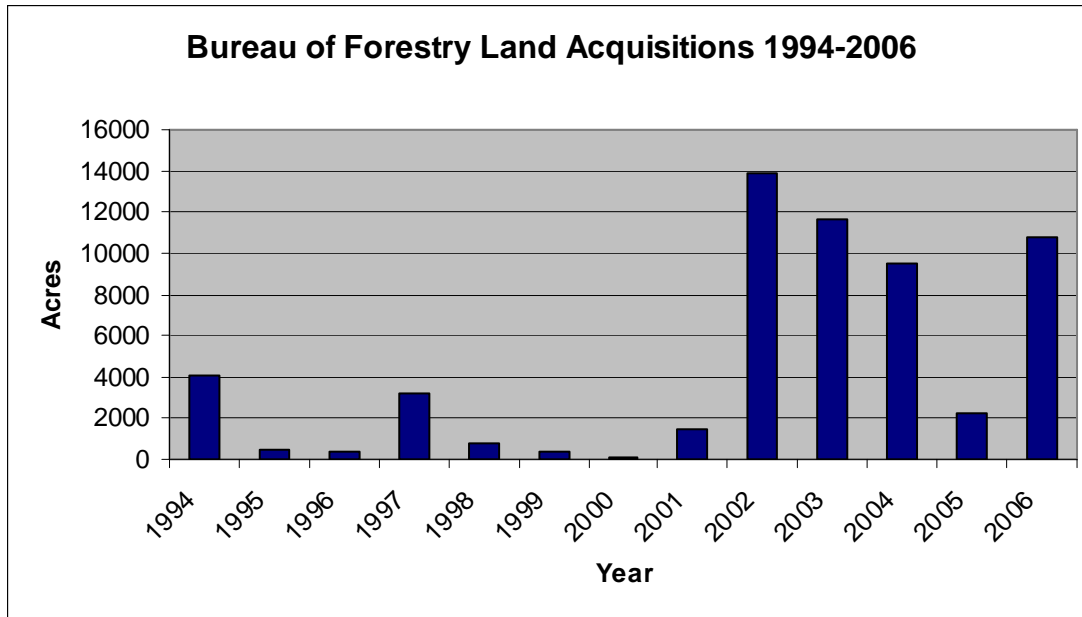
The rate of growth in Census-classified urban areas in the United States over the next several decades was modeled by Nowak and Walton (2005). Counties on the East Coast, including those in Pennsylvania, are projected to have some of the highest rates of urbanization over the next 50 years. The study 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.

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.

Strategy to Fill Gaps

Pennsylvania has four basic strategies to help fill gaps from the forestry sector: 1) better tracking and reporting of existing practices; 2) refinements to Model assumptions that incorrectly attribute higher runoff rates to harvested forestlands than scientifically justifiable; 3) development of new measurable practices that will help close gaps; and 4) inclusion of existing practices recognized by NRCS and others as contributing to reduced loading rates but not currently recognized by the Bay Model. In addition, multiple long-term strategies developed by DCNR through the 5-year State Forestry Assessment are included that highlight many approaches to helping slow the rate of forestland conversion, address forest fragmentation concerns, and promote reforestation and afforestation.

Better Tracking of Existing Practices

Underreporting of best management practices, particularly on harvested forest acres, is already recognized as an issue in Pennsylvania. The current state goal of 125 acres of best management practices each year on harvested acres was based on limited information that is being revised. DCNR alone harvests 11,200 acres each year on its state forest lands in the Bay watershed with the highest-level best management practices in order to meet its third-party certification program requirements under the Forest Stewardship Council (FSC), the highest standard in the U.S. and in the world. The Pennsylvania Game Commission currently harvests an additional 6,000 acres on its state game lands in the Bay watershed using BMPs, for a total of 17,200 acres not presently counted by Pennsylvania. These gains are expected to be annual and long-term, since they follow the management practices of both agencies.

There are additional acres in Pennsylvania's Bay watershed harvested with BMPs on *private* forestland that are not presently reported. There are 260,000 acres enrolled in the American Tree Farm System in PA and 152,488 acres in the Sustainable Forestry Initiative in PA, both third-party certification programs. A conservative estimate puts 50% of these acres within the Bay watershed. Using the model's assumption that 1% of all forested acres are harvested in a given year, an additional 2,065 forested acres are harvested annually with BMPs in the Bay watershed on private forestlands.

What would these additional BMP acres mean in terms of load reductions to the Bay? Since BMPs used on harvested forest acres are documented to reduce N, P and S loadings by at least 50% each (according to Bay Program-sponsored research surveys by Edwards and Willard), better tracking would reflect 50% reductions of N, P and sediment on about 20,000 harvested

acres annually. If these acres harvested with BMPs are loading nitrogen at 50% of the model's estimated rate [i.e. at 8 pounds N/acre/year instead of 16 pounds N/acre/year], the per-acre savings of 8 pounds/acre multiplied by 20,000 acres comes to a reduction of 160,000 pounds of nitrogen per year to the Bay.

In response to public comments, we suggest a pilot study similar to what was done for agriculture to better count BMPs on private forestland both for harvested and non-harvested forest lands. This should involve coordination between all certification programs – SFI, TreeFarm USA, and FSC – as well as conservation districts and the Bureau of Forestry. In a related suggestion, forestry technical support and regulatory compliance activities by the county conservation districts should be considered to provide reasonable assurance.

Refining the Model's Assumptions

DEP has already proposed a series of refinements to the model, including some from the forestry sector. A supporting letter from DEP and DCNR was sent to EPA in late October 2010 requesting that the current loading rates to forested acres and harvested forested acres be revisited. Specifically, DEP and DCNR have requested an analysis to determine what loading reductions occur on (non-harvested) forested lands managed with BMPs. Because of the very large number of forested acres in PA's Bay watershed, any reductions credited to BMPs would also be large in scale. BMPs likely to result in lower loading rates include silvicultural practices that spur regrowth, revegetation, faster overall growth rates and nutrient uptake, and selection of nitrogen-fixing species.

Development of New Measurable Practices

DEP and DCNR have already petitioned EPA to credit a number of new forestry practices in the model that would reduce loadings and forest-to-development conversions. These include augmentations of urban and suburban canopy cover, certified forest acres, forest stewardship-plan-guided management, avoided conversion, and carbon sequestration. These BMPs would require research and modeling to develop estimated load reductions. DCNR staff is already working to calculate reductions for urban and suburban tree canopy cover augmentations.

The Urban Tree Canopy (UTC) project is a Chesapeake Executive Council Directive (No. 03-01) that expands Riparian Forest Buffer Goals to meet Executive Order 13508 for the Protection and Restoration of the Chesapeake Bay. The Chesapeake Executive Council recognizes that tree canopy cover in urban areas can offer water quality benefits and functions analogous to riparian forest buffers.

The UTC project focuses on metropolitan areas and adjacent communities that are located within the Chesapeake Bay watershed. Based on the data, a community can assume a certain amount of nutrient reduction per 100 trees planted to meet the UTC goal. Recorded trees planted in urban areas through state and volunteer programs will be used to estimate acres of canopy added per year. A medium-sized (20 year old, 29' tall, 24' spread) deciduous broadleaf tree over an impervious surface has the potential to intercept 1,014 gallons of precipitation annually in Pennsylvania. With a medium-sized tree's surface area of 435.6 ft, an acre of canopy results

from 100 trees. A tree's ability to intercept and imbibe water allows for the volume reduction of stormwater runoff, equally reducing nutrient loads. The Bay Program is currently looking at the UTC BMP as a land-use change.

In Pennsylvania, DCNR and partners have committed to a goal of planting 1 million trees by 2013 under the TreeVitalize program. We are currently at about 300,000 trees planted, and have another 700,000 to go to meet this goal. Funding availability will determine the success and rate of progress of this effort. An additional 700,000 trees intercepting an average of 1,014 gallons apiece will collectively intercept 7,009,800,000 gallons of precipitation each year annually starting in 2013 if this goal is met. Estimates of corresponding nutrient and sediment load reductions will depend on modeling assumptions and will vary based on soil type, tree type, whether trees are planted into impervious cover areas or open space, and other variables.

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 gages are downstream of primarily forested sites.

The relationship of healthy forests to instream nutrient processing is well documented and accepted. Combining AMD remediation and mineland reforestation to promote biological activity will reduce nutrient loads to downstream communities and ultimately to the Chesapeake Bay. AMD remediation is a critical component of improving stream function in some of the most heavily forested portions of the watershed. Fully accounting for increased nitrogen processing from remediated AMD streams will add another nitrogen load reduction tool to the Bay watershed toolbox. Bay modelers should work with Stroud Water Research Center and others to develop the methodology to capture the benefits of remediated streams to downstream water quality.

Public commentors on the draft WIP also suggested several programs and practices that could help close gaps, particularly focusing on AMD lands. We will work closely with local and

nonprofit partners in “coal country” to do reforestation of AMD lands and target more riparian forested buffers on AMD lands, where erosion is often exacerbated. The availability of Abandoned Mine Lands Trust Fund monies starting in 2011 can provide needed funding for these activities. A secondary focus for AMD-remediation-related water quality improvements will be the state’s 1.04 million acres of Game Lands in the Bay watershed, where some abandoned mine lands are eligible under the ARRI Initiative. Finally, Bay program partners will work to count undercounted tree plantings on AMD lands. For example, in 2009, 2,500 trees were planted on abandoned mine lands in Schuylkill County in a broad partnership that will be promoted and expanded.

Another comment from public responses to the draft WIP suggests developing and promoting tree and woodland protection ordinances as part of an MS4 permit. At a minimum, voluntary adoption of tree and woodland protection ordinances can and should be expanded. Many communities across Pennsylvania already have adopted tree and woodland protection permits on a voluntary basis, which helps to slow the loss of forestland statewide. Promotion and expansion of these voluntarily adopted ordinances will help address forest loss due to future growth.

Inclusion and Promotion of Existing Practices recognized by NRCS and others but not yet included in the Bay model

Windbreaks are a prime example under this category. Windbreak or shelterbelt establishment and renovation are already recognized BMPs in NRCS’s WHIP and EQIP programs. Windbreaks are increasingly being planted in upland agricultural areas next to poultry houses and other confined animal feeding operations (CAFOs) in Pennsylvania for their ability to trap and fix airborne nitrogen, take up nitrogen and phosphorus from stormwater, sequester carbon, and even provide bedding and cellulosic biomass fuel for poultry house operations. Preliminary measurements of ammonia reduction through planting vegetated buffers near exhaust fans on poultry houses showed a 54% reduction of ammonia over six years using a 22-foot-wide vegetated buffer over a control site (Malone et al, 2008). The Maryland Plant Materials Center in Beltsville has established a research and a control buffer in Adams County to compare growth rates in vegetated buffers with and without nearby poultry-house ammonia sources. More study needs to be done to refine the most efficient combination of buffer species and placement distances to reduce ammonia, dust and odor.

These windbreak practices are not formally approved for use in the Bay model, but a “placeholder BMP” has been established. Field windbreaks are among the most commonly enrolled projects under the Conservation Reserve Program over the past 3 years nationwide, although not in the Bay states. Windbreaks also provide visual screens, odor screens, and wildlife habitat. The Bay program should credit windbreaks as a BMP and promote their use extensively in upland areas, particularly near large agricultural operations. New research out of Penn State University is looking at quantifying nutrient reductions through this practice.

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
 - 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 Initiative.
 - d. Work with Department of Agriculture to promote silvopasturing
 - e.

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 re-mining 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.

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.

PENNVEST Non-Point Source Project Funding

The expansion of nonpoint source pollution (NPS) funding in the Pennsylvania Infrastructure Investment Authority (PENNVEST) program is a significant change to the Clean Water State Revolving Loan Fund (CWSRF), which has primarily served "traditional" wastewater system needs in Pennsylvania. DEP serves as the technical advisor to PENNVEST.

PENNVEST has some experience with NPS funding, due to the successful program for on-lot septic system repair, the funding of a few Brownfields projects and three abandoned mine drainage projects. In addition, as a result of the American Recovery and Reinvestment Act (ARRA) requirements for "green" infrastructure projects, a large number of NPS stormwater, hydromodification and agricultural projects were funded in 2009. The new NPS program is largely founded on lessons-learned in ARRA.

Applications were solicited for the first round of projects beginning in April 2010. Staff is now doing outreach and considering changes to make the program more effective. The program guidelines can be seen at [http://files.dep.state.pa.us/Water/Drinking%20Water%20and%20Facility%20Regulation/DrinkingWaterPortalFiles/watersupply/municipalfinance/Program Design Summary Applicant1.pdf](http://files.dep.state.pa.us/Water/Drinking%20Water%20and%20Facility%20Regulation/DrinkingWaterPortalFiles/watersupply/municipalfinance/Program%20Design%20Summary%20Applicant1.pdf).

Program Goals

The primary goals of the NPS Program are to: (1) improve water quality or protect existing exceptional value or high quality waters, (2) promote water conservation and energy efficiency and (3) promote economic development.

It is premature to quantify the specific pollutant removals that will result from the program, but not unreasonable to believe they will be significant.

Sources of NPS Pollution to be Addressed

Nonpoint source (NPS) pollution is typically the result of rainfall becoming contaminated with pollutants as it runs off the land surface into streams or infiltrates through the soils into groundwater. The types of NPS pollution are highly varied, and are discussed in detail in "Pennsylvania's Nonpoint Source Management Program Update" (October 11, 2008, Document Number 394-2000-002).

After careful review of this document, only projects that address the three highest causes for water quality impairment from NPS were made eligible for funding. They include agriculture, stormwater and abandoned mine drainage. For the purposes of this program, stormwater projects were further defined as those projects that address water quality problems caused by “urban runoff”. In addition, this program will also implement Brownfield remediation projects. The program will fund projects which construct Agricultural Best Management Practices, Urban Stormwater Pollution Control, Acid Mine Drainage Control, and Brownfield Water Pollution Reduction, as follows:

Agricultural Best Management Practices

Eligible agricultural work is limited to recognized US Department of Agriculture, Natural Resource Conservation Service (NRCS) best management practices (BMPs).

Urban Runoff Control

Eligible practices, as described in the DEP’s Stormwater Best Management Practice Manual, include BMPs that transport, store, infiltrate or treat stormwater from existing developed areas. Projects will be recognized as serving developed areas either by reference to County Comprehensive Plans or through descriptions provided by applicants.

Abandoned Mine Drainage Control (AMD)

Any project designed to reduce AMD volume or concentration, or treat AMD discharges is eligible, provided there is no entity with the continuing responsibility under applicable law to accomplish the work. Included are Surface Mining Control and Reclamation Act of 1977 (SMCRA) pre-1977 Abandoned Mine Land projects as well as those 1977 and later projects which remain incomplete despite bond forfeiture.

Brownfield Water Pollution Reduction

Eligible projects include those on contaminated commercial/industrial sites whose purpose is to protect water or groundwater quality from contaminants on the site.

Project Award Examples

PENNVEST actively funds Green Initiatives that promote and encourage environmental responsibility in our communities that are creative and innovative with 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. It is projected that this will result in a new, additional \$5-10 million per year for these types of projects. PENNVEST has the capability to increase that funding significantly as demand for projects increases.

The first of what will be an on-going effort to fund non-point sources projects was approved at PENNVEST's July 2010 meeting. \$1.8 million was awarded for projects in the Chesapeake Bay watershed. These projects were:

- 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.
- A \$291,000 loan to treat both hog and dairy manure at various farms to remove both nitrogen and phosphorous from the manure that farmers spread on their fields, thus reducing the contamination of the Chesapeake Bay watershed by these nutrients.
- 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.
- A \$213,000 loan to construct manure storage facilities to eliminate winter manure land applications and contamination of streams by nitrogen and phosphorous runoff.

At the November 2010 the following projects were approved:

- The Lancaster County Conservation District received a \$240,594 grant to replace an undersized manure storage facility with a larger structure that will allow an agricultural operation to to employ improved manure management practices that will reduce nutrient runoff.
- West Wyoming Borough received a \$216,609 grant to construct a dry well, storm drains and curbside rain gardens that will reduce stormwater runoff to the Susquehanna River.
- EnergyWorks BioPower, LLC received an \$11 million loan to construct a manure collection and treatment facility to manage the entire amount of manure produced by a 5 million egg layer facility. This will eliminate hauling of more than 70,000 tons of manure and and reduce nutrient discharges to the Bay.
- Blair County Regional Digester received a \$10 million loan to construct a facility to treat raw manure and milking waste from farms, reducing nutrient discharges to the Bay.

Innovative NPS Prioritization Methodology

DEP and PENNVEST placed significant effort in the development of NPS funding program prioritization criteria. EPA staff provided useful insights. DEP did not however find that the priority systems that are currently in use by other states to be useful.

It is not surprising that limited effort has been placed by other states, because EPA does not require prioritization of NPS projects. DEP and PENNVEST however felt that prioritization was important. The program is expected to be financially and environmentally important in Pennsylvania. The fact that EPA rules now make grants (otherwise known as "principal

forgiveness”) an option in the CWSRF program makes the use of the money all the more important. Grants serve to open the door to more and larger projects.

