Pennsylvania Phase 3 Chesapeake Bay Watershed Implementation Plan

Prepared by the
Pennsylvania Department of Environmental Protection

FINAL
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DISCLAIMER

The policies and procedures outlined in this document are intended to supplement existing requirements. Nothing in the policies or procedures shall affect statutory or regulatory requirements.

The policies and procedures herein are not an adjudication or a regulation. There is no intent on the part of the Department of Environmental Protection (DEP) to give this plan that weight or deference. This document establishes the framework within which DEP will exercise its administrative discretion in the future. DEP reserves the discretion to deviate from this plan if circumstances warrant.

Nothing contained in this document shall be construed to establish a legal requirement on the part of the Commonwealth of Pennsylvania to appropriate funds, or to require the Commonwealth or any agency thereof to take actions not authorized by law.

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ADDENDUMS

The following are addendums to the Phase 3 WIP and are integral to the final plan. These documents are “stand alone” documents that further describe how Pennsylvania intends to implement the final Phase 3 WIP. They are further referenced within the Phase 3 WIP as to the role they play and how they will be used as Pennsylvania moves forward.

The Best Management Practice Verification Plan – This document describes how Pennsylvania is going to track and verify the long-term installation of best management practices in accordance with the protocols developed by the Chesapeake Bay Program Partnership.

Community Clean Water Planning Guide – This document is a guide to be used by the lead planning team as the Countywide Action Plans for the counties in the Chesapeake Bay watershed are developed.

County-Specific Clean Water Technical Toolbox – This document captures the county-specific information needed to serve as the framework for the completion of the Countywide Action Plan.

Milestone Planning and Progress Reporting Template -- This template captures the action steps and milestones that Pennsylvania will use to report progress to EPA on a six-month basis.

Phase 2 Watershed Implementation Plan Nutrient Trading Program Supplement -- This supplement was developed to capture revisions to the Nutrient Trading Program made in response to EPA concerns with this program. It will be updated as needed as further enhancements described in the Phase 3 WIP are implemented.

Phase 2 Watershed Implementation Plan Wastewater Supplement – This supplement describes how the Wastewater National Pollutant Discharge Elimination System (NPDES) Program is implemented in Pennsylvania, with a listing of all the significant and non-significant wastewater and industrial dischargers in the Chesapeake Bay watershed.

Individual Countywide Action Plans -- These are the final plans completed for the counties, designed to address the nutrient local planning goals defined for them based on the assigned Pennsylvania nutrient planning targets. There are four completed: Lancaster, York, Adams, and Franklin counties. As each plan is completed, it will be posted on the DEP webpage as an addendum to the Phase 3 WIP.

Federal Agency Action Plans – These are the final plans for each of the federal agencies. These plans describe how each agency will manage their respective facilities to achieve the planning goals assigned to them, based on their respective loadings to the Chesapeake Bay.

EXECUTIVE SUMMARY

Approximately half of the land area from Pennsylvania drains into the Chesapeake Bay primarily from the Susquehanna and Potomac River basins. The Susquehanna is the largest tributary to the Bay, providing half of the total freshwater flow and 90 percent of the freshwater flow to the upper bay. Without the support of Pennsylvania, the Chesapeake Bay cannot be restored. Even more importantly, the water that feeds into the Chesapeake Bay is local to Pennsylvania. It is crucial that the local waters of Pennsylvania be restored for use by our citizens.

Pennsylvania and our neighboring states with river basins that drain into the Chesapeake Bay (Delaware, the District of Columbia, Maryland, New York, West Virginia, and Virginia) are each creating a Watershed Implementation Plan (WIP) that describes the work to be done to reduce pollution. The Chesapeake Bay Program Partnership recently completed a Midpoint Assessment of the 2010 Total Maximum Daily Load (TMDL) allocations for each state and re-established nutrient reduction planning targets for each jurisdiction within the watershed. The goal is to have all practices to achieve these reductions in place by 2025. Each jurisdiction's plan for meeting their phosphorus (P) and nitrogen (N) pollution reduction goals is outlined in WIPs.

Pennsylvania is committed to having all practices and controls in place by 2025 to achieve the nutrient and sediment reduction planning targets. This plan provides reasonable assurance that Pennsylvania will meet its Chesapeake Bay TMDL commitments. This document, formally known as the "Final Phase 3 Watershed Implementation Plan" (Phase 3 WIP), spells out how the state government will work in partnership with local governments and the private sector to meet Pennsylvania's goals by 2025.

With 43 counties and over 49,000 miles of streams and rivers that flow into the Susquehanna and Potomac Rivers, most of the work outlined in this document will be specific and local in scale. Early in the process, the Commonwealth sought out the leaders in these communities to determine the best way to employ practices and projects to clean up the pollution entering their waterways. Four counties were selected to be early planners — Lancaster, York, Adams, and Franklin. The other 39 counties will follow, benefiting from the lessons learned in these four pilot counties.

This document is a comprehensive strategy based on unprecedented local-level support and engagement. In the previous two versions of the Pennsylvania's WIP, there has not been this level of partnership committed to moving forward to improving local water quality. For the first time, Pennsylvania has local planning goals in a form best suited for directly engaging local, regional, and federal partners. Pennsylvania is committed to moving forward with the programmatic and legislative priorities outlined within this plan.

In addition to state government officials, hundreds of individuals representing local government, universities, businesses, agriculture, and environmental organizations

contributed their time and expertise to the development of this Phase 3 WIP. The preparation of this plan is guided by the principle that clean water is “Great for PA, Good for the Bay.” This Phase 3 WIP planning process is an opportunity for Pennsylvania state government to serve our residents and businesses — cleaning up our water, lowering flood risks, and improving the quality of life in our communities.

Public Comment

The Pennsylvania Department of Environmental Protection (DEP) sought public comment on this draft from April 12 through June 7, 2019. Forty commenters submitted 152 comments on the draft Phase 3 WIP. Appendix 4 is the Comment Response document to these comments.

Some common themes among the comments include:

- Support for collaborative approach
- Concern expressed over planning target and funding “gap”
- Clarification needed on how the Countywide Action Plan process will work
- Sector specific suggestions for additional enhancements, initiatives
- Concern over additional requirements, “unfunded mandates”
- Questions over costs for implementation
- Editing and clean-up needed

The general response to these themes is:

- Pennsylvania looks forward to implementation, continuing the same collaborative approach used to develop the Phase 3 WIP.
- The Phase 3 WIP is realistic, implementable with multiple approaches to achieve the planning targets by 2025.
- The Phase 3 WIP is flexible, with opportunity for updates, improved accounting, and modifications continuing as part of the two-year milestone process to ensure success.

EPA Evaluation of Pennsylvania's Draft Phase 3 WIP

As part of the public comment period, EPA also did a detailed evaluation of Pennsylvania's draft Phase 3 WIP. In this evaluation EPA identified the following strengths:

- Pennsylvania's collaborative approach for engagement of local partners and community engagement.
- The process for the development of the Countywide Action Plans.
- The identification of specific various commitments for each sector.
- The Inclusion of the detailed workload analysis, with an identification of available and needed resources.

EPA also identified some key areas where improvement was needed, including:

- A re-evaluation of activities since the current effort is not projected to achieve 100% of the planning targets.
- Encouragement to expand beyond the approved Bay Program Partnership approved practices and approaches for other opportunities to reduce nutrients and sediment.
- An evaluation of the Bay Program Verification Protocols to ensure the higher rate of implementation can be tracked, verified and reported.
- Enhancement of the level of implementation detail and programmatic commitment descriptions.

In response to EPA's evaluation, the final Phase 3 WIP has:

- Additional programs and practices not previously included to be counted towards progress.
- A re-evaluation of the goals that each sector could realistically achieve by 2025.
- Refined estimates for existing and available resources for implementation.
- Identification of a lead agency with a timeline for completion for each action step for reporting.
- Additional practices and programs not currently recognized that improve water quality in Pennsylvania that should be credited.
- Identified barriers to successful verification of practices that need to be addressed.

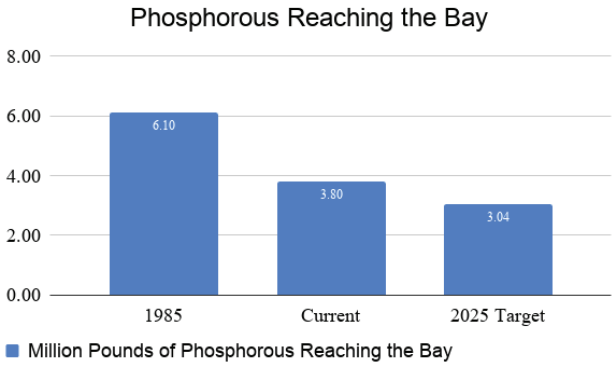
A Brief History

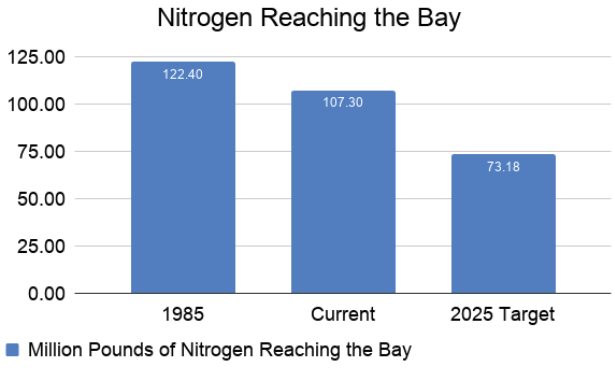
Pennsylvania's efforts to reduce nutrients running into the Chesapeake Bay began in 1985. Since then, Pennsylvania has invested a significant amount of resources through loan and grant programs aimed at restoration efforts. Over the past four years, this effort has averaged approximately $197 million per year. While significant pollution reductions from those investments have been realized, more is needed. In 2009, the U.S. Environmental Protection Agency (EPA) set expectations for Pennsylvania and neighboring states to meet by 2025. In 2010, EPA and the Chesapeake Bay Program Partnership established a Total Maximum Daily Load (TMDL) to address chlorophyll-A, dissolved oxygen, and clarity impairments within the Bay.