DEP and PENNVEST therefore proposed criteria which included consideration of cost/benefit, and created a means of applying that criterion in a simple straightforward way. The belief is that it is not enough to calculate benefit; some projects can have large benefits, but at extraordinarily large costs. The way to get the most benefit for the overall program investment is to consider both cost and benefit in the project selection process. See <http://files.dep.state.pa.us/Water/Drinking%20Water%20and%20Facility%20Regulation/DrinkingWaterPortalFiles/watersupply/municipalfinance/Project%20Rating%20System.pdf>. The expected result is funding many highly beneficial projects, many of which will be in the Chesapeake Bay watershed.

PENNVEST Affordability Criteria

PENNVEST is required by statutory mandate to offer a level of subsidy which takes into consideration the affordability of the project. As a result, loans are offered at a variety of interest rates to some applicants. Grants are provided only when that level of subsidy is essential to project success. The program therefore gets more done than if an arbitrary subsidy is provided across-the-board.

Program Outreach

It is critical that DEP and PENNVEST communicate the availability of the program to potential applicants. That work is being done through presentations at conferences and meetings, through the *Pennsylvania Bulletin*, and the PENNVEST and DEP websites. PENNVEST and DEP staff have been trained so that they can help market the program.

DEP has a NPS program coordinator in the central office, and draws NPS expertise in support of the program from other DEP programs.

DEP will fund a new full-time position utilizing Section 319 funding in 2010-11 to implement an outreach effort. This is necessary because 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 yet expert in non-point source projects, and already have a full point source and drinking water workload. The DEP Regional Offices have staff knowledgeable in technical aspects of non-point source activities, but lack experience in the PENNVEST website. They also already have a full workload. A knowledge gap and a shortage of staff time therefore exists which, if not addressed, would have prevented this program from reaching its potential.

A new service will be provided by an individual called the Non-Point Source Program Application Developer (AKA “NPS Circuit Rider”). The role of this individual is to fill the knowledge gap and staff shortage discussed above, resulting in a greater number and quality of PENNVEST Non-Point Source applications.

The NPS Circuit Rider will be responsible for identifying and eliminating bottlenecks in the completion of high-quality PENNVEST NPS applications. The highest priority work will 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 Regional Office 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 Regional Offices.

Creative Support to the Trading Program

The NPS program can be used by wastewater systems to fund BMPs which satisfy all or part of the nutrient control obligation of the wastewater system. DEP and PENNVEST staff is promoting the concept, in which a wastewater utility might for example collaborate with a County Conservation District (CCD). The CCD could provide agricultural expertise and serve as a contact with farmers, and the wastewater system could serve as the PENNVEST applicant. Alternatively the wastewater system could hire staff, or a consultant, to develop and manage its own portfolio of NPS credit-generating BMPs.

NPS Program Improvements

Constraints that are limiting applications appear to be: (1) the requirement that projects be ready to go to construction, (2) use of the PENNVEST website as the application medium, (3) state statutory constraints on funding privately-owned BMPs, and (4) EPA constraints on NPS funding of CAFOs.

- (1) PENNVEST policy has traditionally favored projects that are ready to go to construction. Planning and design costs are often reimbursed when construction funding is provided. That policy has been effective with wastewater and drinking water projects because the applicants for such projects have access to sophisticated expertise and a source of revenue to pay for the work. The policy also limits the number of administrative actions by PENNVEST and its applicants, and avoids the waste of funding that occurs if planning and/or design efforts fail to proceed to construction.

Frequently, however, the most cost-effective agricultural projects are on small farms. Owners have limited means to do the planning and design work needed to satisfy the current PENNVEST requirement. Discussions are underway to address this problem.

- (2) The PENNVEST website applies state-of-the-art technology to the application solicitation, review and record-keeping process. PENNVEST continues to make changes to the website to accommodate NPS. That work, and support by staff, are expected to overcome current obstacles. Progress will be monitored and improvements will continue to be made.
- (3) A legislative fix is currently being pursued that will allow funding of privately-owned NPS projects. There is no comparable federal constraint.

- (4) EPA does not allow the Clean Water State Revolving Fund NPS program to fund CAFOs. An exception is allowed if the service is provided off-site of the CAFO property. Use of that exception in the planning phase of new projects will allow use of the PENNVEST program for large digester projects. In some cases it can be expected that the location of the treatment off-site of the CAFO may be somewhat less cost-effective than on site. EPA should do everything possible to remove the constraint, allowing the use of best-possible choices.

In summary, the new NPS program is expected to make a significant difference in the Chesapeake Bay drainage. It will directly fund a significant reduction in nitrogen, phosphorus and sediment loads and it will support the trading program.

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 Pennsylvania's Diesel-Powered Motor Idling Act and the methodology proposed to EPA to obtain nitrogen reduction credits in the watershed model input deck. EPA has agreed to provide credit for the placeholder BMP and included it in Pennsylvania's final deck run.

It should be noted that Pennsylvania also submitted information to establish placeholder BMPs for recent state regulations for nitrogen oxide (NO_x) controls on Cement Kilns and Glass Melting Furnaces, and anticipated reductions from Renewable Energy/Energy Efficiency (RE/EE) and Demand Reduction in the electric generating sector. EPA was unable to complete review of the placeholder BMPs prior to the submission of Pennsylvania's final watershed model input deck, so these regulations are further discussed in Section 14, Reasonable Assurance.

Diesel-Powered Motor Vehicle Idling Act (Act 124 of 2008)

Diesel vehicles are a source of emissions that contribute nitrogen oxides to the watersheds of Pennsylvania. On Oct. 9, 2008, Governor Rendell signed Act 124, also called the Diesel-Powered Motor Vehicle Idling Act, which will reduce unnecessary idling of the main propulsion engine in diesel-powered motor vehicles, including trucks and buses. The Act became effective

on Feb. 6, 2009. Act 124 prohibits the owners and drivers of any diesel-powered motor vehicle with a gross weight of 10,001 pounds or more engaged in commerce from causing the engine of the vehicle to idle for more than five minutes in any continuous 60-minute period, except as provided in the Act. In addition to vehicle drivers and owners, owners and operators of locations where subject vehicles load, unload or park are also responsible for compliance with Act 124. An owner or operator of a location where subject vehicles load or unload, or where 15 or more parking spaces are provided for vehicles subject to the Act, must erect and maintain at least one permanent sign to inform drivers that idling is restricted in Pennsylvania.

Enforceability

DEP and state law enforcement officers are authorized to enforce Act 124 requirements.

Nitrogen Reduction Calculation Methodology

As part of the process that informed the development of Act 124, Pennsylvania DEP contracted an extensive study that quantified atmospheric emission reductions for several parameters, including Nitrogen Oxides (NO_x). The study was conducted by Michael Baker Jr. Inc., and is titled “Quantification of Pennsylvania’s Heavy-Duty Diesel Vehicle Idling and Emissions: Final Report”. A copy of the report can be obtained from DEP by contacting the Water Planning Office at (717) 772-4785.

To account for variable deposition throughout the state, and in order to remain conservative, the emission reductions identified by the consultant have been reduced by 50%, for a statewide total reduction of 1622 tons of NO_x in 2009, leading to a reduction of 1600 tons in 2018. Emission reductions are projected to be similar or less in 2018 than in 2009 due to newer, cleaner diesel engines replacing older engines. The difference in emission reductions may also be due to the fact that the study used current idling activity levels in forecasting future emission reductions.

As an additional conservative factor, this placeholder BMP will only use the projected data for 2018. More specifically, a reduction of 1600 tons was used as the starting point for calculations.

To convert the statewide total reduction into numbers that could be used for the Chesapeake Bay, the following assumptions were employed:

- The report listed the estimated total idling hour reductions for the 20 highest counties. Of these counties, 13 are in the Chesapeake Bay watershed. The Bay counties accounted for 46% of the idling hours associated with the 20 top counties.
- The county information represented 16.5 million of the total 22.3 million idling hours (74%) estimated in the report.
- The remaining 26% of the idling hours are assumed to be equally split between the Bay counties and the remainder of the counties in the Commonwealth. This is a logical assumption since the Bay watershed in Pa represents about half the area of the state and also about half the states population.
- The percent of idling hours within the Bay watershed were thus estimated to generate 46% of the NO_x reductions associated with implementation of Act 124

Reductions associated with this BMP

DEP estimated that the reductions associated with this placeholder BMP are 736 tons of NOx per year or about 390,000 pounds of nitrogen per year within the Chesapeake Bay watershed. Information from EPA calculated the reduction in nitrogen loadings to the Chesapeake Bay to be approximately 2,500 pounds per year.

Land Conservation

Pennsylvania has an aggressive land conservation effort. While the Chesapeake Bay watershed model does not currently provide nutrient pollution reduction credit for land conservation activities, it is anticipated that this will occur in the future. Communities and the land conservation community are highly motivated to support the protection of land for water quality, habitat and open space benefits. The Department of Conservation and Natural Resources (DCNR) intends to continue to support the conservation of land through acquisition, technical assistance and working with local partners who are also interested in land conservation. Pennsylvania is a leader in protecting land and our intention is to keep conserving land consistent with the available resources.

AVERAGE ANNUAL STATE FUNDED PERMANENTLY PROTECTED LANDS ¹ PENNSYLVANIA STATE PROTECTED LANDS			
Category	Fee Simple Acres	Less Than Fee Simple Acres	Total Acres Protected
Agricultural Lands	NA	13,881	13,881
Forest, Wetlands, Natural Areas	3,418 ²	NA	3,418 ²
Cultural, Historical, Park Lands	140	NA	140

¹ All figures based on a 15 year annual average except as noted; figures *do not* include other conservation acreage protected by federal, local, or private entities

²28 year annual average

NA—Not available

Greening the Grant Program

The DCNR Community Conservation Partnership Program provides grants to local government and nonprofit partners to conserve land, build sustainable communities and develop recreation opportunities. DCNR’s recreation and conservation grants have assisted all of Pennsylvania’s

counties, and served more than 50 percent of local governments, leveraging \$3 for every \$1 of DCNR grant funding. The Program has been refocused to provide greater emphasis on green and sustainable practices. All projects are reviewed in the context of their overall benefit to the environment and the citizens of the Commonwealth. Practices such as managing water onsite, maintaining and enhancing riparian buffers and minimizing site runoff are strongly considered as part of the grant application review process.

Conservation Landscape Initiative

The Conservation Landscape Initiative (CLI) is an integrated, place-based approach to coordinate strategic investment and actions in large landscapes, around the values of sustainability, conservation, community revitalization, and outdoor recreation. DCNR Bureaus and Offices are working closely with partners and communities on local priorities such as: Conserving land for parks, trails, and critical wildlife habitat; protecting watersheds and greenways; creating walking and biking trails; reducing forest fragmentation and encouraging sustainable economic development.

This approach has leveraged significant funds in partnership with state and federal agencies and private philanthropies. For example, in Ohiopyle Borough the program secured over \$400,000 in private funds and \$3.2 million in federal funds for planning and implementation projects including a green streets project that reduced stormwater flowing into the Youghiogheny River. In the Lower Susquehanna, an innovative partnership with public utilities and private philanthropy (\$2.9 million) will match state funds (\$3.1 million) to permanently protect land in the watershed and provide public access to more than 3,600 acres of riverlands.

Green Infrastructure Planning and Implementation

DCNR is working with multiple partners to design, fund, and implement cutting-edge projects that address urban stormwater issues through retrofitting conventional infrastructure with green infrastructure. DCNR itself recently completed three LEED-designed buildings on state forest and park lands that conserve and reuse water inside the building and on the outside landscape. These buildings provide gains for water quality, reduced runoff quantity, and highly public “modeling” of conservation behavior and practice.

With the new focus on greening of the Community Conservation Partnership Program grants DCNR is rewarding applicants for “greening” their recreation and conservation projects, including water conservation, recycled building materials, and energy conservation. In one recently funded example, Lancaster City estimated that 119,500 lbs. of sediment, 1,546 lbs. of nitrogen, and 229 lbs. of phosphorous generated in the Conestoga River watershed will be eliminated by implementing 3-5 highly visible green infrastructure demonstration projects. The City will develop additional projects to reduce stormwater runoff and share the City’s experience and knowledge with other urban areas in the Chesapeake Bay watershed through its partners, DEP, DCNR, and the Lancaster County Planning Commission (LCPC).

Pennsylvania Coastal and Estuarine Land Conservation Plan (CELCP)

As part of its efforts to continue to protect critical resources and habitat associated with the Chesapeake Bay watershed, the Commonwealth recently received approval from the National Oceanic and Atmospheric Agency to expand CELCP to include eligibility for portions of the Chesapeake Bay watershed in Pennsylvania.

CELCP was created in 2002 by an Act of Congress, for the purpose of protecting important coastal and estuarine areas that have significant conservation, recreation, ecological, historical, or aesthetic values, or that are threatened by conversion from their natural or recreational state to other uses, giving priority to lands which can be effectively managed and protected that have significant ecological value.

The Chesapeake Bay watersheds included are: the Lower Susquehanna Watershed, the Chester-Sassafras Watershed, and the Gunpowder-Patapsco Watershed. Although these watersheds do not drain to Pennsylvania's coastal waters, they are critical areas for national coastal conservation, and support Pennsylvania's participation in the Chesapeake Bay Program. A copy of the recently approved CELCP plan can be obtained by contacting DEP's Water Planning Office.

Section 14.

Reasonable Assurance and Pennsylvania's Blueprint for Success

During the development of the Pennsylvania WIP, it became clear that there is significant support for achieving the nutrient reduction goals associated with the Chesapeake Bay. Pennsylvanians spent hours volunteering their time to discuss nutrient reduction strategies at venues such as advisory committee meetings and workgroup discussions. Section 4 of the WIP highlights some of the work that was supported through these efforts.

While those efforts have helped to ensure that the Pennsylvania WIP is a document that provides a blueprint for success, it is helpful to demonstrate how the WIP establishes a path for achieving specific nutrient reduction goals through programs, policies and people.

Reasonable Assurance

Reasonable assurance is a concept that EPA employs to help the Agency determine whether they feel assured that the goals of a TMDL will be achieved. Regulatory requirements, program commitments and funding generally provide reasonable assurance that nonpoint source goals will be met, while water quality or water management permitting programs demonstrate reasonable assurance that point source goals will be met.

While the concept of reasonable assurance is addressed throughout the Pennsylvania WIP, the intent of this section is to gather key elements together to help explain how the Pennsylvania plan demonstrates the anticipated achievement of nutrient reduction goals. This section does not cover all elements that are contained throughout the WIP.

Measuring Success

Pennsylvania's progress will be measured at specific intervals, and the Chesapeake Bay Watershed Model will be a key component of this process. The Watershed Model projects nutrient loadings, utilizing input that includes a list of Best Management Practices (BMPs) primarily reported to EPA by Pennsylvania DEP, along with relevant permitting information.

Pennsylvania's Current Progress

As discussed in more detail in Section 5 of the WIP, the most recent "run" of the Watershed Model, often referred to as the 2009 Progress Run, shows that Pennsylvania has not yet achieved its nutrient reduction goals. The next table summarizes the status as indicated by the 2009 Progress Run of the Watershed Model:

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

The following table summarizes key BMP information that was used to help inform the 2009 Progress Run:

	Best Management Practice (BMP)	Unit Reported	2009 Progress Run
1.	Abandoned Mine Reclamation	(acres)	7,150
2.	Animal Waste Management Systems (All Types)	(acres)	4,200
3.	Barnyard Runoff Controls	(AFO acres)	0
4.	Carbon Sequestration/Alternative Crops	(acres)	25,430
5.	Conservation Plans/SCWQP	(acres)	1,280,794
6.	Conservation-Tillage (All Types)	(acres)	670,543
7.	Continuous No-Till	(acres)	27,256
8.	Total Cover Crops (All Types)	(acres)	190,714
9.	Dirt & Gravel Road Erosion & Sediment Control	(feet)	3,223,744
10.	Dry Ponds	(acres)	384,971
11.	Erosion & Sediment Control	(acres)	8,199
12.	Enhanced Nutrient Management	(acres)	3,878
13.	Dry Extended Detention Ponds	(acres)	56,181
14.	Urban Filtering Practices	(acres)	8,200
15.	Forest Buffers	(acres)	39,681
16.	Forest Buffers (Urban)	(acres)	0
17.	Forest Harvesting Practices	(acres)	228
18.	Grass Buffers (Urban)	(acres)	7,250
19.	Horse Pasture Management	(acres)	1
20.	Impervious Surface Reduction	(acres)	48
21.	Urban Infiltration Practices	(acres)	36,726
22.	Land Retirement	(acres)	138,889
23.	Mortality Composting	(Units)	4
24.	Non-Urban Stream Restoration	(feet)	157,918
25.	Nutrient Management	(acres)	1,149,437
26.	Off-Stream Watering w/o Fencing	(acres)	7,653
27.	Pasture Fencing	(acres)	1,748

	Best Management Practice (BMP)	Unit Reported	2009 Progress Run
28.	Precision Agriculture	(acres)	0
29.	Street Sweeping	(acres)	0
30.	Tree Planting	(acres)	43,337
31.	Upland Precision Grazing	(acres)	46,923
32.	Urban Grass Buffers	(acres)	0
33.	Urban Sprawl Reduction	(acres)	0
34.	Urban Nutrient Management	(acres)	0
35.	Urban Tree Planting	(acres)	0
36.	Upland Precision Rotational Grazing	(acres)	29
37.	Urban Stream Restoration	(feet)	2,200
38.	Wetland Restoration	(acres)	3,472
39.	Wet Ponds & Wetlands	(acres)	75,203
40.	Dairy Precision Feeding	(percent)	75
41.	Swine Precision Feeding	(percent)	98
42.	Manure Transport	(tons)	~117,000
43.	Septic System Hook-ups	(units)	44,074

Designing the Blue Print and Projecting Results

The results of the 2009 Progress Run indicate a need to demonstrate an additional reduction of approximately 29.53 million pounds of nitrogen, 1.21 million pounds of phosphorous and 0.23 – 0.33 million tons per year of sediment. Pennsylvania plans to achieve the reductions by building on a foundation of three core elements: Milestone Implementation & Tracking; New Technology & Nutrient Trading; and Enhanced Compliance. The foundation sets the basis for the development of a blue print that combines a variety of approaches that Pennsylvania plans to implement to achieve nutrient reductions:

- Continuing existing programs;
- Initiating and implementing new programs, or increasing the capacity of existing programs;
- Implementing new regulations or laws developed since the 2009 Progress Run; and
- Improving the data that is reported to EPA and included in Watershed Model runs.