In 2011, Pennsylvania submitted its Phase 1 WIP to EPA. The goal of the Phase 1 WIP was to identify pollutant sources and develop source specific solutions to achieve reductions. In 2012, Pennsylvania submitted its Phase 2 WIP to EPA. The development of the Phase 2 WIP relied heavily on public input and the inclusion of adaptive management principles in the plan.

Both the Phase 1 WIP and Phase 2 WIP led to significant progress. Many streams that once were heavily polluted are now places where residents gather to swim, fish, boat, and play. Pennsylvania has cut the amount of phosphorus pollution going downstream by more than 1/3, and the amount of nitrogen pollution by about 1/6.

The figures below indicate the progress made over time from 1985 to 2017 based on annual best management practice (BMP) Progress Runs. Current efforts will continue this progress moving toward the TMDL 2025 target.





However, of the nearly 49,000 assessed miles of streams in the Chesapeake Bay watershed, 15,369 miles of streams remain polluted. By 2025, Pennsylvania must reduce nitrogen pollution levels by 34.13 million pounds and phosphorus levels by 0.756 million pounds.

Challenges

One of Pennsylvania's top assets has proved to be one of the most significant challenges of the Chesapeake Bay restoration effort. Within the watershed, we have both rural challenges and urban challenges.

Pennsylvania is a state of nonpoint source "opportunities." Compared to the other states within the watershed, the scale of the nonpoint source challenges in Pennsylvania is one of the most significant factors that has impacted past progress, but one that also presents opportunities for future success. As a state with 33,000 farms within the Susquehanna and Potomac basins, the scale of nonpoint source challenges is staggering, but not insurmountable.

Pennsylvania has steadily improved the capability to document reductions from programs not included in previous WIPs. There are more BMPs happening "on the ground" than what has historically been accounted for in the Chesapeake Bay Watershed Model used to estimate the pollutant loads going to the Bay.

Within Pennsylvania's share of the watershed, there are over 350 municipalities with National Pollutant Discharge Elimination System (NPDES) permitting obligations relative to Municipal Separate Storm Sewer Systems (MS4s), which is another challenge to addressing local and Chesapeake Bay water pollution. Pennsylvania is a large state that values its agricultural industry and local government partners. Since one size does not fit all, local level support is essential to meet the pollution reduction goals.

Consequences

Failing to restore Pennsylvania's impaired waters will mean that our drinking water resources, outdoor recreation, wildlife, and public health and safety will remain impacted. Local communities will continue to suffer from pollution-related problems such as stormwater and flood damage, contamination of drinking water sources, fouled waterways, and lost recreation opportunities.

Additionally, if EPA determines that Pennsylvania cannot meet its goals on its own, EPA has stated it may increase federal enforcement and compliance efforts. For example, EPA has outlined possible consequences including:

- New nitrogen and phosphorus numeric water quality standards for streams and rivers in Pennsylvania;
- More animal feeding operations, industrial and municipal stormwater sources, and urban areas to obtain Clean Water Act permits;
- Stricter nutrient or sediment reductions for those that already have permits;
- Redirection of EPA grant funding away from the state's priorities to its own priorities.

Purpose

The Phase 3 WIP outlines how Pennsylvania will avoid these consequences and achieve its goals, because “Clean water is great for PA, and good for the Bay.” The Phase 3 WIP and the Addendums specify the steps Pennsylvania will take through 2025 to meet local water pollution reduction goals in the Bay watershed. Pennsylvania will continue to implement the previous WIPs. This WIP builds on the strengths of those previous plans and further sharpens the focus on accelerating progress to meet the 2025 goals. **Section 1** introduces Pennsylvania’s Phase 3 WIP, including an overview of the collaborative process by which the Phase 3 WIP was created and an examination of the planning targets the Phase 3 WIP aims to achieve.

Section 2, State Actions, calls on the state government to coordinate the activities of all the partners, provide resources and technical assistance, and report on progress to EPA and our neighboring states, through a combination of programmatic and numeric strategies and priority initiatives. Pennsylvania DEP’s Chesapeake Bay Office will have responsibility to coordinate the implementation support elements of Pennsylvania’s efforts to implement the Phase 3 WIP.

This section of the WIP describes what state partners are already doing to reduce pollutants, as well as the various legislative, programmatic, regulatory and compliance initiatives for which the state agencies have the lead. Among the significant initiatives described are the significant funding needs for the Phase 3 WIP that fall on the state agencies and state legislature to address. The Phase 3 WIP Funding Workgroup estimates that the current public investment in waterways cleanup in the areas upstream of the Chesapeake are approximately $197 million per year. The total investment in both public and private funding from all sources needed to achieve the 2025 goals is estimated to be $521 million per year — an annual gap of $324 million. This section describes the range of options the Phase 3 WIP partners recommend state legislature consider for long-term funding of the Phase 3 WIP with a strong preference for legislation that would create a dedicated and stable funding source for these investments. This section also discusses a recommended amendment to the Right to Know Law that would extend confidentiality protections to farmers who implement or report BMPs on their land. Additionally, proposed fertilizer legislation could address a significant source of nitrogen and phosphorus flowing into Pennsylvania’s waterways.

In addition to the programmatic priorities and the actions already being taken, this section lays out a vision for how the agriculture, forestry, stormwater, and wastewater sectors will achieve additional reductions of the pollution they contribute to Pennsylvania’s waterways and the Bay downstream. To develop the Phase 3 WIP, a collaborative, deliberative approach was taken, with workgroups of stakeholders representing agriculture, forestry, stormwater, and wastewater sectors. This section of the Phase 3 WIP describes the new or additional actions for which the state partners will focus in each of these sectors in order to achieve the 2025 targets.

Agriculture

As discussed above, the agricultural sector in Pennsylvania presents a significant nonpoint source opportunity. The Phase 3 WIP envisions that the state and its partners will work with agriculture in seven strategic areas:

1. Agricultural Compliance -- Ensure farmers are continuing to implement their state required Agricultural Erosion and Sediment Control (Ag E&S) or conservation plan, Manure Management/Nutrient Management Plan, and are implementing required barnyard runoff controls, where needed.

2. Soil Health -- Use crop and soil management practices that improve long-term soil health and stability.

3. Expanded Nutrient Management -- Both manured and non-manured farmlands use nutrient management plans and precision nutrient management practices.

4. Manure Storage Facilities -- Install and use animal waste management systems, meeting state regulatory requirements, to adequately store manure for effective nutrient use.

5. Dairy Precision Feeding -- Use precision feed management to reduce nitrogen and phosphorus in manure.

6. Integrated Systems for Elimination of Excess Manure -- Create integrated (county/regional) programs for transport and/or beneficial use of excess manure.

7. Forest and Grass Riparian Buffers -- Plant perennial herbaceous or forest buffers along streams.

Forestry

Statewide, more than half of Pennsylvania's land area is forest (approximately 17 million acres). About 70% of Pennsylvania's forests are privately owned, including 5% held by forest products companies. Approximately 30% of Pennsylvania forests are public lands. Forests and trees in Pennsylvania provide numerous benefits to the Commonwealth, including recreational opportunities, habitat for animals and forest plants, timber, and non-timber forest products, as well as benefits to water quality. Forests are natural pollution filters — holding rainfall, trapping polluted runoff, and stabilizing soils.

However, many forests have been cleared in agricultural, urban, and suburban areas. The Phase 3 WIP envisions that the state and its partners will work with forestry in five strategic areas:

1. Forest Riparian Buffers -- Plant trees and shrubs along streams

2. Tree Canopy -- Plant trees in developed areas.

3. Woods and Pollinator Habitat -- Convert lawn and turf areas to woods and meadows.

4. Forest and Natural Area Conservation -- Provide credits for land conservation and revise zoning and ordinances to conserve existing natural areas

5. Stream and Wetland Restoration -- Support efforts to restore local streams and wetlands.

Stormwater

Stormwater from developed land may carry pollutants such as sediment, automotive liquids, lawn fertilizers, pesticides, pet waste, trash, and other contaminants into waterways. The Phase 3 WIP contains recommendations for the following seven actions to further reduce stormwater related pollution to local waterways and the Bay:

1. Implement pollutant reduction plans for Municipal Separate Storm Sewer Systems (MS4) Communities -- As one component of the 2018 permit, MS4 permittees must implement management practices to achieve the reductions identified in their respective Pollutant Reduction Plans (PRPs) by 2023.

2. New riparian forest buffers -- Plant trees and shrubs along streams.

3. Control measures for illicit discharges – DEP to facilitate municipal ordinance amendments to control illicit discharges to storm sewer systems.

4. Industrial stormwater -- DEP to develop technical guidance, intended to supplement existing requirements, to inform industrial stormwater discharge permittees engaged in these activities. This guidance will list appropriate BMP utilization, design standards and implementation to reduce pollution which are acceptable to manage industrial stormwater.

5. Fertilizer legislation – This proposed legislation could result in nutrient reductions in urbanized areas. When passed, it is estimated that this legislation could reduce nitrogen runoff by 105,000 pounds per year and phosphorus runoff by 4,000 pounds.

6. Erosion and Sediment Control (E&S Control) and Post-construction Stormwater Management (PCSM) -- Continue permitting, inspecting, and ensuring compliance with Pennsylvania’s erosion and sediment control and post-construction stormwater permit requirements, found in 25 Pa. Code Chapter 102, including DEP programs that implement these provisions not previously reported to the Chesapeake Bay Program for progress. Initial estimates of the projected reductions from the implementation of these programs between now and 2025 are 433,000 pounds of nitrogen and 32,000 pounds of phosphorus.