In addition to identifying programmatic and regulatory changes, DEP worked extensively with EPA to translate the impacts of those changes into BMPs for use in the Watershed Model. Specific programmatic and regulatory changes are described in the next sub-sections, and are supported with greater details in other sections of the WIP. The next sub-section also lists BMPs that can be utilized in the Watershed Model to quantify anticipated reductions.

It should be noted that WIP Section 6 includes information on the Pennsylvania Nutrient Trading Program and other important programs or strategies that address growth. While not addressed in this section, those programs are an important element of demonstrating reasonable assurance and ensuring gaps are covered.

Initiating and implementing new programs, or increasing the capacity of existing programs

Chapter 102 Erosion and Sediment Control Regulation Changes

Chapter 102, “Erosion and Sediment Control,” is a Pennsylvania regulation that requires persons proposing or conducting earth disturbance activities to develop, implement and maintain BMPs to minimize the potential for accelerated erosion and sedimentation and to manage post construction stormwater. It was revised this past year and became effective on November 19, 2010. Sections 8 and 9 of the WIP describe the changes in detail, which include:

- Incorporation of Phase II Stormwater Discharges;
- Codification of Post-Construction Stormwater (PCSM) requirements;
- Updated agricultural planning and implementation requirements;
- Updated Erosion and Sediment Control requirements; and
- Establishment of riparian buffer and riparian forest buffer provisions.

DEP anticipates that the changes to Chapter 102 will result in either increased implementation of the following BMPs reported to the Watershed Model, or increased activities whose nutrient reductions are best quantified by one of the following BMPs:

- Conservation Plans/SCWQP
- Conservation Tillage
- Cover Crops
- Off-stream watering w/o fencing
- Pasture fencing
- Forest Buffers
- Forest Buffers (Urban)
- Grass Buffers
- Urban Grass Buffers

Point Source Strategy

The Pennsylvania Point Source Strategy was developed in 2006 and implementation began the same year. Implementation of significant changes, such as those occurring as a result of implementing the Strategy, includes a period of time that allows permittees to perform analyses and plan for new permit limits. Resulting permits are now being issued with nutrient limits related to the Strategy. WIP section 7 describes in detail the implementation timelines, such as the timeframe of initial compliance for significant sewage dischargers from years 2010 through 2016.

The resultant point source loadings and reductions are captured in the results from the Final Watershed Model input deck., which is provided in the next sub-section.

Water Quality Initiative

Section 8 of the WIP describes a Chesapeake Bay Agricultural Water Quality Initiative (WQI) which will be reviewed through a public process and implemented through various mechanisms,

including the addition of four new staff positions at DEP to provide regional compliance and inspection actions for Pennsylvania's CAFO, stormwater and agriculture regulatory programs. Section 8 of the WIP describes how increased funding from EPA through the Chesapeake Bay Regulatory and Accountability Program (CBRAP) is helping to support this new initiative. Some outreach elements of the WQI have begun with support from existing staff, and expanded implementation will continue in late 2010 as DEP works with stakeholders on ways to most effectively implement the initiative.

As part of the WIP workgroup discussions, the topic of which Watershed Model BMPs correlate with compliance was discussed, and the following BMPs were identified:

- Animal Waste Management Systems
- Conservation Plans/SCWQP
- Conservation Tillage
- Continuous No-till
- Nutrient Management
- Precision Agriculture

As a result of these efforts, there will either be an increase in the implementation of these types of BMPs (and an increase in the numbers reported to the Watershed Model), or there will be an increase in activities that are not necessarily a Watershed Model BMP, but can be quantified by one of the BMPs listed above.

Continued Leadership at the Local Level

Since the inception of the Chesapeake Bay Program, Pennsylvania and the Chesapeake Bay have benefited from the work of citizens and groups taking leadership roles at the local level to implement activities that lead to nutrient reductions. For example, Section 13 of the WIP describes local initiatives such as those in Lycoming and Lancaster Counties, and Section 8 of the WIP describes locally led efforts in the Conewago Creek. These are only a few examples of the outstanding local efforts that are anticipated to continue well into the future in Pennsylvania.

These local efforts help provide additional demonstration of reasonable assurance of Pennsylvania's WIP achieving the nutrient reduction goals for the Chesapeake Bay. As an example of a local effort that can be translated into implementation of Watershed Model BMPs, the Lancaster County Conservation District approved its 2015 District Strategic Plan which sets a goal to have a Conservation Plan on all farms within the county by 2015.

Further north, Union County Conservation District will initiate a proactive approach by engaging in 400 site visits to address conservation planning, manure management and compliance in the agricultural community. Union County recently submitted a Growing Greener grant application to support this effort. These visits would provide on-farm education and assistance to meet baseline compliance and lead to additional written plans and installed BMPs. This effort of 400 farms would address about 80 percent of the farms in Union County.

Natural Resources Conservation Service (NRCS) Funding and the Presidential Executive Order

In support of President Obama's Chesapeake Bay Executive Order 13508, NRCS has established a goal of 4 million new acres of BMPs in the Chesapeake Bay Watershed by 2025.

NRCS support is expected to help increase implementation of the following types of BMPs:

- Animal Waste Management Systems
- Conservation Tillage
- Continuous No-till
- Wetland Restoration
- Wet Ponds & Wetlands
- Dairy Precision Feeding
- Upland Precision Grazing
- Upland Precision Rotational Grazing

In addition to supporting the Presidential Executive Order, NRCS works closely with DEP to determine ways to partner and leverage resources. Section 8 of the WIP includes additional information on NRCS funding and the Partnership Agreement of 1999 that contribute to elements of reasonable assurance of meeting the WIP goals. Section 8 also describes other Executive Order 13508 goals, such as restoring 181,440 miles of riparian forest buffers.

Manure Management Manual Revisions

Section 8 of the WIP describes the Commonwealth's Manure Management Manual and how it relates to implementation of BMPs that help protect water quality. Section 8 also describes proposed revisions and implementation of the manual that will help support the goals of the WIP. For example, Section 8 describes proposed changes regarding the winter application of manure.

It is anticipated that these activities will help support increased implementation of these types of BMPs:

- Animal Waste Management Systems
- Cover crops
- Barnyard Runoff Controls

"Million Pound Initiative"

In 2010, DEP undertook a new initiative with a goal of achieving one million pounds of nutrient reductions annually by changing the approach taken to Commonwealth programs that fund BMPs. For example, the Growing Greener program has been now been revised to include Chesapeake Bay Nutrient Reduction goals as a Special Watershed Consideration. This means that DEP has established as one of its priorities the funding of projects leading to quantitative nutrient reductions. There are a number of BMPs that will be increased as a result of the Million Pound Initiative, including:

- Animal Waste Management Systems
- Cover crops
- Forest Buffers
- Urban Forest Buffers
- Grass Buffers
- Urban Grass Buffers
- Non-Urban Stream Restoration
- Urban Stream Restoration
- Pasture Fencing
- Upland Precision Rotational Grazing
- Wetland Restoration

In addition to Growing Greener, other programs with Commonwealth funding, or with federal funding administered by the Commonwealth, will be utilized to support the Million Pound Initiative, including the Section 319 program and PENNVEST. As further described in WIP Section 8, PENNVEST actively funds Green Initiatives that promote and encourage environmental responsibility in PA 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.

On November 9, 2010 PENNVEST approved grants and loans in the amount of \$173,842,828. A significant portion of this went to 7 non-point source projects, which received grants and loans of \$33,959,046. This was 19.5 percent of the total PENNVEST awards for this meeting. Two large agriculture projects also received loans of about \$21 million, but were not considered non-point source projects because of their connections to NPDES-permitted CAFO facilities. These two point source agriculture projects are the EnergyWorks project in Adams County and the Blair County Regional Digester (BCRD, formerly CARD) project. Two Conservation Districts received grants in the amount of \$1,242,437 for agricultural BMPs. The Chester County Conservation District received a grant to construct facilities that will contain and compost animal waste from agricultural operations. These facilities will reduce nutrient contamination of the local streams and the Chesapeake Bay by controlling storm water runoff from these agricultural operations. The Lancaster County Conservation District received a grant to replace an undersized manure storage facility with a larger structure that will allow an agricultural operation to employ improved manure management practices and reduce nutrient runoff into local streams and the Chesapeake Bay.

Urban Tree Canopy

The Department of Conservation and Natural Resources (DCNR) implements an Urban Tree Canopy project that supports several important objectives and can help communities with MS4 permits. For example, DCNR's Bureau of Forestry utilizes funds provided through the USDA Forest Service to hire a Chesapeake Bay Forester to work with communities that agree to set and

reach goals for protecting and increasing canopy cover. Funding is projected to continue and be available to support new tree plantings in urban areas. Implementing the program can result in a 9.4 percent reduction in nutrient loads for communities. Funding for urban tree planting efforts, through the state Treevitalize initiative and other programs, is projected to continue and be available to support new tree plantings in urban areas.

In the Final Watershed Model input deck., DEP projected an increase in the implementation of the Urban Tree Planting BMP as a result of this initiative.

New Technologies

Section 8 of the WIP describes Pennsylvania's new technology initiative which has the potential to significantly reduce nutrient loadings to the Chesapeake Bay and close gaps in reaching nutrient reduction goals. DEP is working with the Pennsylvania Department of Agriculture and a number of companies to install various technologies such as methane digesters and electrical co-generation on dairy, poultry and hog operations. Pennsylvania is looking more closely at technologies that include a process element that helps ensure overall nutrient reductions. Examples of nutrient processing technology include: denitrification; solids separation; flocculation, combustion, etc.

Pennsylvania is committed to implementing these new technologies as a means to address excess manure within the Bay watershed. DEP worked with EPA staff to develop a placeholder BMP and methodology for recognizing this program through the manure transport BMP in the Final Watershed Model input deck. While implementing manure-to-energy and other new technologies is a key element of Pennsylvania's WIP, DEP and EPA have come to recognize the nutrient reduction capability of these technologies is not adequately reflected in Chesapeake Bay watershed model results. It has cooperatively been agreed to that over the next twelve months, DEP will work with EPA to create a BMP efficiency that will better account for the potential reductions. DEP also agrees to verify the reductions with EPA over the two-year milestone periods to assure the anticipated reductions are occurring. If it is found that the technology projects are not providing the anticipated reductions, DEP agrees to work with EPA to assess where additional nonpoint source reductions may be generated.

Section 8. Agriculture discusses technologies in more detail, including a call by Pennsylvania for the establishment of a Technology Fund.

Implementing new regulations or laws developed since the 2009 Progress Run

Air Quality

EPA's draft TMDL estimated that air deposition contributes approximately 25 to 28 percent of the total nitrogen loadings to the Chesapeake Bay. 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.

Section 13 of the WIP includes a discussion of the Diesel-Powered Motor Vehicle Idling Act (Act 124 of 2008), which will reduce unnecessary idling of the main propulsion engine in diesel-powered motor vehicles, including trucks and buses, and became effective on Feb. 6, 2009. DEP staff worked with EPA to develop a placeholder BMP for the Watershed Model to help recognize the reductions associated with Act 124.

Pennsylvania also submitted information to establish placeholder BMPs for recent state regulations for nitrogen oxide (NOx) controls on Cement Kilns and Glass Melting Furnaces and anticipated reductions from Renewable Energy/Energy Efficiency (RE/EE) and Demand Reduction in the electric generating sector. EPA was unable to complete review of the placeholder BMPs prior to the submission of Pennsylvania's final watershed model input deck, so they are included in this section on Reasonable Assurance. These regulations are providing real NOx reductions. DEP has set a goal of working with EPA and its Watershed Model experts to quantify an estimate of these programs in early 2011. On a qualitative basis, when compared to the overall nutrient numbers associated with the Watershed Model, these programs likely contribute a relatively small (but still very important) number of reductions.

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 NOx Emissions from Glass Melting Furnaces, Sections 129.301-129.310
<http://www.pacode.com/secure/data/025/chapter129/chap129toc.html>

Total glass melting furnace NOx 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 NOx emissions during 2005 were approximately 9,814 tons. This final-form rulemaking is estimated to reduce NOx emissions from glass melting furnaces by approximately 2500 tons or 25 percent 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 NOx from Cement Manufacturing, Sections 145.141-145.146
<http://www.pacode.com/secure/data/025/chapter145/subchapCtoc.html>

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

Renewable Energy/Energy Efficiency (RE/EE) and Demand Reduction: Energy Information Administration (EIA) data indicate the possible reductions from 2008 to 2009 as follows:

Average emissions reductions of 1.8 Lbs. NOx 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.

Phosphorus Ban

The Pennsylvania Phosphate Reduction Act was enacted in 2008. It mandates that dishwashing detergent sold in Pennsylvania contains virtually no phosphate by July 1, 2010. This important law will reduce phosphorus loadings to wastewater treatment plants (WWTPs). The effect of this legislation is that it will reduce the WWTP costs to meet their phosphorus permit cap loads.

Improving the data that is reported to EPA and included in Watershed Model runs.

Un-reported and Under-reported BMPs

During the workgroup discussions that helped in the development of the WIP, it became apparent that there were agricultural and urban BMPs on the ground not being reported by DEP for use in EPA's Watershed Model. This was confirmed by pilot studies conducted in Lancaster and Bradford Counties, which are more fully described in WIP Appendices 2 and 3.

DEP has begun implementing an initiative that will capture un-reported and under-reported BMPs. The effort, more fully described in Section 8, will be modeled upon the Lancaster and Bradford pilots and in addition to agricultural and rural BMPs, will also include urban BMPs. Although accounting for un-reported and under-reported BMPs does not directly result in new nutrient reductions, it is absolutely critical to better understand the real-world status of watershed BMPs in order to effectively plan for the future utilization of resources. Having a complete inventory of implemented BMPs will also play a role in designing community outreach and education efforts.

Due to the various factors that can impact the Watershed Model, DEP has worked with EPA to develop conservative projections of the anticipated number of increased BMPs that will be reported to the Watershed Model as a result of this initiative.

It is anticipated that this initiative will partially contribute to increased reporting of the following types of BMPs:

- Animal Waste Management Systems
- Conservation Tillage
- Continuous No-till
- Cover crops
- Forest Buffers
- Urban Forest Buffers
- Grass Buffers
- Urban Grass Buffers
- Non-Urban Stream Restoration
- Urban Stream Restoration
- Pasture Fencing
- Upland Precision Rotational Grazing
- Wetland Restoration

Projecting Reductions Through the Watershed Model

Identifying programmatic changes and regulatory changes that result in nutrient reductions were the first two important steps in the approach to help demonstrate reasonable assurance. The third step required employing the Watershed Model to help better determine the projected numerical reductions the model would show for the anticipated results of employing Pennsylvania’s WIP.

To achieve the third step, Pennsylvania developed its Final Watershed Model input deck. As with previous Watershed Model input decks, it included a list of projected BMPs, but this final list was developed employing additional critical information such as:

- Analysis of programs and translation of the associated nutrient reduction activities into BMP units for the Watershed Model;
- Input from the Advisory Committees and workgroups mentioned in WIP Section 4;
- Assistance from EPA-supported contractors; and
- Professional best judgment of sector area professionals.

For the Final Watershed Model input deck., the Pennsylvania Point Source Strategy was also included. The following table summarizes the results of the Final Watershed Model input deck: NOTE: Blank entries in table serve as a placeholder until Final Watershed Input Deck is complete.

Pennsylvania Final Watershed Model Input Deck. Nutrient and Sediment Loads Delivered to Chesapeake Bay Source: EPA Phase 5.3 Watershed Model			
Sector	Nitrogen (lbs/yr)	Phosphorus (lbs/yr)	Sediment (tons/yr)
Agriculture			

Forest			
Point Source			
Urban/Developed			
Septic			
Air Deposition to Water			
Totals			

For reference, the following table summarizes the changes between the 2009 Progress Run Input and the Final Watershed Model input deck:

NOTE: Blank entries in table serve as a placeholder until Final Watershed Input Deck is complete.

	Best Management Practice (BMP)	Unit Reported	2009 Progress Run	Final Watershed Model Input Deck (Projected through 2025)
1.	Abandoned Mine Reclamation	(acres)	7,150	
2.	Animal Waste Management Systems (All Types)	(acres)	4,200	
3.	Barnyard Runoff Controls	(AFO acres)	0	
4.	Carbon Sequestration/Alternative Crops	(acres)	25,430	
5.	Conservation Plans/SCWQP	(acres)	1,280,794	
6.	Conservation-Tillage (All Types)	(acres)	670,543	
7.	Continuous No-Till	(acres)	27,256	
8.	Total Cover Crops (All Types)	(acres)	190,714	
9.	Dirt & Gravel Road Erosion & Sediment Control	(feet)	3,223,744	
10.	Dry Ponds	(acres)	384,971	
11.	Erosion & Sediment Control	(acres)	8,199	
12.	Enhanced Nutrient Management	(acres)	3,878	
13.	Dry Extended Detention Ponds	(acres)	56,181	
14.	Urban Filtering Practices	(acres)	8,200	
15.	Forest Buffers	(acres)	39,681	
16.	Forest Buffers (Urban)	(acres)	0	
17.	Forest Harvesting Practices	(acres)	228	
18.	Grass Buffers (Urban)	(acres)	7,250	
19.	Horse Pasture Management	(acres)	1	
20.	Impervious Surface Reduction	(acres)	48	
21.	Urban Infiltration Practices	(acres)	36,726	
22.	Land Retirement	(acres)	138,889	
23.	Mortality Composting	(Units)	4	
24.	Non-Urban Stream Restoration	(feet)	157,918	
25.	Nutrient Management	(acres)	1,149,43	

			7
26.	Off-Stream Watering w/o Fencing	(acres)	7,653
27.	Pasture Fencing	(acres)	1,748
28.	Precision Agriculture	(acres)	0
29.	Street Sweeping	(acres)	0
30.	Tree Planting	(acres)	43,337
31.	Upland Precision Grazing	(acres)	46,923
32.	Urban Grass Buffers	(acres)	0
33.	Urban Sprawl Reduction	(acres)	0
34.	Urban Nutrient Management	(acres)	0
35.	Urban Tree Planting	(acres)	0
36.	Upland Precision Rotational Grazing	(acres)	29
37.	Urban Stream Restoration	(feet)	2,200
38.	Wetland Restoration	(acres)	3,472
39.	Wet Ponds & Wetlands	(acres)	75,203
40.	Dairy Precision Feeding	(percent)	75
41.	Swine Precision Feeding	(percent)	98
42.	Manure Transport	(tons)	~117,000
43.	Septic System Hook-ups	(units)	44,074
44.	Manure Injection	(acres)	0

(Placeholder for additional potential clarifying language.)

Additional Information

The following table contains abbreviated information that provides a quick reference and summary of the elements of reasonable assurance that were applied to develop the list of NPS BMPs for the Final Watershed Model input deck.

	Best Management Practice (BMP)	Elements of Reasonable Assurance
1.	Abandoned Mine Reclamation	<ul style="list-style-type: none"> Based on projections of existing implementation rates
2.	Animal Waste Management Systems (All Types)	<ul style="list-style-type: none"> Water Quality Initiative (one of six Watershed Model BMPs correlated with this initiative as a possible compliance option or possibly demonstrative of compliance) <i>Manure Management Manual</i> (This is a Watershed Model BMP that correlates to manure handling procedures outlined in manual) Unreported BMP Initiative: Bradford/Lancaster pilot projects Chesapeake Bay Implementation Grant (CBIG) funding NRCS EQIP, Chesapeake Bay Watershed Initiative (CBWI) Funding Section 319 funding Resource Enhancement and Protection (REAP) program PENNVEST Green Initiative (Section 8 of WIP)
3.	Barnyard Runoff Controls	<ul style="list-style-type: none"> Water Quality Initiative CBIG funding NRCS EQIP, CBWI Funding Section 319 funding

	Best Management Practice (BMP)	Elements of Reasonable Assurance
		<ul style="list-style-type: none"> • REAP Program • PENNVEST Green Initiative (Section 8 of WIP) • <i>Manure Management Manual</i> (MMM)
4.	Carbon Sequestration/Alternative Crops	<ul style="list-style-type: none"> • Conservation Reserve Enhancement Program (CREP) funding • Need to improve reporting
5.	Conservation Plans/SCWQP	<ul style="list-style-type: none"> • Chapter 102 requirements for maintaining recommended NRCS "T" values for soil loss over crop rotations • Water Quality Initiative • Section 319 funding • Local leadership: Lancaster Conservation District goal to have a Conservation Plan on all farms within the county by 2015 • REAP • All USDA programs (CREP, etc) require the landowner to have an approved conservation plan. Many NRCS financial assistance programs help implement conservation plans. EQIP (CBWI) also provides funding for development of conservation activity plans (CAP) for nutrient management plans and comprehensive nutrient management plans. • USDA/NRCS/FSA Support, including Technical Services Provider (TSP) Support
6.	Conservation-Tillage (All Types)	<ul style="list-style-type: none"> • Water Quality Initiative • Unreported BMP Initiative: Bradford/Lancaster pilot projects and Capital RC&D Transect analysis • Review of NASS data • CBIG Funding: Average of 1,500 acres per year • NRCS EQIP, CBWI Funding • Section 319 funding
7.	Continuous No-Till	<ul style="list-style-type: none"> • Unreported BMP Initiative: Bradford/Lancaster pilot projects and Capital RC&D Transect analysis • Park the Plow • CBIG Funding • NRCS EQIP, CBWI Funding • Section 319 funding • Part of the Core 4 that is being emphasized • Water Quality Initiative • REAP program • Working with Watershed Model to better understand reporting requirements (not all acres reported/projected may have been credited)
8.	Total Cover Crops (All Types)	<ul style="list-style-type: none"> • Recommendations from agricultural workgroup and agency professionals • "Cover Crops" is a watershed model BMP that can be used to project Chapter 102 requirements for increased crop residue within 100 feet of a stream or waterway • Unreported BMP Initiative: Bradford County shows 74 percent not cost-shared • Part of Core 4 • As part of MMM, winter spreading of manure would require a certain percent of cover • NRCS EQIP, CBWI Funding • Growing Greener Funding (average 1,600 acres per year) • CBIG Funding: Average 2,100 acres per year • Section 319 funding • REAP program • Park the Plow program goal of incorporating cover crops into continuous no-till systems
9.	Dirt & Gravel Road Erosion & Sediment Control	<ul style="list-style-type: none"> • Projections based on existing implementation rates • Funding: Section 9106 of Pennsylvania Motor Code

	Best Management Practice (BMP)	Elements of Reasonable Assurance
10.	Dry Ponds	<ul style="list-style-type: none"> • Projections based on compliance, which requires no net change; each project plan is reviewed • Chapter 102 changes: licensed professional certifies BMPs installed; obligations for long-term operation of BMPs; PCSW changes • Increased reporting anticipated as Chapter 102 implementation discussion begins • Projections decreased with units moved to urban filtering practices • Working with Watershed Model to better understand how many stormwater BMPs per acre can be reported to best reflect real-world conditions
11.	Erosion & Sediment Control	<ul style="list-style-type: none"> • Projections based on compliance, which requires no net change; each project plan is reviewed • Chapter 102 changes: licensed professional certifies BMPs installed; obligations for long-term operation of BMPs; PCSW changes • Increased numbers reflect Pennsylvania's efforts to now report E & S controls on active mining acres (approximately 139,000 acres)
12.	Enhanced Nutrient Management	<ul style="list-style-type: none"> • MMM changes will include the development of Nutrient Balance Sheet (NBS) • Water Quality Initiative • Water Quality Initiative includes Chesapeake Bay Technician outreach, so its impact is broader than the new DEP CBRAP positions • Economics: Over-application of commercial fertilizer is minimized because of the cost of the fertilizer; more simply put, over-applying is costly and doesn't make sense • NRCS EQIP, CBWI Funding • Growing Greener Funding • CBIG Funding • Section 319 funding • REAP program • Requirement of most (if not all) financial assistance programs
13.	Dry Extended Detention Ponds	<ul style="list-style-type: none"> • Projections based on compliance, which requires no net change; each project plan is reviewed • Chapter 102 changes: licensed professional certifies BMPs installed; obligations for long-term operation of BMPs; PCSW changes • Projections decreased with units moved to urban filtering practices • Increased reporting anticipated as Chapter 102 implementation discussion begins • Working with Watershed Model to better understand how many stormwater BMPs per acre can be reported to best reflect real-world conditions
14.	Urban Filtering Practices	<ul style="list-style-type: none"> • Projections based on compliance, which requires no net change; each project plan is reviewed • Chapter 102 changes: licensed professional certifies BMPs installed; obligations for long-term operation of BMPs; PCSW changes • Projections increased with units moved from ponds to here • Increased reporting anticipated as Chapter 102 implementation discussion begins • Working with Watershed Model to better understand how many stormwater BMPs per acre can be reported to best reflect real-world conditions
15.	Forest Buffers	<ul style="list-style-type: none"> • CREP funding • Growing Greener funding (average of 37,000 feet of riparian buffers last four years) • Section 319 funding • Fencing programs, 51% not cost-shared in Bradford

	Best Management Practice (BMP)	Elements of Reasonable Assurance
		<p>pilot. Although setback may not meet entire buffer BMP specification, can make an assumption as excluded area</p> <ul style="list-style-type: none"> • Unreported BMP Initiative: Bradford/Lancaster pilot projects • NRCS EQIP, CBWI Funding • CBIG Funding • Pennsylvania Fish and Boat Habitat Projects • Executive Order 13508 goal of 181,440 miles of overall <u>riparian forest buffers</u>
16.	Forest Buffers (Urban)	<ul style="list-style-type: none"> • Chapter 102 has new requirements for riparian buffers adjacent to EV/HQ waters (not meeting use) • Growing Greener funding (average of 37,000 feet per year of overall <u>riparian buffers</u> last four years) • TreeVitalize Streams Program • Unreported BMP Initiative: Bradford/Lancaster pilot projects • Increased reporting anticipated as Chapter 102 implementation discussion begins • Pennsylvania Fish and Boat Habitat Projects • Executive Order 13508 goal of 181,440 miles of overall <u>riparian forest buffers</u>
17.	Forest Harvesting Practices	<ul style="list-style-type: none"> • Includes program numbers for lands managed by Pennsylvania DCONR and Game Commission • Work with United States Forest Service to review additional potential acres to be reported • Workgroup discussions indicate significant numbers of private lands have these practices • These projections may be significantly underestimated, based on workgroup discussions • Need to improve reporting
18.	Grass Buffers (Urban)	<ul style="list-style-type: none"> • CREP funding • Stream bank fencing correlates to this Watershed Model BMP • Unreported BMP Initiative: Bradford/Lancaster pilot projects • Growing Greener funding (average of 21,000 feet per year of stream bank fencing last four years) • Increased reporting anticipated as Chapter 102 implementation discussion begins • NRCS EQIP, CBWI Funding • CBIG Funding • REAP Program • Section 319 Funding
19.	Horse Pasture Management	<ul style="list-style-type: none"> • Chapter 102 has new requirements • <i>Manure Management Manual</i> • Need for improved reporting • NRCS EQIP, CBWI Funding • CBIG Funding • REAP Program • Section 319 Funding • Governor-elect Corbett's plans to develop an Equine Commission
20.	Impervious Surface Reduction	<ul style="list-style-type: none"> • Increased reporting anticipated as Chapter 102 implementation discussion begins
21.	Urban Infiltration Practices	<ul style="list-style-type: none"> • Projections based on compliance, which requires no net change; each project plan is reviewed • Chapter 102 changes: licensed professional certifies BMPs installed; obligations for long-term operation of BMPs; PCSW changes • Increased reporting anticipated as Chapter 102 implementation discussion begins • Working with Watershed Model to better understand how many stormwater BMPs per acre can be reported to best reflect real-world conditions

	Best Management Practice (BMP)	Elements of Reasonable Assurance
22.	Land Retirement	<ul style="list-style-type: none"> Based on projections of existing implementation rates Wildlife plantings
23.	Mortality Composting	<ul style="list-style-type: none"> Historical data Consider efforts to improve reporting NRCS EQIP, CBWI Funding CBIG Funding REAP Program Section 319 Funding
24.	Non-Urban Stream Restoration	<ul style="list-style-type: none"> Growing Greener funding (avg 28,000 feet per year of overall <u>stream restoration</u>) Projections from Bradford/Lancaster pilot projects
25.	Nutrient Management	<ul style="list-style-type: none"> Reported to the Watershed Model as either precision agriculture or enhanced nutrient management Reporting could be impacted by anticipated changes to the Watershed Model
26.	Off-Stream Watering w/o Fencing	<ul style="list-style-type: none"> Chapter 102 requirements regarding control of erosion in riparian pasture [75 % of model's "Trampled Stream" to be addressed] Promotion of Core 4 Review of Bradford/Lancaster pilot projects NRCS EQIP, CBWI Funding CBIG Funding REAP Program Section 319 Funding
27.	Pasture Fencing	<ul style="list-style-type: none"> Chapter 102 requirements regarding control of erosion in riparian pasture CBIG Funding: Average of 57,000 feet per year Growing Greener: Average of 21,000 feet per year NRCS EQIP, CBWI Funding REAP Program Section 319 Funding
28.	Precision Agriculture	<ul style="list-style-type: none"> NBS requirements by MMM update Water Quality Initiative Water Quality Initiative includes Chesapeake Bay Technician outreach, so its impact is broader than the new DEP positions Economics: Over-application of commercial fertilizer is minimized because of the cost of the fertilizer; more simply put, over-applying is costly and doesn't make sense NRCS EQIP, CBWI Funding CBIG Funding REAP Program Section 319 Funding
29.	Street Sweeping	<ul style="list-style-type: none"> Projections from Bradford/Lancaster pilot projects
30.	Tree Planting	<ul style="list-style-type: none"> Projections based on existing implementation rates
31.	Upland Precision Grazing	<ul style="list-style-type: none"> Projections from Bradford/Lancaster pilot projects Un-reported BMP Initiative CBIG Funding: Average of 80 acres per year REAP Section 319 Funding NRCS EQIP, CBWI Funding NRCS Agricultural Management Assistance (AMA) Funding PA Project Grass
32.	Urban Grass Buffers	<ul style="list-style-type: none"> Projections based on compliance, which requires no net change; each project plan is reviewed Chapter 102 changes: licensed professional certifies BMPs installed; obligations for long-term operation of BMPs; PCSW changes Chapter 102 has new requirements for riparian buffers adjacent to EV/HQ waters (meeting use) Increased reporting anticipated as Chapter 102

	Best Management Practice (BMP)	Elements of Reasonable Assurance
		implementation discussion begins
33.	Urban Sprawl Reduction	<ul style="list-style-type: none"> • Projections from prior Tributary Strategy • Need for improved reporting
34.	Urban Nutrient Management	<ul style="list-style-type: none"> • Golf course information • Goal: Establish a UNM program through open public discussion, discussed in WIP
35.	Urban Tree Planting	<ul style="list-style-type: none"> • DCNR TreeVitalize Program provides funding • Detailed DCNR analysis employed to help make projections • TreeVitalize Streams Program
36.	Upland Precision Rotational Grazing	<ul style="list-style-type: none"> • Projections from Bradford/Lancaster pilot projects • Un-reported BMP Initiative • CBIG Funding: Average of 80 acres per year • REAP • Section 319 Funding • NRCS EQIP, CBWI Funding • NRCS Agricultural Management Assistance (AMA) Funding
37.	Urban Stream Restoration	<ul style="list-style-type: none"> • Growing Greener funding (average of 28,000 feet per year of overall <u>stream restoration</u> last four years)
38.	Wetland Restoration	<ul style="list-style-type: none"> • Growing Greener funding (average of 16 acres per year) • NRCS funding (Executive Order 13508 goal of 30,000 acres of non-tidal wetlands) • FSA Practice ("Bottom Lands") • Past implementation rates
39.	Wet Ponds & Wetlands	<ul style="list-style-type: none"> • Projections lowered due to change in number of available applicable acres in watershed model • NRCS funding (WHP goal of 30,000 acres of non-tidal wetlands)
40.	Dairy Precision Feeding	<ul style="list-style-type: none"> • NRCS Pilot Outreach Program • Reduced from prior reported number based on workgroup discussions
41.	Swine Precision Feeding	<ul style="list-style-type: none"> • Workgroup discussions • Review of data
42.	Manure Transport	<ul style="list-style-type: none"> • Analysis of manure transport conducted by state agency staff • Placeholder BMP for manure technologies • Technology Fund • This number is likely to be under-estimated

Section 15.

Pennsylvania's Unfinished Business

Given the tight timeframes that were required to develop and submit the final WIP, DEP recognizes that there are many other activities that could have been included as future priorities but were not. Many of the priorities came from discussions with workgroups and from public comments. The adaptive management approach that is provided through each phase of the EPA TMDL process and WIP implementation allows jurisdictions to advance new and innovative priorities over time. The following are examples of such priorities that PA may seek to advance in the future, or are currently underway but require priority attention to bring them to fruition.

Additional New Technologies

DEP anticipates that there will be significantly more new technologies that will advance further nutrient reductions. This is supported in part by information received during the public comment period on technologies beyond manure processing, such as algae-processing techniques and AMD technologies that create energy.