7. Dirt and Gravel Roads -- Continue to implement the Dirt and Gravel Roads Program through the Center for Dirt and Gravel Roads.

Wastewater

Wastewater is the sewage or liquid industrial waste from homes, businesses, schools, industrial facilities, and other institutions. Most wastewater in Pennsylvania is treated before it is released into waterways. Pennsylvania's wastewater sector has greatly reduced its contribution of nitrogen and phosphorus to the state's waterways. To reduce these pollutants even more would be extremely costly. The three priority strategies for wastewater are:

1. Continue Current Treatment – Existing significant wastewater treatment systems will continue the successful treatment levels already achieved with biological nutrient removal.

2. Plant Optimization Program – Expand DEP's current assistance program to maximize operations at wastewater systems to achieve additional reductions where appropriate.

3. Municipalities Implement Onsite Septic System Inspection and Pumping Programs – As a requirement under the Act 537 Sewage Facilities Planning Act, municipalities are required to implement onsite septic system inspection and pumping programs. However, the implementation of these programs is not currently tracked or documented. Municipalities will work with DEP to ensure proper tracking and achieve further reductions.

Finally, Section 2 proposes accounting for actions occurring in the state which reduce nitrogen, phosphorus and sediment pollution that are not currently credited in the Chesapeake Bay Watershed Model. There are several very successful programs in place designed to improve Pennsylvania's local streams and waterways that do not currently report progress towards achievement of nutrient and sediment reductions to the Chesapeake Bay Program. There are also new initiatives underway in Pennsylvania that will further accelerate our progress. Section 2 provides details regarding these programs and the expected reductions from these programs. This section includes the state's commitment to expand its capabilities to collect real-time water quality data to document water quality improvement and progress.

Section 3, Countywide Actions, outlines how the counties located within the basin can reduce pollution flowing into Pennsylvania's streams that drain into the Chesapeake Bay. Forty-three of Pennsylvania's counties contain waterways that drain to either the Susquehanna or the Potomac rivers.

The Chesapeake Bay Program has modeled Chesapeake Bay pollution sources, including pollution entering Pennsylvania's waterways and where it originates. Each Pennsylvania county has its own goal to reduce its share of pollution. Some counties have more work to do than others. The Phase 3 WIP Steering Committee grouped the 43 counties into four tiers. Tier 1 counties have the most pollution to reduce, and Tier 4 counties have the least.

Continuing the collaborative, deliberative approach to meet the restoration goals, the Commonwealth will work with each of these counties to develop Countywide Action Plans (CAPs) for clean water that are realistic and able to be accomplished by local communities. County-level planning is the most feasible planning scale in terms of size, number, existing data, and ability to organize resources. Pennsylvania's nitrogen and phosphorus reduction targets are broken down into local planning goals for each of these 43 counties.

It is important to note that the county clean water goals do NOT establish any new requirement or regulatory obligation on counties. These goals are simply a way for Pennsylvania to engage with local partners on shared issues and focus resources on efforts that help Pennsylvania reach its Chesapeake Bay goals.

Each of these counties will receive a county-specific pollution reduction goal, planning tools, and a customized technical toolbox. County leaders can use the toolbox to develop a mix of approaches that best fits the local needs and desires for local waterways. As examples, some of the options might include environmental education, regulation and permitting, public works investments, restoration projects, and assistance to streamside property owners.

As part of the Phase 3 WIP planning process, Pennsylvania invited four of the 43 counties in the Chesapeake Bay watershed to participate in a pilot project to develop local CAPs. Lancaster and York counties began in spring 2018, and Adams and Franklin counties began in fall 2018. The Tier 1 counties (Lancaster and York) were completed as part of the pilot project. For the next phase, there are four remaining Tier 2 counties to be completed. These counties will be completed first, as the seven Tier 1 and Tier 2 counties collectively account for 54% of Pennsylvania's nitrogen and 42% of Pennsylvania's phosphorus loads. The remaining 35 Tier 3 and Tier 4 counties will complete their plans after the Tier 2 counties are completed. These 35 counties collectively account for the remaining 46% of Pennsylvania's nitrogen and 58% of Pennsylvania's phosphorus goals.

Section 4, Federal Actions and Coordination, outlines the federal role of the Chesapeake Bay restoration effort. There are federal facilities operated by the U.S. Department of Defense (DOD or Department of Defense), National Park Service, U.S. Fish and Wildlife Service and the General Services Administration in 24 counties in Pennsylvania's portion of the Chesapeake Bay watershed. Each of these federal facilities have nutrient reduction goals assigned and are required to submit a plan to the Commonwealth for how they will achieve these reduction goals. The Department of Defense and the U.S. Fish and Wildlife Service have submitted their plans. DEP is working with EPA and the other federal agencies to complete the plans for the other federal agencies. The total annual reduction goals from these federal facilities is 97,358 pounds of nitrogen and 9,316 pounds of phosphorus.

Successful implementation of the Phase 3 WIP will require improved coordination and cooperation between the Commonwealth and federal agencies to track and report on

the work they do together to meet Phase 3 WIP goals. Additionally, Pennsylvania will continue to need funding from EPA for pollution reductions projects. This section highlights three areas for further coordination:

- Tracking and reporting efforts by the Natural Resources Conservation Service (NRCS) to install many of the pollution prevention practices described in this document.

- Closing gaps in how the partners measure, verify, and report on BMPs and wetland restoration projects.

- Revisions to EPA's Clean Water Act Section 319 grants to make those funds available for projects that meet the goals of the Phase 3 WIP.

Section 5, Existing and Needed Resources describes how the Phase 3 WIP goals will require an increased investment of approximately $324 million per year in both public and private funding, and outlines where the money comes from currently, how it is used, and possible sources of additional financial resources. These figures do not account for investments from individual, private investors or local funding that is not currently reported. Recent surveys show a large amount of water quality improvements come from private dollars either directly or indirectly that have not been captured in the figures below. It would be valuable to capture not only all practices going on the landscape but also all resources being expended through this effort.

Currently, there are approximately 88 state agency staff involved in the Chesapeake Bay cleanup effort; however, it is projected that this number needs to increase to 188. There are approximately 186 external agency staff supported with state or federal agency resources, such as county conservation district staff, contributing this effort. It is estimated an additional 154 of these external agency staff people are needed. Total costs for these staff resources is $52,008,734.

Existing	Existing Resources 2018	$168,522,608
	Existing Staff Resources	$28,285,954
	Total	$196,808,562
Total Needed Resources	Statewide Practice Implementation	$311,779,000
	Pilot County Practice Implementation[1]	$157,170,000
	Staffing Resources	$52,148,734
	Total	$521,097,905
	Annual Funding Gap	**$324,289,173**

Pennsylvania will consider a phased approach to filling this funding gap. With this approach, at a minimum, at least $100 million annually for BMP implementation is recommended as a first phase for implementation. With this, the top four priority initiatives are identified. These four initiatives alone will help to achieve 50% of the nitrogen reduction goal and 86% of the phosphorus reduction goal. Some amount of the $52 million identified for existing and new agency and external staff resources for

technical support would also be needed to implement this effort. A minimum of five percent of the cost of implementation is recommended. See the table below.

Priority Initiative	Cost (in millions)	Nitrogen Reduction	Phosphorus Reduction
Agricultural Compliance	$33.1	14%	12%
Soil Health	$32.9	14%	14%
Forest Buffers	$28.1	16%	41%
Grass Buffers	$3.4	8%	37%
TOTAL	**$97.7**	**50%**	**86%**

Section 6, Documenting, Tracking and Verifying, describes Pennsylvania's efforts to improve the existing Data Management Systems and the capability to document, track and verify the installation of practices. Revisions and enhancements to Pennsylvania's BMP Verification Plan are also highlighted. Finally, the inordinate amount of financial and staffing needed to "keep" BMPs in the modeling tools, while putting more BMPs on the ground, is insurmountable, and continued engagement with our partners, including EPA, is necessary.

Section 7, Milestones and Progress Reporting, describes the action steps that Pennsylvania will take to implement the priority initiatives in the Phase 3 WIP. DEP will report progress on these action steps to EPA every six months. These six-month progress reports are in addition to the annual numeric progress reports completed by DEP, and the annual progress reports completed by the counties on their CAPs. Updates to these action steps and the CAPs will be done every two years.

The action steps are divided into five categories:

1. Communication and Outreach
2. Funding and Resources
3. Expanding Capacity for Technical Assistance
4. Reporting and Tracking
5. Compliance

Section 8, Accounting for Growth, considers growth within the watershed. Pennsylvania's framework to offset this growth includes:

- Conserving and protecting wetlands
- Conserving and limiting development in riparian areas
- Modernizing local planning and zoning to conserve critical forests and habitats
- Preserving farmland as part of a holistic approach to conserving working lands

Section 9, Climate Change, discusses how the Phase 3 WIP will account for the trend that climate scientists forecast related to more rain and more frequent intense storms in Pennsylvania. These anticipated climate change effects create new challenges for the local waterway cleanup effort.

The Chesapeake Bay Program Partnership has used computer models to predict how climate change will influence nutrient loads in 2025. These scientists estimate that Pennsylvania will need to reduce another 4.135 million pounds of nitrogen and 0.141 million pounds of phosphorus due to changing weather patterns.

The Phase 3 WIP calls for many actions that are beneficial in a changing climate. The actions that reduce pollution also restore soil health, soften the blow from floods, create habitat, and capture carbon from the atmosphere. This section provides recommendations for making the most of the opportunities to target investments in areas that accelerate waterways cleanup and prepare our communities for a changing climate.