DEP has called for a public/private partnership to support a Technology Development Fund. DEP has proposed an annual \$100 million fund to support large-scale technology projects throughout the Chesapeake watershed, with 50 percent of the fund being contributed by the states and 50 percent from the federal government. DEP has made a commitment of \$15 million, anticipating at least one project per year in Pennsylvania. A fund of this magnitude could install potentially four to eight projects with close to a million pounds of nitrogen reduced per project.

DEP convened a meeting of stakeholders on October 27, 2010 to gauge the interest for Fund development. DEP will continue the discussion and development of such a fund and will focus on key follow-up outcomes from the first meeting, including discussion on guarantee loans and their use in the bond market; and discussion on new financing opportunities.

Legacy Sediment

DEP intends to continue to pursue technical and programmatic support for projects that deal with legacy sediment. This initiative has the potential to significantly reduce nutrient and sediment loadings to the Chesapeake Bay and to reconnect streams with their natural floodplain.

As an example of what one project can contribute, an analysis of a restoration project completed in Lancaster County in 2004 was performed. The floodplain restoration project was completed by Pennsylvania Environmental Council, Lititz Borough and Pfizer Pharmaceuticals and is often referred to as the "New Street Park Project". The purpose was to remove the excessively high stream banks and terraced area to establish a well developed floodplain that is attached to a meandering channel. Approximately 200 feet of stream channel was added to create a meandering 950 foot stream reach. The floodplain also added vegetative growth and numerous pockets of wetland areas.

In “An evaluation of the pollution reduction benefits of the Santo Domingo Floodplain restoration project in Lancaster County” in December 2004, work was done to estimate average annual reductions in nutrient and sediment loads that might be realized as a result of a floodplain restoration project undertaken in the Santo Domingo Floodplain. The evaluation developed estimates of average annual loads produced by the stream bank erosion pre and post restoration and evaluated the filtration benefits derived from the restored floodplain. The estimation from the evaluation was that 1722 lbs of nitrogen, 173 lbs of phosphorous, and 143 tons of sediment were reduced annually.

A gap exists in allowing for the quantification of these types of projects in the Watershed Model. As a first step, in 2010 a best management practice definition was approved for “Natural Floodplain, Stream and Riparian Wetland Restoration” that addresses aquatic resources impaired by legacy sediments. The next step is to formalize quantification. Research is underway at Big Springs Run Basin in Lancaster County to establish nitrogen, phosphorus and sediment efficiencies for the BMP and site design components. This BMP quantification will provide additional reasonable assurance to the commonwealth for greater reductions.

Low Emission Vehicle Requirement

Pennsylvania has adopted the California low emission vehicle requirements. The requirements were published Dec. 9, 2006, in 25 Pa Code Chapter 126 Subchapter D , “Pennsylvania Clean Vehicles Program”. As stated in the final form rulemaking: “By 2025, when full fleet turnover is expected, the California LEV II program will provide an additional reduction of 2,850 to 6,170 tons per year of VOCs, 3,540 tons per year reduction of NOx and 5 percent to 11 percent more reduction of six toxic air pollutants, including a 7 percent to 15 percent additional benefit for benzene, a known carcinogen.” The rule became applicable to Model Year 2008 and newer vehicles, where Model Year 2008 could start as early as Jan. 2, 2007.

This type of program has the potential to provide comparatively small (but still important) reductions. Additional analytical work could be done with this initiative to determine its potential contribution of nitrogen reductions.

Legislative Efforts

There are other initiatives that the Commonwealth plans to explore that provide potential for additional reasonable assurance. Of primary importance is the potential for new legislative efforts. Pennsylvania’s Chesapeake Bay Commission (CBC) members continue to provide outstanding leadership for Chesapeake Bay-related efforts. DEP is committed to continuing to work closely through an open dialogue with CBC representatives and all members of the General Assembly on Chesapeake Bay efforts and identifying areas where legislative initiatives may be helpful.

The Pennsylvania delegation of the Chesapeake Bay Commission recently met on October 28, 2010. Their agenda is an excellent example of some of the forward-thinking discussions that are underway in Pennsylvania. Agenda topics included:

- Urban Nutrient Management
- Stormwater Authorities
- Act 167 PA Stormwater Management Act Funding
- Increased technical and cost-share assistance for agriculture
- Dedicated funding source for conservation and preservation initiatives

A more thorough discussion of the legislative proposals is included in Appendix 4.

CHESAPEAKE BAY COMMISSION - *Policy for the Bay: An Introduction to Pennsylvania's Implementation of the Chesapeake Bay TMDL*, October 28, 2010.

Additional Initiatives Under Consideration

- Promote reductions from renewable energy type projects that may reduce deposition deposited on land within PA.
- Collaborate with the EPA Chesapeake Bay Program to revise the model to account for advancements on the ground and enhancements based on new research. An example could include identifying and receiving approval for new Best Management Practices (i.e. Manure Composting, Double Cover Crop Plantings) and account for the influence of groundwater nitrogen. DEP and DCNR also intend to collaborate with the Forestry workgroup to ensure the watershed model more accurately reflects loading rates of forestland and provides credit for BMPs on non-harvested forestlands.
- Advance quantification research by working with key stakeholders that is necessary for nutrient reductions from projects such as Acid Mine Drainage (AMD) restoration and AMD treatment systems.
- Support projects that identify land and water use connections for the development of new alternatives that integrate water resource planning methods (water resource, green infrastructure, flood protection, recreation and conservation, etc).
- Develop and execute a Memorandum of Understanding for state agencies to report projects that are funded through other programs. An example could include that PENNDOT report applicable practices (dirt and gravel road improvements, buffers, drainage, etc) included in Metropolitan Planning Organization Transportation Improvement Plans.
- Collaborate with other Bay jurisdictions, land grant universities and stakeholders to advance “in the water” activities (i.e. stocking of native mussels, floating islands, etc.) that may have the ability to create further nutrient reductions and water quality improvements once water has already reached the stream.
- Analyze the ability to use the EPA approved management practice related to reducing urban sprawl. This will include obtaining a definition and clarity on what practices are appropriate for urban sprawl reduction. This practice, depending on how it is defined, may support development of additional defined growth areas, conservation overlays and agricultural preservation zones.
- Evaluate innovative and science-based approaches to address and fund stormwater retrofits and impervious surface reductions in existing urban and suburban areas, and advance sediment reductions through stream and floodplain restoration. Two related recommendations provided during the comment period included: establish a law that creates a state incentive program to facilitate the redevelopment and reduction of impervious

surfaces in existing urban corridors, and tax greenfield disturbances to encourage redevelopment, discourage sprawl, and pay for stormwater retrofits.

- Continue to work with EPA and the Bay jurisdictions on the proper development and implementation of National Environmental Information Exchange Network (NEIEN) - Chesapeake Bay Program Regional Exchange for BMPs and the BayTMDL Accounting and Tracking System (Bay-TAS). The development of BayTAS is required by Executive Order 13508 “Strategy for Protecting and Restoring the Chesapeake Bay Watershed” and is also an obligation under the May 12th, 2010 Settlement Agreement (Settlement Agreement) between Chesapeake Bay Foundation (CBF) and USEPA. According to the terms of the Settlement Agreement, EPA has to begin implementing a tracking and accounting system to provide EPA, the Bay Watershed Jurisdictions, and the public with information about load and wasteload allocations established in the Chesapeake Bay TMDL and the load caps. The NEIEN data exchange allows Chesapeake Bay states to submit and solicit data on Non-Point Source Best Management Practices to and from the U.S. EPA Chesapeake Bay Program Office (CBPO).
- Continue to work with EPA, NASS, NACD and others to develop an appropriate and comprehensive methodology to track voluntary BMPs.
- As appropriate, involve individuals who can speak from the perspective of County governments, Conservation Districts, crop and livestock consultants, third-party service providers and local watershed groups in the development of the Phase II WIP so that local expertise and knowledge can advance the county targets. This discussion may include the identification of priority areas, projects, available on-the-ground assistance, new ideas on how to use existing funding in innovative ways, and help carrying through on new ideas to create a connection between the Bay TMDL and local priorities.
- Evaluate and advance options to overcome the need for greater education, outreach and implementation assistance for municipal and farming groups. Part of this may include strengthen the private sector’s role in providing planning and design services to producers and availability of resources (forms, manuals etc).
- Determine and implement measures ensure all cooperating agencies and organizations are working on goals that are consistent with the WIP. This may include the identification of priority funding areas and prerequisites for funding (baseline compliance, implemented ordinances etc).
- Collaborate with industry leaders such as PennAg Industries to advance the reporting and use of practices such as Phytase feeding in Swine, Mortality Composting, and Horse Pasture Management. For example, between the PennAg membership of swine growers and poultry growers, and the Pa Pork Producers Council, an accurate count of composters installed since 2007 could be collected and verified. And through a recently formed Horse Council, PennAg would be able to help with the Horse Pasture Management section in terms of what is done for pasture management, acres of pasture land, etc. The data would be obtained from actual horse owners and not just based on estimates.
- Support requests to the legislature to make available additional funding for counties within the Chesapeake Bay watershed to demonstrate the benefits of nonpoint source improvements and promote awareness of stormwater retrofits. This may include funding to restore and grow the REAP tax credit program and to rebuild conservation district capacity, agricultural BMP implementation, and stormwater planning and BMP implementation. Specifically related to stormwater planning and BMP implementation, funding could be used for planning that

considers build out in greenfield development and retrofit potential in concert with water quality based control requirements; regional stormwater management planning, including design of regional facilities that can be used in conjunction with decentralized BMPs to manage for peak rate, volume and water quality; or for pilot projects that implement regional stormwater plans and address load reductions from existing development.

- Consider asking the Forest Legacy Program for block grant funding to be matched by PA for targeted preservation efforts within the Chesapeake Bay watershed. PA can look to the successes of neighboring New York State to advance the protecting of water resources by protecting and preserving forestlands.

Conclusion

Through efforts identified in Section 14 to provide reasonable assurance and the identification of Pennsylvania's "unfinished business," Pennsylvania has laid a clear path forward to meet its nutrient and sediment reduction goals to fulfill its obligations under the Chesapeake Bay Final TMDL. During the public comment period on Pennsylvania's Draft WIP, many comments addressed the imposition by EPA of the "federal backstop TMDL" and urged DEP to work with its stakeholders to provide greater reasonable assurance in order to remove the onerous backstop requirements. DEP wishes to thank its partner agencies and stakeholders for their efforts to provide additional reasonable assurance in the Final WIP. Without their assistance, success stories associated with Pennsylvania meeting its Chesapeake Bay goals would not be possible. DEP remains confident that EPA will recognize our combined efforts and adopt a Final TMDL consistent with Pennsylvania's WIP.

Appendix 1.
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 Protect and Restore Vital Aquatic Habitats	\$11,278,957.00
Fish Passage Coordination: funding	Restoration	Fish Passage	Protect and Restore Water Quality	\$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%
Barnyard 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:

Four (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***

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	
<u>Survey Method:</u>			
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	41,826
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	21927
(without cost share)		Rotational Grazing	
Total # farms	34	# farms	74
Total # MSFs	35	# acres	4679
Total AUs	2,702	(without cost-share)	
<i>43% of MSFs reported were not cost-shared</i>		# farms	65
		# acres	4000
		<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>		<u>(without cost-share)</u>	
		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
<u>(without cost share)</u>		Rotational Grazing	
Total # farms	16	# farms	39
Total # MSFs	17	# acres	2,638
Total AUs	2,218	<u>(without cost-share)</u>	
<i>40% of MSFs reported were not cost-shared</i>		# farms	36
		# acres	2,404
		<i>92% of farms practicing rotational grazing used no cost-share</i>	
		<i>91% of rotational grazing acres were implemented without cost-share</i>	
Barnyard Runoff Control			
Total # of farms	32		
Total # systems	32		
Total AUs	2,266		
<u>(without cost share)</u>			
Total # farms	15		
Total # systems	15		
Total AUs	888		
<i>47% of Barnyard runoff controls reported were not cost-shared</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</u> of corn planted?	Moldboard Plow	
	Conservation Till	
	No-till	
	Silage acres	
	Grain acres	
<u>Acres</u> of hay seeding (legume and/or grass) planted?	Moldboard Plow	
	Conservation till	
	No-till	
Total <u>acres</u> of hay harvested?		
Total acres of pasture?		
<u>Acres</u> of small grains planted?	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	
Regarding the condition these cover crops were planted into, was the previous crop planted using Moldboard Plow or Conservation/No-till.	Other	
	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 aeriels available in order to create better fit streamlines to the aeriels. 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 aerals where previous streamlines totaled 2133.51miles, the increase can be explained by the tight fit in the new lines to the aerals 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.

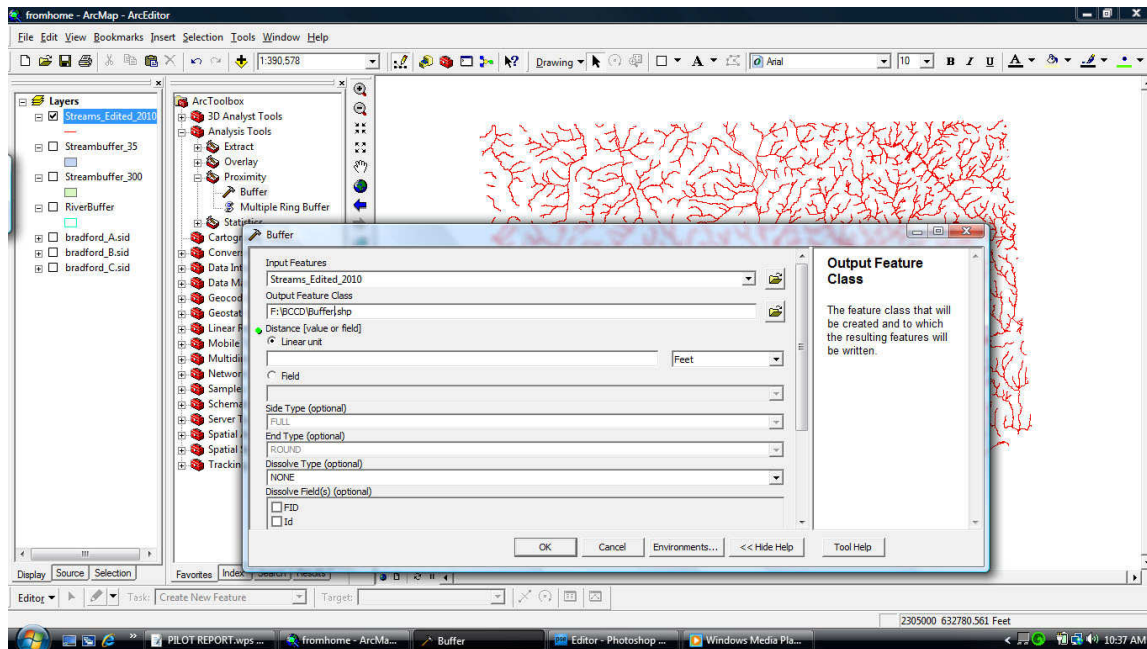


Figure 2. Screen shot for Buffer tool

*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 to 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.

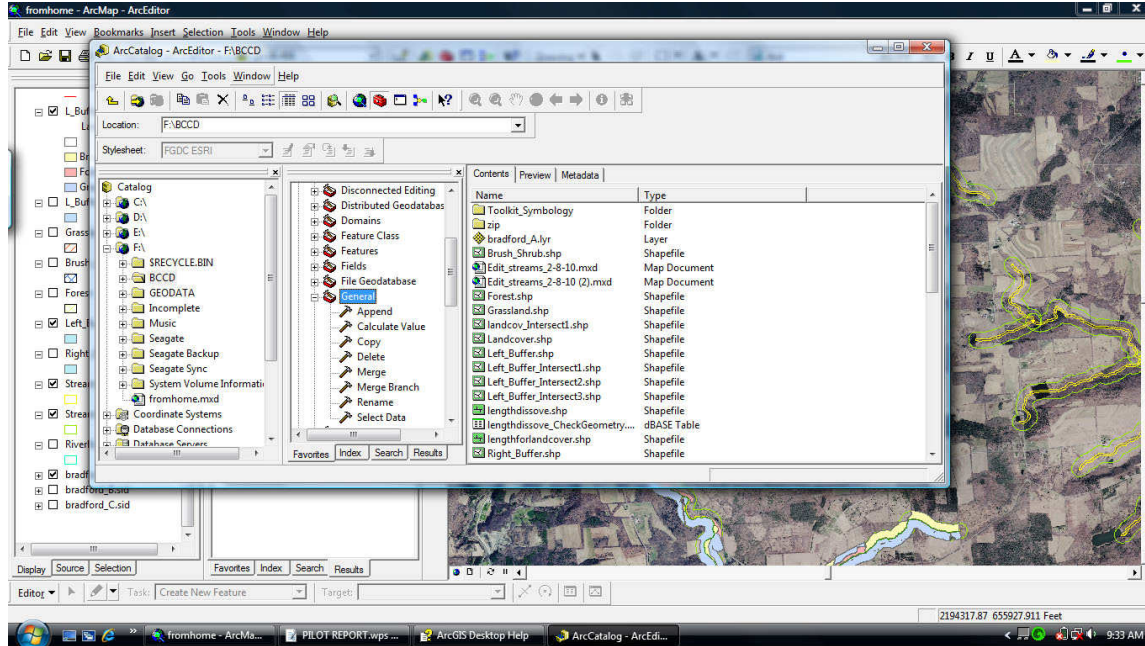


Figure 3. Screen shot for Merge tool

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.

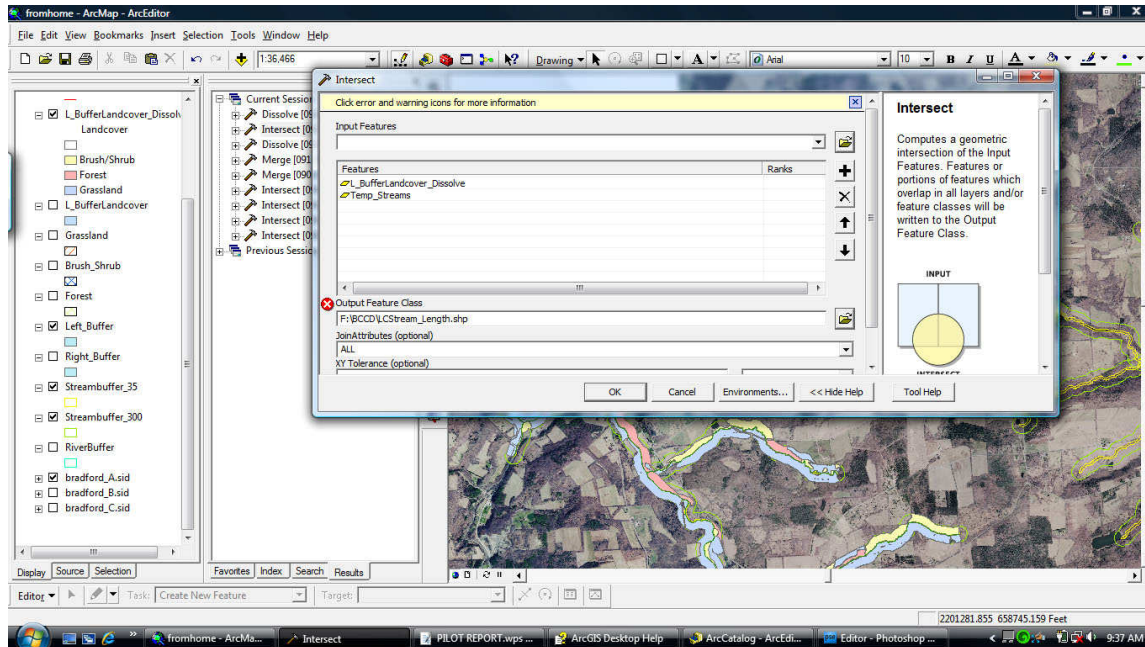


Figure 4. Screen shot for Intersect tool

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.

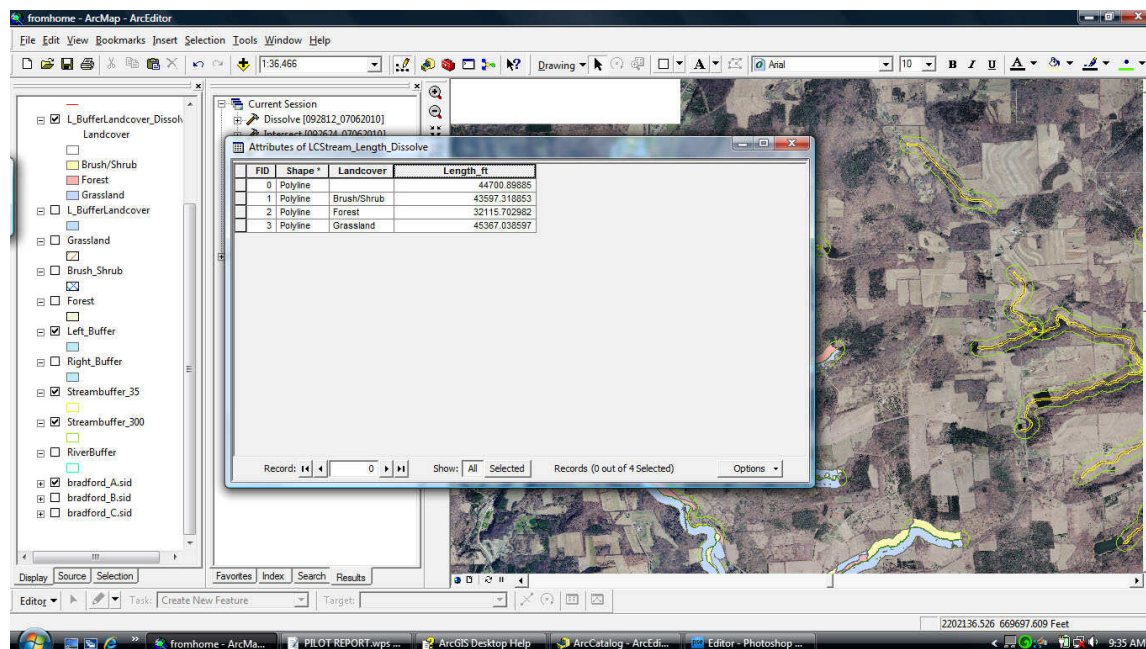


Figure 5. Screen shot of Attribute table from Dissolve

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.

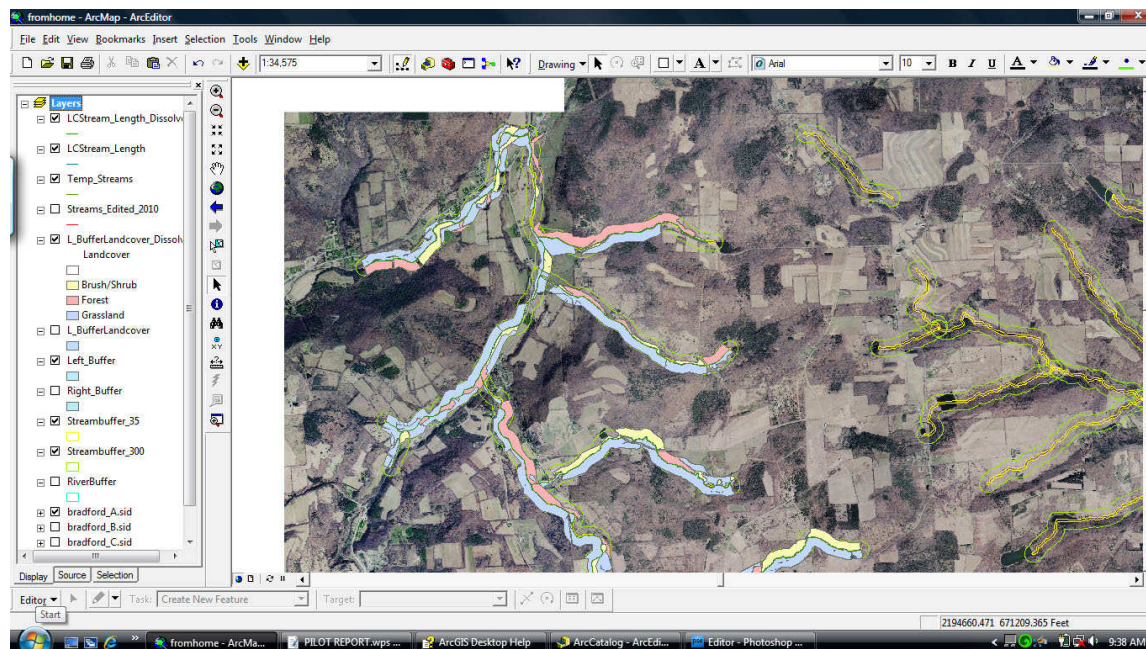


Figure 6. Sample area screen shot

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.
- 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.
- 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.
- 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
- 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

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.

CHESAPEAKE BAY COMMISSION *Policy for the Bay*

An Introduction to Pennsylvania's Implementation of the Chesapeake Bay TMDL October 28, 2010

1. Urban Nutrient Management

- a. P-ban for "DIY" application per industry initiatives, with exceptions for starter fertilizer and soil test results.

This topic has been a frequent point of discussion in DEP's Stormwater WIP workgroup, with consensus behind making the voluntary industry initiatives mandatory. Additionally, there is interest in supplementing such initiatives with strong public outreach and education initiatives, especially regarding the use of soil tests.

- b. Nutrient Management planning and recordkeeping requirements for golf course and commercial lawn care, nursery and turf industries.

The PA CBC Delegation has already met with representatives of the golf course industry and made initial contact with the lawn care and nursery industries, for the purpose of generating industry support for such legislation.

2. Authorization for county or local governments to create stormwater authorities, which could then assess stormwater management or impervious surface fees.

A lack of funding for installation, maintenance and oversight has been cited as a reason for lack of compliance with Act 167 and MS4 requirements, and for diminished quality or failure of stormwater BMPs over time.

In Pennsylvania, Philadelphia is the only local government unit that has clear authority to enact such fees, but there appears to be consensus that the time has come for clear legislative authorization for county or local governments to be able to create stormwater authorities. These authorities could then oversee installation and maintenance of stormwater BMPs and administer local action to implement Act 167 stormwater management plans and MS4 permits where applicable.

3. Restoration of funding for Act 167 planning.

Funding for county stormwater management planning has been zeroed out in the two most recent PA budgets. Restoring and possibly increasing this funding will be critical to developing meaningful watershed-based plans at the county level and implementation of local ordinances as required by the plans.

4. Increased technical and cost-share assistance funding for agriculture (await results of SR 215 study)

- a. Conservation, manure management, and nutrient management planning
- b. Installation of BMPs
- c. Improved tracking and reporting of non-cost-share practices

Several needs exist for conservation dollars, including technical assistance for planning and BMP implementation and tracking through the conservation districts and other service providers, education and outreach to all sectors and the general public, and deployment of new technology.

SR 215 was passed during the '09-'10 legislative session, and requires the Legislative Budget and Finance Committee to undertake a study of the cost of agricultural compliance with the WIP. The Committee has received proposals per an RFP, with a contract to follow. When cost information is available, we can strategically begin to fill budget and program gaps.

Existing programs that could be enhanced include the Environmental Stewardship Fund, the Conservation District Fund, the Resource Enhancement and Protection Program (REAP) and the Chesapeake Bay Watershed Education Program. A new program is being considered to provide \$15 million annually for new technology deployment. This program would provide matching funds for a new source of federal dollars.

Suggestions have been made to condition participation in the "Clean & Green" preferential assessment program on compliance with conservation and nutrient management plan requirements. If this were to occur, there would be a significant increase in the demand for planning assistance.

5. Dedicated funding source for conservation and preservation initiatives.

Because the 15-year timeline of the TMDL will require a stable source of funding over the long term, a dedicated source of conservation funding support would be helpful, especially in light of diminishing Growing Greener dollars.

Appendix 5.

Pennsylvania’s Proposed Chesapeake Bay Agricultural Water Quality Initiative Policy

Goal:

Clean water within the Chesapeake Bay Watershed, starting with Pennsylvania local water quality and ultimately the Chesapeake Bay, and Economically Viable Farms

Objectives:

To reduce nutrient (Nitrogen and Phosphorous) and sediment loads entering surface and ground waters from agricultural operations.

To restore and reclaim water quality in watersheds that do not meet their designated and existing uses and are listed as impaired due to agricultural activities in Pennsylvania’s portion of the Chesapeake Bay Watershed. .

To achieve environmental objectives in a manner that strives to maintain the economic viability of Pennsylvania farms and farm families.

To achieve environmental and economic viability of farms in a manner consistent with existing legal agreements among the Chesapeake Bay States, and state and federal laws.

Key Components of this Initiative include:

- Continue to maintain, and where possible enhance and target, the current base of technical and financial assistance provided to the agricultural community provided through local (conservation districts (CDs), non-profit organizations and agricultural organizations/consultants), state (Pennsylvania Department of Agriculture (PDA), Pennsylvania Department of Environmental Protection (DEP), Pennsylvania Department of Conservation and Natural Resources (DCNR)) and federal (Natural Resources Conservation Service (NRCS)) partners;
- Maintain a continued focus on the “Core 4 Conservation Practices” including: conservation and nutrient management plans; cover crops; streamside buffers; and no-till and low till practices;
- Focus on full implementation of existing Pennsylvania “baseline” regulatory requirements. This would include Chapter 91 and Chapter 102 compliance for all sized farms, Chapter 83 (Act-38 of 2005) and Chapter 92 where applicable, and the Clean Streams Law;
- Evaluate and modify regulatory requirements (where necessary), water quality programs and administrative tools, to help maximize attainment of the goal;
- Implement a basin-wide approach to achieve agricultural compliance focusing on a robust communications and outreach strategy coupled with an assessment of agricultural operations to achieve baseline compliance with regulatory requirements.
- Implement a targeted watershed approach to systematically assess compliance of all agricultural operations, within a targeted watershed, with existing baseline water quality regulatory requirements and to implement strategies to achieve greater compliance with these water quality requirements.

- Monitor and evaluate the progress of this initiative and make necessary revisions to the initiative as appropriate. When warranted, reassess stream segments to see if they can be removed from the 303d list as impaired waters of the Commonwealth;
- Monitor and evaluate the progress of this initiative toward meeting the nutrient and sediment reduction goals of the Chesapeake Bay TMDL and revise as appropriate.
- Work to enable and encourage agricultural operations that are found to be meeting base-line regulatory compliance to actively participate in nutrient credit trading and other market based ecosystem programs that financially reward farmers for implementing Best Management Practices (BMPs) that go beyond baseline compliance and ultimately benefit the Chesapeake Bay;
- Promote the use of nutrient reduction technologies and nutrient trades. DEP, along with its agricultural partners, should encourage nutrient capturing technologies and BMPs;
- Focus on receiving and reporting BMP data that includes non government cost shared BMPs. Verification of the BMP data, implementation to standards and specifications, and continued operation and maintenance is of up most importance;
- Initiate a renewed focus on Education and Outreach. Education and outreach will be focused on all segments, issues, and concerns include those providing technical assistance directly to farmers;
- Support the Pennsylvania's Watershed Implementation Plans (WIP) - a requirement of the Chesapeake Bay Total Maximum Daily Load (TMDL) including working with EPA to verify that the Bay Model properly accounts for implementation of BMPs implemented to achieve TMDL reduction targets;
- Promote the retention and enhancement of forest cover on agricultural lands. Promote agroforestry practices including windbreaks, buffers, forest farming, silvopasture to maximize ecological and economic benefits and retention of working farm forests (Avoided loss of forest cover).

Pennsylvania's Agricultural Water Quality Initiative builds upon implementation of current regulatory authorities by implementing a basin-wide communications, outreach, and assessment strategy and targeting of existing resources toward systematically restoring water quality within priority watersheds across the Chesapeake Bay basin. It maintains the active implementation of the existing statewide DEP Concentrated Animal Feeding Operation (CAFO) regulatory program and recognizes the need to continue to respond to and address complaints concerning potential pollution at agricultural operations all across the state.

It is important to recognize the importance and considerable resources of the CDs, and their significant role as the primary agricultural staff (technical and financial assistance) for implementing Pennsylvania's environmental programs. NRCS's role is also significant. With current budget considerations, there is no expectation that any significant additional staff resources will become available in the near term (3-4 years). However, by targeting our existing resources to continue to provide a strong focus on Concentrated Animal Feeding Operations (CAFOs), Concentrated Animal Operations (CAOs) and on other farms with potential pollution incidents; and by implementing a new communications and outreach strategy while actively assessing all farming operations within selected targeted watersheds, Pennsylvania will be able to methodically increase compliance by agricultural operations and reduce the nutrients and sediments entering watersheds in the Chesapeake Bay basin.

I. Continue Existing Regulatory Program:

1. Continue routine CAFO inspections. The current frequency of one inspection per year by DEP (CAFOs falling under Individual Permits) and one inspection per year by CDs (remaining CAFOs that fall under the General Permit since primarily they are CAOs under Act-38) will be maintained as long as sufficient resources exist and where annual inspections are necessary. These inspections continue to yield improvements in these larger agricultural operations. If there are violations, they will be corrected either cooperatively or through an enforcement action.
2. Continue routine CAO inspections by CDs and the SCC under the Nutrient Management Act (Act 38 of 2005). These inspections continue to yield positive program improvement. If there are violations, they will be corrected either cooperatively or through an enforcement action.
3. Continue to respond to and investigate agricultural water quality complaints. In each case, field staff will pursue the development and implementation of a manure management plan and agricultural erosion and sediment pollution control (E&S) or conservation plan, if not already in place, as these are requirements of all farming operations. Utilize the complaint investigation and follow-up process to provide one-on-one education to the farm operations.

For complaints that have identified an actual pollution event:

- Require mitigation efforts if the event is in progress and has not been controlled.
- Require corrective actions. These actions may include immediate cessation of the discharge; field orders; or consent order agreements.
- Assess the need for government Technical and Financial Assistance which then may be provided
- Retain the right to assess reimbursement of cost incurred by Technical Assistance Providers (CDs, etc.)
- Assess a penalty where appropriate
- Coordinate with or referral to other State and Federal Agencies (i.e. Pennsylvania Fish and Boat Commission and EPA)

For complaints that have not identified an actual pollution event, but the operations is found to be out of their baseline regulatory requirements an escalating compliance approach will be used:

- Utilize a “3 strikes you’re out” approach to compliance.
- Send written notification of the regulatory deficiencies. Allow for voluntary corrective actions within 90 days (1st strike).
 - If the corrective action is season dependent, this time frame may be adjusted determined by field personnel.
 - Government Technical and Financial Assistance may be provided
 - If voluntary corrective actions are not started within 90 days (#1 above), give the operation an additional 45 days to comply (2nd strike)

If the corrective action is season dependent, this time frame may be adjusted determined by field personnel.