Section 10, Communication and Engagement Strategy, acknowledges that it will take a team effort to accomplish the initiatives included in the Phase 3 WIP. This section outlines how the state has — and will — coordinate the effort among dozens of partners through 2025.

The process for developing the draft Phase 3 WIP has been inclusive and transparent, with dozens of organizations and scores of individuals actively engaged in all elements of the Phase 3 WIP. Nearly 100 people from the public and private sectors serve on the Phase 3 WIP Steering Committee and workgroups. All Steering Committee and workgroup meetings are open to the public. This successful structure will remain in place, with the Steering Committee being converted to a Phase 3 WIP Action Team. This Action Team will be responsible for overseeing the implementation of the Phase 3 WIP, modifying the two-year milestones and tracking progress.

The Phase 3 WIP Communications and Engagement Workgroup developed a matrix of conferences, meetings, and professional periodicals that will deliver information about the Phase 3 WIP to industry sectors and stakeholders. For the general public, DEP has developed a “Healthy Waters, Healthy Communities” communication campaign to guide its media and digital outreach. At the county level, the planning teams will also provide outreach to civic and business leaders and citizens as they write their CAPs.

To fulfill the goals of this plan, it will be critical to overcome the three primary hurdles to engagement: (1) ideologic – developing an understanding of the value of the practices; (2) technical – ensuring that once interested in implementation, tools are available to aid in selection, design, and installation; and (3) funding – providing resources to those that are willing and able to implement the selected practices. The Communications Offices of DEP, DCNR and PDA, in partnership with the Phase 3 WIP Communications and Engagement Workgroup, have the lead in focusing on the ideologic hurdle to ensure that the Phase 3 WIP is implemented.

Section 11 concludes Pennsylvania’s Phase 3 WIP. The total projected reduction for phosphorus in the Phase 3 WIP will be 918,000 pounds. Since Pennsylvania successfully exceeded its 2025 reduction goal for phosphorus by 139,367 pounds, Pennsylvania is proposing to exchange that phosphorus reduction for nitrogen reduction

based on the EPA's provided conversion factors. For the Susquehanna River Basin, one pound of phosphorus may be exchanged for 2.36 pounds of nitrogen. In the Potomac River Basin, one pound of phosphorus may be exchanged for 1.58 pounds of nitrogen. This results in Pennsylvania achieving an additional 307,946 pounds reduction of nitrogen.

In addition, with the four completed CAPs, Pennsylvania is projecting reductions of 24.81 million pounds annually through the implementation of the Phase 3 WIP as currently drafted. Pennsylvania commits to have practices and controls in place by 2025 necessary to achieve the final Phase 3 WIP phosphorus and nitrogen targets. Pennsylvania, in conjunction with the Partnership, will utilize an adaptive management approach to achieve our collective desired outcome. The two-year milestones and six-month progress reporting will allow for the assessment of the implementation progress and targeted adjustments to programs and priorities to ensure the practices and controls called for in the Phase 3 WIP are achieved by 2025. The additional reductions needed will be achieved through the completion of the remaining CAPs and improved documenting, tracking and verification of existing practices and programs.

Development of the Phase 3 WIP is just the first step in this final phase of TMDL implementation, to be followed by a series of further planning and implementation activities necessary to restore and maintain the health of the Chesapeake Bay and restoration of local waters. Future activities will include implementation of practices; tracking and reporting of implementation for evaluation of milestone progress every six months; and practice verification. Federal, state, and local coordination and partnership in these activities is vital.

To ensure sufficient progress to achieve the 2025 targets, and avoid possible consequences of insufficient progress, Pennsylvania will continuously evaluate technical issues regarding the pace of implementation. Pennsylvania will also evaluate feasible implementation rates and share this information with the Pennsylvania partnership and stakeholders as part of the milestone development process.

SECTION 1. INTRODUCTION

I. BACKGROUND

In 2010, the Chesapeake Bay Total Maximum Daily Load (TMDL) was established by the U.S. Environmental Protection Agency (EPA). This historic clean-up plan provides a guide for reducing pollution and restoring clean water to the Chesapeake Bay and its local rivers and streams. To guide these efforts, Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia, and the District of Columbia (collectively referred to as the "Bay jurisdictions") created a series of roadmaps—known as Watershed Implementation Plans (WIPs)—describing how each will achieve the pollution reductions called for in the TMDL.

There are three phases of WIPs. Phase 1 and 2 WIPs were developed in 2010 and 2012, respectively, and describe actions to be implemented by 2017 and 2025 to achieve the goals of the TMDL. Phase 3 WIPs, under development in the 2017 to 2019 timeframe, describe actions the seven Chesapeake Bay jurisdictions intend to implement through 2025 to meet Chesapeake Bay restoration goals, based on the Chesapeake Bay Program Partnership's midpoint assessment of progress. This midpoint assessment was completed in 2017.

The Phase 3 WIP builds on strengths and seeks to address the weaknesses of the Phase 1 and Phase 2 WIPs. Pennsylvania will continue to implement pollutant reduction activities identified in those earlier WIPs. The Phase 3 WIP specifies the steps Pennsylvania will take through 2025 to meet local water pollution reduction goals in the Chesapeake Bay watershed.

The Pennsylvania Department of Environmental Protection (DEP) is the primary state agency with the statutory mandate to implement the Chesapeake Bay TMDL under the federal Clean Water Act in Pennsylvania and is therefore the lead author of this document. DEP notes however, that the Phase 3 WIP development process was built on the fundamental recognition of the need to approach identification and implementation of goals and actions in a much more deeply collaborative fashion with all public, private, federal, state, and local stakeholders. While DEP is the drafter of this document, Pennsylvania's Phase 3 WIP will only be successful if all who have been engaged in the development of the recommendations on which it is based continue to work together to make this plan a reality.

It is important to recognize that Pennsylvania is unique to the rest of the Bay jurisdictions and will require a unique approach to meeting water pollution reduction goals. Pennsylvania is a large state and therefore inherently has a significant impact on the water quality of the Chesapeake Bay. For example:

- Pennsylvania encompasses 35.2% of the Chesapeake Bay watershed.
- The Susquehanna River provides 50% of the total freshwater flow to the Chesapeake Bay. Pennsylvania's portion of the Potomac River basin provides an

additional 2%. There is also a portion of Chester County that drains to the Eastern Shore watershed, and a portion of York County that drains to the Western Shore watershed, which leads directly to the Chesapeake Bay.

- Pennsylvania is designated as responsible for 69% of the remaining basinwide nitrogen load reductions by 2025.

Pennsylvania is a state of nonpoint source "opportunities." Compared to the other states in the watershed, the scale of the nonpoint source challenges in Pennsylvania is one of the most significant factors that has impacted past progress and will impact future success. For example:

- Agriculture Sector:
    - Of the 33,000 farms, less than 400[1] are large enough to be considered a Concentrated Animal Feeding Operation (CAFO), which are required to have a National Pollutant Discharge Elimination System (NPDES) permit.
    - Less than 1,000 farms are regulated as Concentrated Animal Operations (CAOs), which are required to have and implement a Nutrient Management Plan.
    - All farms must comply with Pennsylvania's Chapter 91 Manure Management and Chapter 102 Agriculture Erosion and Sediment (E&S) Control regulations.
- Urban Stormwater
    - There are over 350 Municipal Separate Sewer Systems (MS4s) in Pennsylvania's portion of the Chesapeake Bay watershed.
    - Nearly 75% of developed acres in the Chesapeake Bay watershed are outside of an MS4 or combined sewer system area. However, any persons proposing earth disturbance activities must comply with planning, permitting, implementation and maintenance requirements in Pennsylvania's Chapter 102 E&S Control and (Post-Construction Stormwater Management (PCSM) regulatory requirements, regardless of location.

In contrast, Pennsylvania's point source or Wastewater sector:

- Has met the required 2017 reduction goals three years early at a cost of $1.4 billion.
- Is on track to meet the 2025 goals without further enhancements.

[1] The public report of permitted CAFOs can be found on DEP's website at www.pa.gov/CAFOs

With the establishment of the TMDL, the need for consistent and broad-ranging BMP data became critically important to attain adequate yearly progress. These data sources and systems include permit programs, grant and cost-share awards, and special efforts to collect and report BMPs that have not been previously accounted for or are implemented outside of government oversight. On December 1 of each year, Pennsylvania reports these BMPs to the EPA Chesapeake Bay Program Office. There have been growing pains in developing this capacity while also working with limited funding.

Since 2010, improvements in data collection through programs and new data sources have been steady. Improving the data management protocols and the capability to document progress was one of six priorities identified as part of the 2016 Pennsylvania Restoration Strategy announced by Governor Wolf to accelerate progress. The results have shown that with each refinement of data submitted to the Chesapeake Bay Watershed Model, Pennsylvania is able to demonstrate increased reductions.

It is also important to note that Pennsylvania still does not receive full credit for many currently implemented practices, particularly practices implemented through permit programs and practices implemented without public assistance through grant and cost-share awards. Improved data collection around these practices will be addressed during implementation of the Phase 3 WIP at both the state and local level as part of the BMP Verification Plan and other steps taken as outlined in Section 2, State Actions and Section 4, Federal Actions and Coordination.

DEP is currently evaluating and quantifying additional practices that Pennsylvania has previously implemented and will implement in the future to assure Pennsylvania will receive full credit and achieve its nutrient reduction planning targets. Pennsylvania will continue to work to receive full credit for implemented practices across the Chesapeake Bay watershed. Additionally, DEP is evaluating its permitting requirements to facilitate a smooth process for practice implementation. As part of that effort, DEP has identified the need for more timely reviews and responses when state and federal partners have a role in the permit process.