Government Technical and Financial Assistance may be provided

- If voluntary corrective actions are not started within 45 days (#2 above, 135 days total), move the operation to mandatory compliance actions that will include Field Orders, or Consent Order and Agreements, etc. (3rd strike)
 - Government Technical Assistance may be provided.
 - Financial Assistance may be provided but is not a condition for compliance.
 - Assess a penalty where appropriate
 - Coordinate with or referral to other State and Federal Agencies (i.e. Pennsylvania Fish and Boat Commission, EPA)

- DEP may exercise its enforcement discretion to adopt a more aggressive enforcement role and address compliance and enforcement activities without utilizing the preferred “three strikes” approach. DEP may consider the use of any and all compliance tools available including NOV’s, field orders, compliance orders, CO&A’s, and requiring permits in situations of imminent potential threats of pollution or substantial and/or chronic non-compliance. DEP will utilize its enforcement discretion in a thoughtful and thorough manner.

For complaints that fall out of the jurisdiction of DEP, refer to the appropriate agency or agricultural organization that handles, for example:

- Flies – State Conservation Commission Agriculture Ombudsman
- Odors – SCC
- Pesticide misuse – PDA
- Mud on road – Pennsylvania State Police
- Nuisance complaints - PFB

The Department has sufficient regulatory and statutory authority under the Clean Streams law to ensure compliance with all regulatory requirements as well as pollutant discharges to Waters of the Commonwealth.

II. Evaluate and Modify Regulatory and Administrative Tools:

1. Working with appropriate partner groups, accelerate development of regulatory and administrative “tools” to better address agricultural compliance. (NOTE: “Partners” in this effort includes CDs, State Conservation Commission (SCC), DEP, PDA, USDA-NRCS, and Environmental Protection Agency Region 3 (EPA Region 3). The Ag Advisory Board (AAB), PA Agricultural Organizations / Consultants, Manure Haulers and Brokers, Chesapeake Bay Foundation (CBF) and others would be involved as efforts progress and documents are revised.)
 - a. Update Chapter 102 Administrative Manual and technical guidance to specifically address agricultural activities under Chapter 102 (Currently Underway).
 - b. Update Manure Management Manual (MMM) and Field Application of Manure Supplement to address “workable” manure plan format, phosphorus, buffers, Animal Concentration Areas (ACAs), incorporation of manure, and winter spreading of manure

- consistent with the approach taken in nutrient management program (Currently Underway).
- c. Update Chapter 96 (Water Quality Standards Implementation) to include Pennsylvania's Nutrient Trading Program, which can assist the Department in meeting Chesapeake Bay Milestones through the use of nutrient reductions technologies and trades (Became effective October 9, 2010).
2. Working with the CDs, SCC and NRCS, re-evaluate the current Chesapeake Bay Implementation Grant program to effectively utilize current technical assistance capabilities and financial resources to enhance the agricultural assessment and compliance initiative.
 - Revise Chesapeake Bay Technician's annual work plans for the 49 conservation district Bay technicians and engineers with a focus on implementing the Agriculture Water Quality Initiative. These changes would/could occur over the next 3 years beginning with the July 2011-June 2012 contracts.
 - Modify funding priorities and resource allocations for Chesapeake Bay "Special Projects." DEP allocation of Chesapeake Bay BMP funds should be assessed, and if needed, revised to best utilize this consistent/available source of BMP funds. These changes would occur with the July 2011-June 2012 contracts.
 - Explore other resources, including funding, from federal partners as well as specific sources like ACT (Agricultural Conservation Technical Assistance) funding.
 3. Working with EPA Region 3, cooperatively review Pennsylvania's existing CAFO regulatory program to ensure that it meets current federal regulations. 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. Discussion of specific issues identified by EPA's technical standards review of the PA CAFO program will be needed.
 4. Modify funding priorities and resource allocations, as appropriate, for other DEP non-point source funding programs that would include, but not be limited to, Section 319 grants, Growing Greener, Pennvest, etc.
 5. Working with partner groups and agencies, as well as developing a relationship with non-traditional partner groups and agencies, develop a system to report, track, and verify BMPs that are installed, and operated and maintained, with out cost share assistance. This is a critical component needed to reach full implementation of Pennsylvania's Chesapeake Bay WIP.
 6. Evaluate effectiveness of this Agricultural Water Quality Initiative toward meeting the Chesapeake Bay TMDL nutrient and sediment load targets. Progress will be monitored at the end of each 2 year WIP milestone period with a mid-course evaluation and recommendations for adjustment, if needed, in 2016. This will allow sufficient time for the development of any new regulatory tools needed to meet the TMDL by 2025.

III. Basin-wide Component to Achieve Agricultural Compliance with State Regulatory Requirements:

An increased effort will be developed to inform agricultural operations of their regulatory responsibilities, and opportunities to go beyond regulatory compliance through out the Chesapeake Bay watershed. Additionally, accountability is needed to ensure agricultural operations are complying with regulatory requirements basin-wide.

1. The Department, in cooperation with local, state, and federal partners, will develop and implement a communications and outreach strategy that will ensure the distribution of information to farmers about the intent and implementation of the Ag water quality Initiative, baseline regulatory compliance, Chesapeake Bay goals, going beyond baseline compliance, trading, importance of safeguarding onsite drinking water sources, technical and financial assistance, and identification and reporting of non cost-share voluntary BMPs.
 - Form a workgroup of partners to identify, collect, and develop materials for distribution to agricultural operators. Outreach materials may include:

Technical Assistance Providers (CD's, field staff, etc.):

- Education of different agricultural sectors (i.e. poultry versus swine versus dairy)
- Education on Non-point Source Pollution – Cause, sectors, effects, solutions, etc.
- Education on Pennsylvania Water Quality and the Chesapeake Bay
- Education on Rules and Regulations (State and Federal)
- Education on Programs and Policies (State and Federal)
- Education on BMP standards and specifications
- Education on BMP efficiencies and effectiveness, to include new technologies, forestry practices, and non-traditional BMPs

Agricultural Operations:

- Education on Non-point Source Pollution – Cause, sectors, effects, solutions, etc.
- Education on Pennsylvania Water Quality and the Chesapeake Bay
- Education on going above and beyond regulatory requirements (Installation of additional BMPs) to further enhance water quality
- Education on Rules and Regulations (State and Federal)
- Education on BMP effectiveness when comparing different BMPs that could be applied to the landscape

2. In addition to communications and outreach as described in #1 above, assessments of agricultural operations are needed. The Department in cooperation with local, state, and federal partners will develop a strategy to enhance accountability for compliance with baseline regulatory requirements through a prioritized farm assessment program. The Department proposes to conduct site visits by engaging conservation districts, local federal agencies, and DEP regional staff in implementing a prioritized site assessment process at selected agricultural operations. The selection process may include a hierarchy consisting of existing compliance history, size and type of animal population, state or federal cost-share history (absence of manure storage funding), or other relevant determining factors that would

assist in targeting limited resources to achieve the most environmental gain. This site visit would consist of discussion and information distribution related to the intent of the assessment, determination of regulatory compliance, identification and implementation verification of existing non cost-share BMPs, and expected follow-up by the CD or DEP.

3. Identify and engage Conservation District Bay Technicians, Engineers, and Watershed Specialists as appropriate to assist in the implementation of #1 and #2 above. This will be accomplished through revisions to job descriptions and work plan outputs associated with DEP grants to the CD.
4. Engage Conservation Districts to develop assessment and compliance plans that can be implemented at the district level with a goal of assessing agricultural operations to determine compliance with baseline regulatory requirements and then implement an approach to achieve compliance. These plans would also address verification of existing BMPs and identification of non cost-share BMPs already installed.
5. While an ultimate goal is to visit all agricultural operations in the basin, the actual number of agricultural operations assessed under this strategy will be dependent on available resources at the local, state and federal level. Resources are needed for all facets of the initiative including: communication and outreach, assessment, data management, and compliance/enforcement.
6. Work with federal, state and local partners to develop a compliance assistance and enforcement referral process to achieve compliance with baseline requirements. The focus of this effort will be on expedited compliance and enforcement approaches and will target implementation of Manure Management Plans and Agricultural Erosion and Sediment Pollution Control Plans by agricultural operations that are not CAFOs or CAOs.

IV. Targeted Watershed Approach to Assess and Achieve Agricultural Compliance:

Unlike the tools used in Number III (basin-wide approach) which are designed to get as many agricultural operations as possible into compliance to meet the Bay TMDL goals, the Targeted Watershed Approach has a primary focus of restoring local agriculturally impaired waters. This approach will allow DEP and its local, state, and federal partners to focus limited resources in a coordinated and targeted way to increase the likelihood of improving water quality in agricultural 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 of their regulatory obligations and provide a general description of the targeted assessment and compliance initiative.

The assessments will be focused on identifying the current status of the operation in regards to regulatory compliance, including baseline compliance for trading, installed BMPs, operational limitations, areas needing attention, and any regulatory violations of both federal law (NPDES violations) and state law (Chapter 83, 91, 92, 102, Clean Streams Law, etc). The assessment

results will be used to develop a strategy to evaluate, identify 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 (details above in the Continue Existing Regulatory Program section). If there are structural, regulatory or funding impediments, these impediments would be identified and, where appropriate, strategies to overcome the impediments would be implemented.

The proposed assessment and compliance process is described below:

- 1) DEP, working with local, state, and federal partners will select manageable-sized watersheds (e.g. both geographically and number of farming operations) for the assessment and compliance initiative.

Watershed Selection and Targeting Considerations will include:

- Agricultural impaired watersheds
 - Watersheds with a Total Maximum Daily Load (TMDL);
 - Target watersheds with the potential for success considering a manageable size (up to 20 sq. miles), number and diversity of operations (20-50 farms being optimum) including consideration of operation type (animal, crop, combination, nursery), size (100-200 acres averaged optimum) and ownership, and strong partner cooperation and involvement.
 - Target watersheds with current watershed plans including: 319, Growing Greener, and County Implementation Plans.
 - Target watersheds with limited forest cover;
 - Target watersheds where the maximum available funding can occur
 - Target watershed where sufficient staffing (Conservation District and NRCS Capacity) is present. This staffing capacity is needed to assist farmers in fulfilling any compliance or required BMP findings.
- 2) Develop and implement outreach and assessment tools for use in the compliance initiative. (Additional education and outreach tools are identified in the Education and Outreach Section of this document.) Outreach efforts will be focused over a finite period of time (6-8 weeks) in advance of the actual assessments. Outreach considerations include:
 - Outreach materials developed through the basin-wide initiative
 - Use and distribution of the Agricultural Action Packet, informational meetings, press releases and direct mailings. Private sector and agricultural organizations / consultant's involvement and CD stakeholder assistance will be important.
 - Development of the assessment protocol and assessment form used in the initiative. The assessment form(s) will focus on documenting status of existing regulatory compliance, observations of pollution or operational issues impacting water quality, existing BMPs already implemented (non state or federal cost-shared), type of drinking or animal watering sources, presence or absence of "Core 4 Conservation Practices".
 - 3) Prioritize DEP regional and central office time to complete an agricultural assessment and compliance initiative in the identified watershed(s) in a finite period of time (4-8 weeks).

Conduct assessments of all agricultural operations in the watershed(s) using the assessment process developed. Assessments would be performed by either the CD or DEP staff and accompanied by agricultural liaisons (CDs, agricultural organizations / consultants, etc., if they choose to participate) that have a strong understanding of agricultural farming operations and farming logistics, and with expertise that addresses the special needs of the underserved farming groups and communities.

- 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.

- 4) Develop a tiered compliance process that encourages voluntary compliance where possible and reserves enforcement tools for uncooperative agricultural operations. The goal of this effort is to get voluntary implementation of proper agricultural activities and BMPs. If voluntary efforts are not realized, compliance measures including, but not limited to, field orders, Notice of Violation (NOVs), Consent Orders and Agreements (COAs), and assessment of penalties through Consent Assessments of Civil Penalties (CACPs). Farmers will be provided the opportunity to comply within a reasonable timeframe, but where compliance cannot be obtained, enforcement efforts will be initiated. Enforcement actions include summary criminal prosecutions, Enforcement Orders and Complaints for Assessment of Civil Penalties. This 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 CD technical assistance and lead to DEP and/or EPA enforcement activities, based on the severity of the violations, potential for environmental degradation and/or the willingness to comply with regulatory requirements.

The tiered compliance process will include:

- A focus on attaining baseline regulatory compliance (compliance with Chapter 83, 91, 92, 102, clean streams law) as appropriate.
- A general compliance process that utilizes an escalating tiered approach ranging from notification of concerns, opportunity for voluntary compliance and financial assistance, and last chance for voluntary compliance prior to taking enforcement action.
- Implementation of a compliance strategy that takes into account enforcement discretion and focuses on taking action on the most egregious violators first. This strategy will utilize an escalating enforcement process known as the “3 strikes you’re out” approach (described in Section I. Above) unless a pollution discharge is occurring that requires a more immediate compliance response. DEP will consider any and all compliance tools available including NOVs, field orders, compliance orders, CO&A’s, and requiring permits as CAFOs.

NOTE:

- If BMPs must be installed as part of the corrective action, a reasonable timeframe will be established in the baseline regulatory plans that take into consideration the financial capacity of the farm, alternate BMPs, season of installation, etc.
 - In particular cases of recalcitrant agricultural operators DEP will share information with and may request EPA involvement as appropriate.
- 5) Maximize availability of funding opportunities to agricultural and forestland operations in the targeted watershed. DEP will designate these targeted watersheds as priority watersheds for Growing Greener and other state funding (ex. PennVest's Nonpoint source funding program.) In addition, DEP will work with federal partners (EPA 319, NRCS, FSA, 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.
 - 6) Develop a strategy to track implementation of existing and future BMPs, planning, or operational changes at agricultural operations in response to the assessment and compliance initiative in the watershed.

Following corrective actions on watershed, DEP may initiate stream biological surveys on the targeted watershed to assess improvements to aide in the calculations of nutrient and sediment reductions realized through the implementation of BMPs as part of the Bay Model verification process. In addition, articles, success stories, watershed tours, etc. could be planned to celebrate the successes of this joint assessment and compliance initiative. (Partners: DEP, EPA, PDA, CDs, DCNR).

NOTE: EPA could provide assistance in the follow-up biological and water quality monitoring.

- 7) Focus on receiving and reporting voluntary BMP Data that includes non-government cost-shared BMPs. Verification of the BMP data, implementation to standards and specifications, and continued operation and maintenance is of up most importance.

V. Monitor and Evaluate Progress and Effectiveness of the Assessment and Compliance Initiative:

As this initiative is implemented, a workgroup will meet consisting of key partners (CDs, PDA, SCC, EPA, DCNR, NRCS and ag organizations) on a periodic basis to discuss progress, effectiveness, impediments, and successes. These discussions will be used to make revisions to or enhance the initiative as well as evaluating its use for implementation outside the bay basin or even taking the fundamentals of the process and apply to other sectors. Information gained through this initiative may also help in identifying the need for future regulatory revisions or even statutory revisions to ensure the protection of water quality from agricultural activities.

VI. Implementation Considerations

This Agricultural Water Quality Initiative Policy has been developed to meet the 4 key objectives listed at the beginning of this document. This is an ambitious initiative requiring cooperation and resources from local, state, and federal partners as well as the agricultural

operations to meet the common goal of improved or restored water quality of our local Pennsylvania streams as well as the Chesapeake Bay.

As the initiative is rolled-out the following initial implementation considerations should be noted:

1. DEP plans to finalize the Chapter 102 Administrative Manual and technical Guidance and the Manure Management Manual as high priorities (targeted completion March 2011)
2. DEP considers the Chapter 96 regulations, related to establishing Pennsylvania's trading program, as a high priority (Became Effective October 9, 2010)
3. DEP plans to amend CD/DEP contracts for Chesapeake Bay technicians, engineers, and watershed specialists job descriptions and work outputs (Beginning July 2011)
4. Ongoing Discussion with EPA regarding Pennsylvania's CAFO Program will continue. (Resolution in March 2011)
5. A workgroup (co-chaired by DEP and a representative from the Agricultural sector) consisting of representatives from local CDs, agricultural organizations, NRCS, DCNR, DEP (regions and CO), EPA, SCC, and PDA will be formed to develop the necessary tools, schedules and strategies to implement the Agriculture Water Quality Initiative including: communications and outreach materials, component implementation strategies, roles and responsibilities of partners, assessment protocols and forms, BMP tracking tools, targeted watershed selection criteria, basin-wide assessment criteria, CD assessment and compliance plan objectives, funding and resource commitments, and evaluation and monitoring tools needed to implement the Basin-wide and Targeted Watershed compliance approaches. (Targeted workgroup formation January 2011)
6. Complete final implementation strategies. (Targeted Completion July 2011)
7. Rollout communication and outreach. (Targeted for all operations September 2011 – March 2012)
8. Select Targeted Watersheds for 2012. (Target – 3 watersheds/year)
9. Rollout implementation of basin-wide and targeted watershed initiatives. (Target March 2012 – October 2012 each year)
10. Continue process steps 7-10.
11. Begin County level CD compliance plan development and implementation, (Beginning 2012 for all CDs in bay watershed)
12. The workgroup established in number 5 will continue to meet on a regular basis to evaluate and address implementation issues and concerns. Progress will be monitored at the end of each 2 year WIP milestone period with a mid-course evaluation and recommendations for adjustment, if needed, in 2016.