II. PENNSYLVANIA'S COLLABORATIVE PROCESS

Crucial to the development and future implementation of the Phase 3 WIP is the collaborative, deliberative approach taken. This approach focuses on impacts and projects at the local level, with the state as a committed partner in the effort. To facilitate this approach, a comprehensive, sustained engagement strategy is necessary. The strategy developed is described in detail in Section 10, "Communication and Engagement Strategy."

This strategy has three dimensions:

1. Widespread collaboration with multiple partners from multiple sectors and localities in developing, writing, and implementing the Phase 3 WIP;

2. Strategic inclusion and engagement with different sectors and localities throughout the Phase 3 WIP planning process to ensure that all concerns, needs, and goals are addressed throughout the planning process; and

3. A strategic communication effort to ensure understanding of and support for the plan among key stakeholders as well as throughout the watershed.

These extensive efforts have facilitated widespread improved understanding of the requirements for the Phase 3 WIP, in diverse and sustained collaboration, and in new partnerships. As a result, the Phase 3 WIP has widespread shared ownership, is well informed by those working on the ground, and enhances reasonable assurance that Pennsylvania will achieve improvements in local water quality and the 2025 Chesapeake Bay targets.

Completed efforts include the following:

1. Widespread collaboration in developing and writing the Phase 3 WIP:
   - An active 20-member Steering Committee;
   - Seven active workgroups, including one dedicated to Communication and Engagement; and
   - Countywide Action Plans for four pilot counties.

2. Strategic inclusion and engagement throughout the planning process. A complete summary of the input received from the different listening sessions, forums, focus groups, etc. can be found in Appendix 2, Summary of Local Engagement.
   - June 5, 2017 Phase 3 WIP Kickoff and Listening Session that attracted 240 participants from multiple sectors and communities;

- April 10, 2018 Session with nearly 200 participants to review and discuss local planning and a Community Clean Water Toolbox to be used in the development of the Countywide Action Plans;
- Aug. 30, 2018 Pennsylvania Best Management Practice Verification Program Planning Summit;
- Other forums, focus groups, and roundtables focused on the completion of the sector-specific action plans for the Phase 3 WIP and other issues of interest to local governments in the watershed.

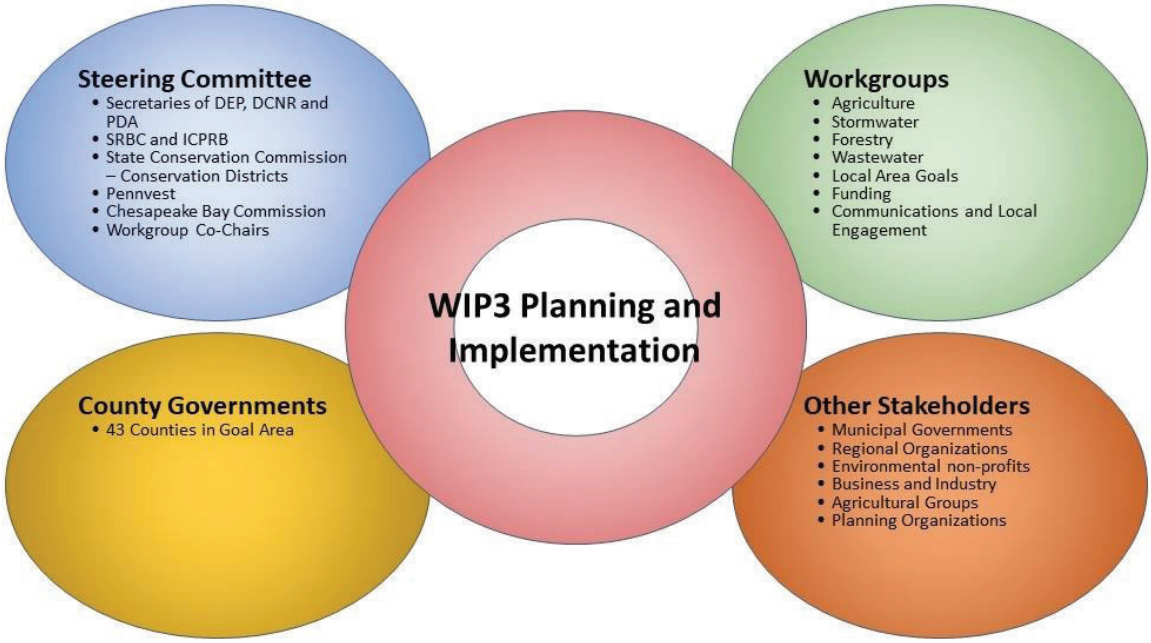
3. Strategic communication effort:
   - Development of a "Healthy Waters, Healthy Communities" communications strategy;
   - Development of accurate, readable, accessible outreach materials.

4. Public comment period on the draft Phase 3 WIP:
   - Received comments from 40 representatives of local, county, state government; academia; non-profit and for-profit organizations; private consultants; and other interested parties.
   - Appendix 4, Comment Response Document is a complete summary of these comments and DEP's response.

A. Phase 3 WIP Steering Committee and Workgroups

To coordinate and lead this effort, a Pennsylvania Phase 3 WIP Steering Committee was created. Nearly 100 people from the public and private sectors are either members of this Phase 3 WIP Steering Committee or one of seven workgroups as illustrated in Figure 1.1. All Steering Committee meetings and workgroup meetings were open to the public.

Figure 1.1. Collaborative Process Framework



Chaired by the Secretary of DEP, members of the Steering Committee included the Secretaries of Agriculture and of Conservation and Natural Resources; Chair, Chesapeake Bay Commission; Executive Secretary, State Conservation Commission; Executive Director, Susquehanna River Basin Commission; Executive Director, Interstate Commission of the Potomac River Basin; Executive Director, Pennsylvania Infrastructure Investment Authority; and the Workgroup Co-chairs.

The mission of the Steering Committee was to advise DEP in the effective development of the Phase 3 WIP so that the final plan:

1. Is implementable to achieve the TMDL nutrient and sediment load reduction allocations for Pennsylvania.

2. Results in local water quality improvement while restoring the Chesapeake Bay.

3. Addresses EPA's expectations as described in their finalized "Expectations for the Phase III Watershed Implementation Plans" documentation including:
   - Pollutant Source Sector-specific plans for reductions;
   - Local area planning goals;
   - A consideration of climate change, Conowingo Dam, and sector growth, depending on Partnership resolution of these issues.

4. Addresses the additional special conditions and expectations EPA has delineated for Pennsylvania due to the Commonwealth's current "backstop" status for the agriculture and urban sectors.

5. Includes stakeholder input, public engagement, and public comment.

The seven workgroups established to develop the Phase 3 WIP are:

- Agriculture
- Communication and Engagement
- Forestry
- Funding
- Local Area Goals
- Stormwater
- Wastewater

Each workgroup was co-chaired by leaders in the private, nonprofit, and public sectors, and had dedicated state agency staff support. They set their own meeting schedules and conducted their own outreach to their relevant constituencies. These meetings were open to the public, and workgroups occasionally shared joint meetings. The dates and times of these meetings were posted on the DEP Phase 3 Steering Committee Actions webpage.

The workgroup co-chairs, besides being part of the Steering Committee, also met monthly to coordinate efforts. Two independent facilitators, Jennifer Handke, Consulting with a Purpose, and Dr. Frank Dukes, University of Virginia, facilitated the workgroup co-chairs meetings. Ms. Handke and Dr. Dukes also provided support to individual workgroups. The Susquehanna River Basin Commission and the EPA Chesapeake Bay Program Office provided technical support. Eric Eckl and Avia Huisman, Water Words That Works, provided marketing, outreach, and messaging support.

A complete list of the Steering Committee members and the seven workgroup members can be found in Appendix 1, Steering Committee and Workgroup Members. A summary of the recommendations from the seven workgroups can be found in Appendix 3, County and Phase 3 WIP Workgroup Recommendations.

B. Four County Pilot Planning Process

The Local Area Goals Workgroup developed a planning process, a Community Clean Water Planning Guide, and a county-specific Community Clean Water Technical Toolbox with support from DEP, the EPA Chesapeake Bay Program Office, the Susquehanna River Basin Commission (SRBC) and the Communications and Engagement Workgroup. The purpose of this planning process and the toolbox was to assist in the development of the local Countywide Action Plans (CAPs) as defined in Section 3. Countywide Actions. The process and materials were pilot-tested in Lancaster, York, Franklin, and Adams counties in the summer and fall of 2018.

Lancaster and York presented their respective final CAPs to the Steering Committee in January 2019; Franklin and Adams presented theirs in March 2019.

The CAPs are intended primarily to improve local water quality and to provide related benefits for those localities. The CAPs developed by the counties included priority goals and initiatives, action steps, the identification of responsible parties, and available and needed technical and financial resources. In addition, the four pilot counties shared lessons learned throughout the process to make the development of CAPs in other counties across Pennsylvania's Chesapeake Bay watershed more efficient and effective.

On September 21, 2018, midway through the pilot projects, the pilot counties gathered to share updates. Pilot counties shared their local planning process and identified challenges, lessons learned, and recommendations for a more effective process.

In November and December 2018, joint planning meetings were held with each of the four pilot counties and the Steering Committee workgroup co-chairs, DEP Chesapeake Bay Program office staff and the Phase 3 WIP technical support team. The purpose of these meetings was to share both county planning team and state Phase 3 WIP workgroup draft recommendations for nutrient reduction, identify overlaps and resulting nutrient reductions, explore areas for further reductions, and recommend and decide next steps for moving forward together. The final CAPs for the four counties are a merging of the Phase 3 WIP workgroup sector recommendations and the identified local initiatives and priorities.

Relevant lessons from this pilot process were incorporated into a revised Community Clean Water Planning Guide and county-specific Clean Water Technical Toolbox that will be provided to other counties.

C. Engagement Strategy

The Engagement Strategy incorporates communications and outreach tools to raise awareness, increase knowledge, and inspire actions to help reduce pollution in local streams and rivers in Pennsylvania. This strategy is targeted to residents, municipal officials, legislative leaders, farms, and businesses within the 43 counties in the Chesapeake Bay watershed and across the Commonwealth.

The strategy contains three goals:

1. Help Pennsylvania make significant progress in reducing the amount of nitrogen, phosphorus, and sediment Pennsylvania is putting into local waters and, ultimately, the Chesapeake Bay.

2. Demonstrably increase target audience's awareness and knowledge of the value and benefits of healthy local streams and rivers; the negative impacts of nonpoint source pollution; and actions they can take.

3. Increase positive behaviors by individuals to help reduce these pollutants.

Principles used to accomplish these goals may be summarized as follows:

- Focus on the restoration of Pennsylvania's waters.
- Develop and provide timely, mainstream, and relatable messaging. Avoid governmental, policy and academic jargon.
- Increase efforts to garner positive mainstream media coverage.
- Enlist and leverage supportive advocates such as farmers, hunters and other outdoor sportsmen/women, business owners, sports figures, and others who are not conventional environmental advocates, to show support of clean water to their audiences through their own channels.
- Publicly recognize positive actions, progress, and successes by highlighting success stories through social media, blogs, and newsletters, and by hosting press events.

Partners engaged in the effort to raise awareness and promote plan engagement goals include Pennsylvania Department of Environmental Protection (DEP) Communications Office; Pennsylvania Department of Agriculture (PDA) Communications Office; Pennsylvania Department of Conservation and Natural Resources (DCNR) Communications Office; Phase 3 WIP Communications and Engagement Workgroup; DEP Chesapeake Bay Office; other Bureaus within DEP's Office of Water Programs, and private industry.

A critical piece to the Phase 3 WIP's success is the development and distribution of a clear and easy to understand message. Partner assistance is needed to:

- Identify the appropriate audience(s).
- Develop effective audience-focused outreach materials that are easily accessible.
- Identify appropriate communication tools and methods to reach those audiences.
- Identify and enlist supportive advocates who can assist in delivering materials and messages.

To address identified outreach needs:

1. DEP hired a Communications and Marketing firm to help with the development of outreach materials and the identification of methods to reach different target audiences. Work products include summary informational sheets, graphics for presentations, whole overview presentations to brief the counties and the basics for the larger WIP presentation. Additionally, the firm provided the framework for

the updated WIP website and translated technical language to be readable for the general public.

2. The Steering Committee created the Communications and Engagement Workgroup to facilitate the development and definition of the message for different target audiences and to serve as the core group of committed partners to help with the delivery of these materials and their messages.

3. Through a federal grant, DCNR is engaging a contractor to prioritize the riparian buffer landscape, particularly in southcentral Pennsylvania, for outreach, design outreach strategies, design landowner-specific outreach messages and develop targeted messaging and delivery strategies based on consumer patterns.

D. The Phase 3 WIP Implementation Action Team

The collaborative approach used to develop the Phase 3 WIP will be instrumental to the success of its implementation. For this reason, the Phase 3 WIP Steering Committee will be converted to a Phase 3 WIP Implementation Action Team (Action Team) comprised of the same members. The main purpose of the Action Team will be to:

1. Adaptively manage the ongoing implementation of the priority initiatives identified in the Phase 3 WIP.

2. Provide input into the development and revision of future two-year milestones for the Phase 3 WIP.

3. Track progress and provide input into the six-month programmatic progress reports and annual Countywide Action Plan progress reports.

The workgroups will continue to meet as needed to provide input to the Action Team, at the discretion of the Workgroup Co-chairs. The Workgroup Co-Chairs and the Action Team will meet as needed to accomplish the above purpose, but no more frequently than quarterly. All Action Team and workgroup meetings will be open to the public.

III. PARTNERSHIP AGREEMENT

To support Chesapeake Bay cleanup efforts, all the states in the watershed, including Pennsylvania, Maryland, Virginia, Delaware, New York, West Virginia and the District of Columbia and several federal agencies formed the Chesapeake Bay Program Partnership (Partnership). The lead federal agency is EPA, but the other federal agencies involved are the US Departments of Agriculture, Commerce, Defense, Homeland Security, Interior and Transportation. Also involved are the US Geological Survey, National Park Service, the US Fish and Wildlife Service, and the US Army Corps of Engineers. Another key member of the “Partnership” is the Chesapeake Bay Commission. This Commission is comprised of representatives of the state house and senate for the states of Pennsylvania, Maryland and Virginia and the Cabinet-level head

of the lead environmental agency for these states responsible for the implementation of the Chesapeake Bay Program.

In 2014, the Partnership executed the non-binding "Chesapeake Bay Watershed Agreement" (2014 Watershed Agreement), through which the parties committed to work together on specific priority management strategies to clean up local watersheds and the Chesapeake Bay. The 2014 Watershed Agreement established ten goals: sustainable fisheries, vital habitats, improved water quality (of which the implementation of the TMDL is one component), toxic contamination, healthy watersheds, stewardship (including diversity, local leadership, and citizen stewardship), land conservation, public access, environmental literacy, and climate resiliency. There are 31 management strategies and associated workplans with identified action items and indicators for these goals. These goals and outcomes are all designed to further restore and protect the Chesapeake Bay.

Early in the process of the 2017 Midpoint Assessment of the TMDL, the Partnership recognized a significant overlap in priorities identified in the 2014 Watershed Agreement and the priority areas for the Phase 3 WIPs including:

- Sustainable Fisheries - Fish Habitat
- Vital Habitats:
  - Brook Trout
  - Submerged Aquatic Vegetation
  - Forest Buffers
  - Tree Canopy
  - Wetlands
  - Stream Health
- Land Conservation - Protected Lands
- Healthy Watersheds
- Public Access
- Toxics Contaminants
- Climate Resiliency

Many of the priority initiatives identified under Section 2, State Actions to achieve the TMDL also address priorities in the 2014 Watershed Agreement.

IV. PHASE 3 WIP PLANNING TARGETS FOR PENNSYLVANIA

The Partnership assigned planning targets for Pennsylvania based on the estimated amount of nutrient loadings that reach the Chesapeake Bay from Pennsylvania waters. These planning targets are the reduction numbers that Pennsylvania's Phase 3 WIP must demonstrate will be achieved by having all practices in place by 2025.These planning targets are based on a modeled methodology first defined in the TMDL established in 2010. This same methodology was then translated to local planning goals defined for counties in Table 2.7 and Table 2.8 in Section 2 and for federal facilities in

Table 4.1 and Table 4.2 in Section 4. Two basic concepts behind this methodology are described below:

- Controllable Load
- Edge of Stream vs Edge of Tide Load

A. Calculation of "Controllable Load"

To assign these planning targets, the Partnership started with the concept of a "controllable load". This was first defined when the TMDL was published in 2010. The mathematics behind the Partnership's rule of equity was defined for the TMDL. This rule of equity is that those who pollute more should do more. To quantify the controllable load, the Partnership designed two model scenarios; (1) the No-Action scenario and (2) the E3 scenario. The No-Action scenario is a condition in the Chesapeake Bay watershed without any BMPs on land controlling nutrient and sediment loads. The E3 scenario stands for Everything, Everywhere, by Everyone and is the opposite condition in the watershed, where there is full implementation of the most effective BMPs on all pollutant sources and land, whether agricultural or developed. The difference between the very high No-Action loads and very low E3 loads is defined as the "controllable load".

The E3 scenario is a hypothetical condition that does not consider costs of implementation and considers few physical limitations to implementing BMPs. By applying the same rules of No-Action and E3 across all sources of nutrients in the Chesapeake Bay watershed, there is equity among the many localities, counties, regions, tributaries, and states. For example, those areas with high densities of animal manure, impervious surface, fertilizer use, and septic system discharges, will have greater controllable loads than areas of entirely pristine forest. Comparing the difference in these scenario loads (the controllable load), defines where the excess nutrient pollution is greatest and where it is least.

For determining the planning goals among these areas, each controllable load is multiplied by the same fraction so that when all the individual planning goal loads are added, the total is the Planning Target. For Pennsylvania, this fraction is 0.7392, or Pennsylvania's planning targets are 73.92% of the difference between the No-Action and E3 loads. In other words, each county and each federal facility in Pennsylvania is expected to reduce 73.92% of the controllable load for Pennsylvania to meet water quality standards in the Chesapeake Bay. The level of effort required to achieve the outcome is the same for each county and federal facility (73.92% of E3) but the load reductions are different because each area has a different load, some areas are high-loaders while others are low.

B. Edge of Stream (EOS) and Edge of Tide (EOT) Planning Targets

Pennsylvania's focus is on local water quality; therefore, Pennsylvania works with two sets of planning targets for its nutrient loading because not all the nutrients that reach

Pennsylvania's waterways reach the Chesapeake Bay. When nitrogen and phosphorus enter local waterways, these loads are much higher than when the same loads reach the Chesapeake Bay. Aquatic ecosystems help remove "some" nitrogen and phosphorus as the runoff travels across Pennsylvania's waterways and toward the Chesapeake Bay.