Appendix 6.

Manure Management Manual Revision

Land Application of Manure

INTRODUCTION

The Pennsylvania Department of Environmental Protection (“PADEP”) is revising the Manure Management Manual that regulates the Land Application of Manure for agricultural operations that are not Concentrated Animal Operations (“CAOs”) or Concentrated Animal Feeding Operations (“CAFOs”). This paper describes the relationship of the Manure Management Manual Revision to the Watershed Implementation Plan being developed to meet the Total Maximum Daily Load (“TMDL”) established for the Chesapeake Bay.

BACKGROUND

It is estimated that there are approximately 60,000 farms in Pennsylvania that are not regulated under the Pennsylvania Nutrient and Odor Management Act as CAOs or the Federal Clean Water Act as CAFOs. Of these farms, approximately 40,000 are located in the Chesapeake Bay Watershed.

If they land apply manure, these farms are required to have a written manure management plan meeting the requirements of the Pennsylvania Manure Management Manual, unless they have received either approval or a permit from the PADEP. See 25 Pa. Code Section 91.36(b). The Manure Management Manual was last updated in 2001 but has not been materially changed since the mid 1990s.

The 2001 Manure Management Manual does not include many of the current standards for development and implementation of a plan to manage nutrients for water quality protection. In addition, the 2001 manual is technically complex and very difficult for a farmer to use to develop a manure management plan.

Because of the structure of the manual and the fact that the PADEP has focused its resources on supporting the State Nutrient Management Program and implementing the federal CAFO program, the vast majority of farms subject to the land application requirements of the PADEP’s regulations have not developed and are not implementing a written Manure Management Plan.

EPA is pressuring Pennsylvania to expand the scope of the federal CAFO program. EPA has also announced its intention to expand the CAFO definition to include additional farms in the program. EPA and others are focusing on the small farms and their potential environmental impact. PADEP believes that implementation of the Manure Management Plan revisions is a better approach for Pennsylvania. The PADEP does not have and is unlikely to be able to obtain the resources to include a significant number of the up to 60,000 additional agricultural

operations into the CAFO program and believes that implementation of the Manure Management Manual is a better alternative.

MANURE MANAGEMENT MANUAL REVISION - LAND APPLICATION OF MANURE

As part of Pennsylvania's commitment to reduce nutrient and sediment loading to the Chesapeake Bay and in response to EPA pressure for expanding the number of agricultural operations subject to the federal CAFO program, the PADEP 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. Farmers that did not want to follow the standard plan format can seek approval from the PADEP for an alternative format or approach or can obtain a permit for the land application of manure.

The PADEP 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.

The PADEP will be providing a 90 day public comment period and will be holding meetings with county conservation districts, agricultural and environmental organizations and other state and federal agencies to review the proposed revisions. In addition, the PADEP plans to do "pilot testing" of the proposed revision with farmers. The PADEP plans to have the revised Manure Management Manual finalized and begin implementation in the spring of 2011.

The proposed revision to the Manure Management Manual includes a process to calculate manure application rates, provides setbacks from environmentally sensitive areas, establishes special conditions for winter application, includes periodic evaluation of manure storage facilities, establishes conditions for stockpiling and stacking of dry manure, requires pasture management in the form of maintaining dense vegetation in pastures and establishing agronomically based stocking rates and 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.

RELATIONSHIP OF MANURE MANAGEMENT MANUAL TO WIP

States located within the Chesapeake Bay Watershed are required to develop Watershed Implementation Plans ("WIPs"), under Section 117(g) of the Clean water Act, describing the process and schedule for accomplishing a reduction in nutrients and sediment loads to the Chesapeake Bay. The WIPs must include all major sources of pollution including both point sources and nonpoint sources. The plans must include dates for enhancing programs and implementing key actions to achieve these pollutant reductions using regulatory authority,

permits or otherwise enforceable agreements. Because agriculture, if not properly managed, is a major source of nutrient and sediment loading to the Chesapeake Bay, the Pennsylvania WIP must include a description of the programs to reduce the discharge of these pollutants.

COMPONENTS OF MANURE MANAGEMENT MANUAL REVISIONS

The proposed revisions to the Manure Management Manual represent one of the major enhancements of the PADEP program to regulate nutrient loads to the Chesapeake Bay. As discussed in more detail below, when implemented, these standards will result in significant reductions in nutrient loading. The PADEP plans to work with the WIP Agricultural Workgroup and the EPA to quantify the nutrient reductions that are expected to be achieved. The following discussion highlights the standards included in the proposed Manure Management Plan Revision.

1. Application Rates and Timing

In determining manure application rates, farmers have three options.

1. Use “book values” from the Manure Application Rate Chart based on the crop group and manure type;
2. Establish application rates based on the applicable Nitrogen or Phosphorus Balance Worksheets; or
3. Have a certified nutrient management planner develop this section of the plan using the “Pa. Phosphorus - Index”.

2. Application Setbacks

Except where the Farmer uses the “Pa. Phosphorus Index” to develop application rates, Farmers may not mechanically apply manure within the following setback areas, regardless of the slope of the land or the ground cover:

1. Within 150 feet of the top of the bank of a perennial or intermittent stream with a defined bed and bank, a lake or a pond.
2. Within 100 feet of an existing open sinkhole.
3. Within 100 feet of an active private drinking water source such as a well or a spring.
4. Within, at a minimum, 100 feet of an active public drinking water source. In some cases state and federal laws may establish greater distances.
5. Within concentrated water flow areas in which vegetation is not maintained such as a gully or a ditch.

Farmers that use a Certified Nutrient Management Specialist to develop this portion of their plan using option “3” above (“Pa. Phosphorus Index”) will often have reduced manure application setback areas that will range from 35 to 100 feet from streams and other surface water bodies, based on the management practices used on the near stream areas. For example, if there is a vegetated buffer along a stream, you may be able to apply manure closer to the stream.

3. Winter Application

Farmers that choose to apply manure in the winter will need to follow the below criteria:

1. The maximum application rate for the winter season is 5,000 gallons of liquid manure or 20 tons of dry manure per acre. As an alternative maximum rate, a farmer can choose to calculate and apply manure to the phosphorus removal rate for the coming year’s crop.
2. An additional setback of 150 feet from an above ground inlet to an agricultural drainage system (such as inlet pipes to pipe outlet terraces) if surface water flow is toward the above ground inlet is required.
3. All fields must have at least 40% crop residue at application time or an established and growing cover crop, hay, or pasture crop. The 40% cover provision would generally exclude application to corn silage fields that do not have an established cover crop, corn grain fields where a significant portion of the fodder has been removed, and soybean fields. Fields with a cover crop or sod crop should be used first.
4. Because slope is an important factor, all winter application must be done consistent with an agricultural erosion and sediment pollution control plan meeting the requirements of 25 Pa. Code Section 102.4(a) of the DEP regulations. Manure may not be applied during winter on fields with slopes greater than 15% (“A”, “B” or “C” slopes).

4. Manure Storage Facilities

Manure management must assure that manure not immediately applied is properly stored. Manure storage facilities are used for safely containing manure until it is able to be properly applied or processed. Manure storage facilities include structures such as earthen ponds with various liners such as concrete, bentonite, and/or membrane products like HDPE, concrete tanks located outside or under the barn, above ground steel tanks and roofed stockpiling/stacking facilities.

The plan must list all existing manure storage facilities (and any planned expansion or additions). For liquid or semi-solid manure storage facilities, the plan must document the type, date of construction, estimated capacity, and documentation of the environmental evaluation of the structure as outlined below.

Liquid or semi-solid manure storage facilities must be evaluated by the operator, on at least a quarterly basis, to assure that they are not producing potential discharges. The operator must document that there is:

1. No evidence of overtopping or leakage from the manure storage facility. The operator must maintain a minimum 12-inch freeboard for all ponds and a minimum 6-inch freeboard for all other manure storage facilities at all times.
2. No visible cracking or other problems with concrete structures that would lead to leakage
3. No visible slope failures, deterioration of any liner, or knowledge of any local water pollution issues associated with the storage facility.

Any discharges or potential discharges need to be addressed immediately. In addition, liquid or semi-solid manure storage facilities built in the year 2000 and later must be designed by a registered Pennsylvania Professional Engineer, and the farmer should maintain a copy of a certification from the engineer indicating that the storage facility was built according to the appropriate standards.

5. Temporary Manure Stockpiling/Manure Stacking

Daily hauling operations typically have one or more temporary stockpiling/stacking areas in the field to handle situations when direct manure application is unacceptable. These conditions could be due to severe weather, limits due to application from other criteria set forth in this document or field conditions unsuitable for spreading equipment. Some poultry as well as other operations also include temporary stockpiling/stacking of manure in outdoor areas. The requirements relating to stacking of manure include:

1. Keeping all stockpiles/stacks at least 150 feet from sensitive areas such as streams, lakes and ponds, 100 feet from any open sinkhole, 100 feet from any drinking water well (public or private) and not within an area of concentrated water flow.
2. Stockpiling/stacking manure on properly constructed improved stacking pads whenever possible. When stockpiling/stacking in fields, the stockpiles/stacks cannot be in the same location each year. Use the same area only once in four years and re-vegetate the area with grasses or legumes.
3. Placing these areas at the top of a hill (within 100 feet from the top of a slope), where possible, diverting upslope water away from stockpile/stacking areas.
4. Placing stacks on areas with less than 8% slope and orienting stockpiling/stacks up and down the hill.
5. Having sufficient bedding in the manure to allow for stacking at least 5 feet in height and when stacked on the application field, limit volume to the amount that can be spread on fields nearby to the stack.
6. Covering temporary stockpiled/stacked manure within 15 days if it will be in place for more than 120 days.

6. Pasture Management

All pastures on the farm must be included in the manure management plan. Farms with a grazing plan meeting the requirements of the Pennsylvania Technical Guide do not have to complete this section of the plan. No detailed planning is required for a pasture that:

1. Is located at least 150 feet from a perennial or intermittent stream, lake, pond or other surface water. This setback can be reduced to 50 feet if the area between the pasture and surface water is a non-grazed permanent vegetated buffer strip; and
2. Is composed of dense vegetation. Dense vegetation means a pasture that is managed to minimize bare spots and keep vegetation height to at least 3 inches high throughout the year or maintain an 80% permanent uniform vegetative cover.

For pastures that do not meet both of these requirements, the farmer must follow a more detailed pasture management approach using either nitrogen or phosphorus Stocking Rate Tables or a nitrogen or phosphorus based Pasture Balance Worksheet.

7. Animal Concentration Areas

ACAs (sometimes also called “Animal Heavy Use Areas”) are barnyards, feedlots, loafing areas, exercise lots or other similar animal confinement areas that will not maintain the dense vegetation of a pasture. ACAs do not include areas managed as pastures or other cropland. Animal access ways, feeding areas, watering areas, shade areas or walkways are not considered ACAs if they do not cause a direct flow of manure contaminated runoff to streams, lakes, ponds, or sinkholes.

ACAs located within 150 feet a perennial or intermittent stream, lake, pond or other surface water need to be managed to:

1. Divert clean water flow from upslope fields, pastures, driveways, barn roofs etc. away from the ACA.
2. Direct polluted runoff from the ACA area into a storage facility or treatment system such as a correctly sized and well maintained vegetative buffer or treatment area.
3. Limit animal access to surface waters to only properly implemented livestock crossings. Animals may not have free access to streams adjacent to ACAs.
4. Minimize the size of denuded areas such as sacrifice lots.
5. Keep areas where animals congregate, such as feed racks and shade, as far away from a water body as possible.

Farms that have ACAs must address the ACA in the Manure Management Plan. The plan needs to identify Best Management Practices (“BMPs”) that are currently being implemented to prevent pollution and, where necessary, include a schedule for obtaining assistance to develop and implement additional BMPs that require expert planning or where additional time is needed to obtain the financial resources to implement the necessary BMPs. Farmers working with a design professional (conservation district, NRCS, certified nutrient management planner, etc.) can be provided up to 2 years to develop a plan and up to 3 years to implement that plan

IMPLEMENTATION OF THE MANURE MANAGEMENT MANUAL REVISION THROUGH THE WIP

Pennsylvania has been quite successful in implementation of the federal National Pollutant Discharge Elimination System (“NPDES”) program, including the CAFO program regulating point source discharges from agricultural operations. In addition, Pennsylvania has the State Nutrient Management Program that overlaps with the federal point source program but also regulates agricultural operations with an animal density of more than 2000 pounds of live weight per acre of land under the management control of the farmer. Both of these programs require submission and approval of applications and include recordkeeping and reporting and a regular inspection schedule and the regulations have a high level of rule implementation and effectiveness.

Pennsylvania has not had the same success with the implementation of the Manure Management Manual. It is estimated that there may be as many as 40,000 farms in the Chesapeake Bay watershed that do not have Manure Management Plans or a PADEP approval or permit as required by the regulations at 25 Pa. Code Section 91.36(b). The PADEP plans to substantially increase the rule effectiveness with the Manure Management Manual revision.

As described above, the PADEP has worked with other state and federal agencies, representatives from organizations representing agricultural and environmental interests and farmers to draft the proposed revisions. The PADEP will continue to work with these groups over the course of the public comment period. The intention is to develop a document that has broad support and that can be completed and implemented directly by the farmer (with the exception of some ACA BMPs).

Pennsylvania plans to finalize the Manure Management Manual revisions by the spring of 2011. When completed, the PADEP plans to hold implementation workshops in targeted counties throughout 2011 to assist farmers in completing a manure management plan. The PADEP intends to follow up in these counties with a simplified enforcement approach aimed solely at farms that have not developed a plan. This process will be followed in other counties in subsequent years. The PADEP anticipates that it can achieve significant rule penetration with this approach over a two to four year period.

Pennsylvania plans to utilize future Chesapeake Bay Regulatory and Accountability Program (CBRAP) grants to expand technical resources necessary to implement the Manure Management Manual. The expectation is that \$2,000,000 will be granted in 2011 and, for the next five years,

\$400,000/year will be made available to conservation districts to increase staff capacity. These funds will be used to supplement and/or expand existing Nutrient Management Technician capabilities.

DEP also plans to revise the existing Nutrient Management Delegation Agreements to specifically include Chapter 91.36 activities. By including Chapter 91.35 in the existing delegation agreements, Pennsylvania will increase compliance inspections on small farms and increase compliance with Manure Management requirements in 36 Chesapeake Bay counties.

The Nutrient Management Technicians are currently engaged in Pennsylvania's Act 38 Nutrient Management regulatory program. The revisions to the Manure Management Manual closely track the regulatory requirements of this program. DEP will also train these staff on the Ag E&S requirements in Chapter 102 and provide outreach/education materials on Ag E&S. This will allow these staff to adequately inform all farm operator they contact of their environmental requirements.

The actual workload and outputs will vary by county, based on number/type of farms and other factors, but estimates of 100 farms per year per staff person is a reasonable expectation. In five years, about 18,000 farm operations – about half the farms in the watershed – will be in compliance with their regulatory requirements.

In addition to the focus on assuring that agricultural operations develop plans, the PADEP will also include a process to ensure that manure management plans follow the regulatory requirements and are implemented. This will include both an inspection and enforcement component and will be implemented as part of the Chesapeake Bay Agricultural Water Quality Initiative.

MANURE MANAGEMENT MANUAL REVISION PROCESS

The Manure Management Manual was published in the PA Bulletin for public review and comment on August 12, 2010. The public comment period for these revisions closes on November 12, 2010. The Manual is a DEP Technical Guidance Document, not a regulation, but these Technical Guidance Documents are required to be drafted and revised in a public process. After the close of the public comment period, DEP will review the comments, edit the Manual as appropriate and prepare the final Manual and Comment/Response Document. DEP will engage both a technical committee – made up of DEP, SCC, NRCS and Penn State staff - a small workgroup of DEP's Agricultural Advisory Board. This workgroup includes members of the technical committee, as well as, Chesapeake Bay Foundation, PA Farm Bureau, PennAg Industries and others. This Manual will then be presented to the Agricultural Advisory Board and published in the PA Bulletin as a final Technical guidance Document. (It is important to note that the Agricultural Advisory Board is legislatively established advisory group to DEP that is required by statute to review DEP policies applicable to agriculture. Its membership is established by the legislature and is made up of farm owners/operators and industry representatives appointed by the Governor.)

SUMMARY

PADEP plans to finalize a revision to the Manure Management Manual in the spring of 2011. This revision will update the standards applicable to farms, not meeting the CAO or CAFO program definitions, that land apply manure. Pennsylvania will be implementing this revised regulation as part of the Chesapeake Bay WIP and anticipates significant nutrient load reductions over the next 5 years.

Appendix 7.
Table B2
Target Load and Reduction Tables by
Source Segment for 2017 and 2025

To be Provided as an Excel Spreadsheet Attachment