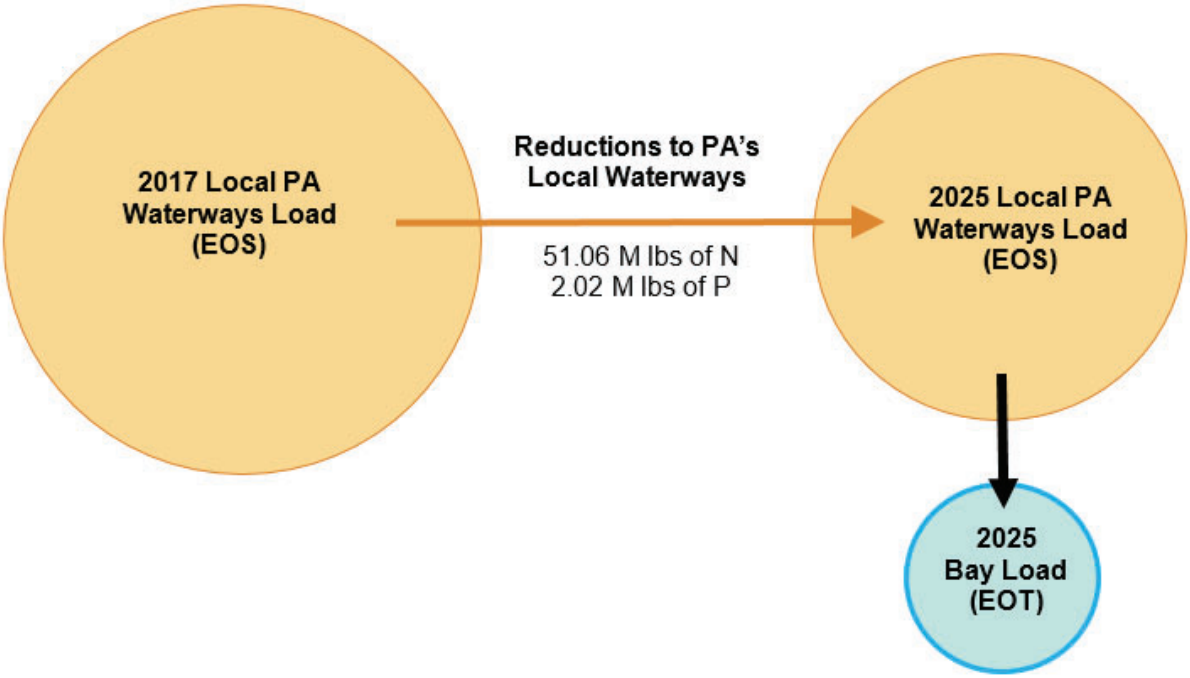
The loads and reduction numbers come from the EPA Chesapeake Bay Program's Office tool called the Chesapeake Assessment Scenario Tool (CAST). Each county in Pennsylvania's Chesapeake Bay watershed has a varied attenuation factor based on geographic proximity to the Chesapeake Bay. CAST accounts for the variation in attenuation and calculates the difference between the loads delivered to the "local waterways" as *Edge of Stream* (EOS) and the loads delivered to the Chesapeake Bay as *Edge of Tide* (EOT).

Pennsylvania has decided to focus on nutrients loads from "local waterways" to resonate a stronger message with its citizens. For Pennsylvania to achieve the reduction needed for the Chesapeake Bay, Pennsylvania must reduce 51.06 million pounds of nitrogen and 2.02 million pounds of phosphorus annually to local waterways to successfully meet the 2025 planning target.

Reductions of nutrients in local waterways equate to reductions of loads delivered to the Chesapeake Bay. Ultimately, Pennsylvania will need to reduce 34.13 million pounds of nitrogen and 0.756 million pounds of phosphorus annually to the Chesapeake Bay.

Figure 1.2 illustrates the correlation between EOS and EOT.

Figure 1.2. Pennsylvania Planning Targets



Please note that these planning targets do not include any additional reductions that will be achieved through the separate Phase 3 WIP being developed to address the additional six million pounds per year of nitrogen and 260,000 pounds of phosphorus attributed to the loss of trapping capacity behind Conowingo Dam. The Partnership has agreed to address this additional loading together in a separate Phase 3 WIP. It also does not include any additional reductions that will be assigned in the future due to climate change, as discussed in Section 9, Climate Change.

C. Sediment Planning Targets for Pennsylvania

Sediment loads are managed in the Chesapeake Bay Total Maximum Daily Load to specifically address the water clarity/submerged aquatic vegetation (SAV) water quality standards. Research has shown that the water clarity/SAV water quality standard is generally more responsive to nutrient load reductions than it is to sediment load reductions. This is because algae fueled by nutrients can block as much, or more, light from reaching SAV as suspended sediments.

The Phase 3 WIP sediment targets will not affect the BMPs called for in the Phase 3 WIP and are not intended to be the driver for implementation moving forward. The sediment targets developed for the Phase 3 WIPs as they have been for previous WIPs, will be formed on the basis of the sediment load delivered to the Chesapeake Bay associated with management actions taken to address the Phase 3 WIP nitrogen and phosphorus targets. In other words, the Best Management Practices (BMPs) that are identified in this WIP to meet the Phase 3 WIP nitrogen and phosphorus targets will be run through the Partnership's Phase 6 suite of modeling tools, and the resulting

sediment loads will form the basis for the Phase 3 WIP sediment targets. These sediment loads will be adjusted proportionally to account for any overshooting or undershooting of the Phase 3 WIP nitrogen and phosphorus targets. An additional 10% allowance will be added to the calculated Phase 3 WIP sediment target in each major basin.

The resulting final Phase 3 WIP sediment targets will be appended to this final Phase 3 WIP in October 2019, once they have been approved by the Partnership.

V. EPA EXPECTATIONS FOR THE PHASE 3 WIP

EPA provided the jurisdictions written "expectations" of what they expected from jurisdictions' Phase 1 and Phase 2 WIPs in 2009 and 2011, respectively. For the Phase 3 WIP, EPA provided final "Expectations for the Phase III Watershed Implementation Plans" to the jurisdictions on June 19, 2018. For Pennsylvania, EPA highlighted:

- Comprehensive strategies for engagement of the full array of Pennsylvania local, regional, and federal partners in WIP implementation.
- Local planning goals below the state major basin scales and in the form best suited for directly engaging local, regional, and federal partners.
- Definition of programmatic and numeric implementation commitments between 2018 and 2025 needed to achieve the Phase 3 WIP planning targets.

EPA recognizes that the Phase 3 WIP commitments may need to be modified as part of the adaptive management process during the 2018-2025 timeframe and expects the jurisdictions to update those programmatic and/or numeric commitments, as appropriate, through their two-year water quality milestones. Based upon EPA's conclusion that Pennsylvania has not demonstrated adequate progress, EPA requested that Pennsylvania report progress on a six-month basis.

EPA also identified additional expectations for Pennsylvania to accelerate its progress towards achievement of the planning goals. These additional expectations can be summarized as follows:

- Commitment to programmatic, policy, legislative, and regulatory changes needed to implement Pennsylvania's Phase 3 WIP; citing such initiatives as an Agriculture Recognition or Certainty Program, expansion of the Act 38 Nutrient Management Program, further restrictions on winter spreading of manure, development of an agriculture cost share program and tax incentive programs and revisions to the nutrient trading program regulations as examples.
- Commitment to the level of staff, partnerships, and financial resources needed to successfully implement the Phase 3 WIP.
- Commitment to additional reporting and tracking requirements for EPA grant monies and the use of 3rd parties to expeditiously spend EPA grant monies.
- Consideration of additional reductions of loadings from point sources.

VI. PENNSYLVANIA REASONABLE ASSURANCE FOR ITS PHASE 3 WIP

Pennsylvania's Phase 3 WIP must provide "reasonable assurance" that nonpoint source controls will achieve the load reductions required of the state in the Chesapeake Bay TMDL. In Section 7.1 of EPA's 2010 Chesapeake Bay TMDL, EPA explains that it will use best professional judgment to assess "reasonable assurance," using criteria including whether practices included in a state's WIP to reduce nonpoint source pollutant loads: (1) exist; (2) are technically feasible at a level required to meet allocations; and (3) have a high likelihood of implementation.

NPDES permitting programs demonstrate reasonable assurance that waste load allocations (WLAs) in the TMDL will be achieved, because by regulation, those permits include specific numeric or narrative effluent limits and other permit terms and conditions that require discharges be consistent with "the assumptions and requirements of any available [WLA]" in an approved TMDL.

Pennsylvania's Phase 3 WIP demonstrates reasonable assurance through a comprehensive, integrated framework of federal, state, and local collaboration in a variety of regulatory programs and voluntary initiatives. The Phase 3 WIP is founded on, and reasonable assurance is demonstrated in large measure through, the intensive collaborative, deliberative local engagement process undertaken since the 2017 milestones.

Additionally, reasonable assurance is provided by robust non-NPDES permitting programs that require controls that reduce nitrogen, phosphorus, and sediment pollutant loads, and require compliance with Pennsylvania Water Quality Standards and antidegradation requirements, and include permit review, oversight, and inspection.

Pennsylvania's Phase 3 WIP also includes many nonpoint source control actions and initiatives which contribute to the demonstration of reasonable assurance. For example, the agriculture component in the Phase 3 WIP includes regulatory and non-regulatory initiatives. Non-regulatory and non-permitting initiatives include the expansion and reporting of soil health related practices (includes implementation of conservation tillage and no-till, cover crops, and enhanced nutrient management); dairy precision feeding; utilization of expanded forest and grass riparian buffers; and stream restoration/legacy sediment removal and ecosystem restoration projects. These non-regulatory and non-permitting initiatives are not "new" practices; in fact, these are readily accepted practices throughout the agriculture industry that help to ensure farm sustainability.

A final contributor to reasonable assurance is the Pennsylvania programs and initiatives that Pennsylvania has not accounted for or adequately accounted for in past WIPs that achieve net reductions in Bay pollutants of concern. DEP has steadily improved the capability to document reductions from programs not included in previous WIPs. These programs and initiatives are detailed in Section 2, State Actions. In the Phase 3 WIP, Pennsylvania is committed to accounting for these reductions in the Chesapeake Bay

watershed, enhancing reasonable assurance that Pennsylvania will meet the 2025 targets.

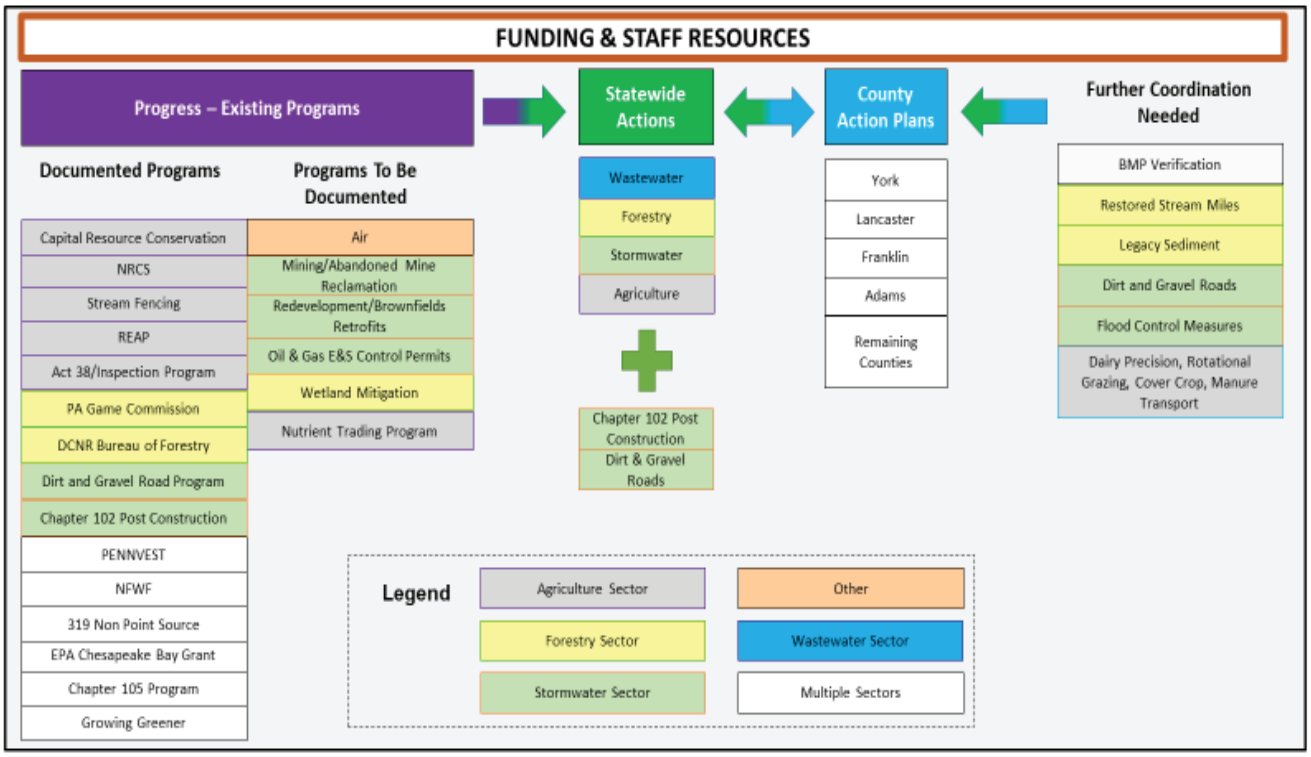
During the Phase 3 WIP planning process, as the Chesapeake Bay Program presented data and information to the Phase 3 WIP Steering Committee, the seven workgroups and county pilot partners, Pennsylvania became increasingly aware of discrepancies between what is on the ground and what is being reported to and what is being counted by the EPA Chesapeake Bay Program office for input into the Chesapeake Bay Watershed Model for progress. Pennsylvania recognizes that this is due to challenges it has historically had with collecting and reporting data, as well as challenges with Pennsylvania's data fitting properly into the Chesapeake Bay Watershed Model. Going forward, Pennsylvania welcomes continued discussions with the Bay Program Partnership on these reporting challenges as we continue to adaptively manage the program together to accurately reflect real world circumstances beyond the Model, so that resources and efforts are tailored most effectively to achieve local and Chesapeake Bay cleanup goals.

Pennsylvania commits to have all practices and controls in place by 2025 necessary to achieve the final Phase 3 WIP planning targets. Pennsylvania, in conjunction with the Partnership, will utilize an adaptive management approach to achieve our collective desired outcome. The two-year milestones and six-month progress reporting will allow for the assessment of the implementation progress and targeted adjustments to programs and priorities to ensure the practices and controls called for in the Phase 3 WIP are achieved by 2025.

SECTION 2. STATE ACTIONS

This section describes how Pennsylvania's Phase 3 WIP is designed to achieve the assigned nutrient reduction planning targets by 2025. Each section – Section 2 through Section 8 in particular – is designed to build on the preceding section(s) and to support the following section(s). Figure 2.1 below is a conceptual representation, not to scale, of Pennsylvania's strategy to achieve the assigned nutrient reduction planning targets, including the modeled analysis of the progress towards those targets to date.

Figure 2.1. Graphic Representation of Pennsylvania's Nutrient Reduction Plan



The **purple bar** represents the progress Pennsylvania has achieved to date. This progress includes all documented existing programs/practices that currently receive credit in the Chesapeake Bay Watershed Model (Section 2, State Actions, subsections 2.III and 2.IV). The **purple bar** also includes reductions from existing programs that have not reported progress on accepted Bay Program BMPs in the past but have begun to report progress in the future (Section 2, State Actions, subsection 2.V and Section 6, Documenting, Tracking and Verifying). Although these programs have not previously reported progress, they have achieved applicable reductions. The programs represented by the **purple bar** will support the statewide actions outlined in the **green bar** (Section 2, State Actions) through funding and resource support. Supporting the statewide actions may result in modification of existing programs, or creation of new programs. In many ways, the **purple bar** captures the key programs and is a graphical representation of how the statewide actions represented by the **green bar** will be achieved between now and 2025.

The **green bar** represents the statewide actions that Pennsylvania is planning to achieve by 2025 (Section 2, State Actions). The **green bar** includes the numeric statewide commitments and the accompanying programmatic, legislative and policy recommendations. These statewide actions will be supported by existing, new and undocumented programs represented in the **purple bar**. The statewide actions support the actions defined by the 43 Pennsylvania counties in their respective Countywide Action Plans (CAPs) and act as surrogates until the final county specific plans are submitted.

The **blue bar** represents the CAPs. Four of these CAPs were finalized as part of the drafting of the Phase 3 WIP. The results of these four CAPs are described in Section 3, Countywide Actions**.** Counties that have not completed their CAPs are represented under the statewide actions **green bar** until they submit a final CAP. As each county completes its CAP, the bar will shift toward a **blue bar.** The **purple** and **green** bars are designed to support the CAPs.

Further coordination needs to occur to: continue documentation of currently undocumented practices; continue coordination with the Partnership to achieve credit for additional practices and programs that achieve water quality improvement in Pennsylvania and that are not currently credited in the Chesapeake Bay Watershed Model; and document completion of the CAPs.

Pennsylvania's strategy is built on the foundations of the programs and practices represented by the **purple**, **green** and **blue** bars in addition to the further coordination needed to achieve the 2025 planning targets. The **purple bar** will continuously grow as state and county actions are implemented. Counties without CAPs will continue to develop comprehensive plans that build on the statewide recommendations. Pennsylvania commits to have practices and controls in place by 2025 necessary to achieve the final Phase 3 WIP phosphorus and nitrogen targets. Pennsylvania, in conjunction with the Partnership, will utilize an adaptive management approach to achieve our collectively desired outcome. Through the adaptive management approach, Pennsylvania intends to gain accreditation of new practices that improve water quality and reduce nutrient and sediment pollution. The two-year milestones and six-month progress reporting will allow Pennsylvania to assess implementation progress and to target adjustments of programs and priorities to ensure sufficient practices and controls are in place by 2025. The rest of this section describes key details of each program, how the parts of the strategy fit together and how Pennsylvania will achieve its commitments.

I. TOTAL MODELED NITROGEN REDUCTION TO THE BAY

Table 2.1 summarizes the modeled reduction estimates as a result of Pennsylvania's strategy for nitrogen. These numeric values do not include reductions from existing programs that have not reported progress on accepted Bay Program BMPs in the past but will begin to report progress going forward.

Pennsylvania has four completed CAPs for Lancaster, York, Franklin, and Adams counties. These four completed CAPs result in an estimated modeled additional reduction of 9.16 million pounds of nitrogen, that combined with Pennsylvania's Progress through 2017 of 14.7 million pounds and the projected additional reductions to be achieved from the statewide priority initiatives of 15.64 million pounds in the remaining 39 counties, result in a total estimated modeled load reduction of approximately 24.81 million pounds.

In collaboration with EPA's Chesapeake Bay Program Office, EPA determined an exchange ratio may occur if Pennsylvania exceeds its nutrient reduction goal. Through this same modeling analysis, Pennsylvania has met and exceeded its 2025 reduction goal for phosphorus by 139,367 pounds and will exchange that for nitrogen reduction based on EPA's provided conversion factors. For the Susquehanna River Basin, one pound of phosphorus may be exchanged for 2.36 pounds of nitrogen. In the Potomac River Basin, one pound of phosphorus may be exchanged for 1.58 pound of nitrogen. This results in Pennsylvania achieving an additional 307,946 pounds of load reduction for nitrogen.

II. TOTAL MODELED PHOSPHORUS REDUCTION TO THE BAY

Table 2.1 summarizes the modeled reduction estimates as a result of Pennsylvania's strategy for nitrogen. These numeric values do not include reductions from existing programs that have not reported progress on accepted Bay Program BMPs in the past but will begin to report progress going forward.

Pennsylvania is projected to exceed its phosphorus reduction goal by 139,367 pounds and is exchanging these excess pounds for additional nitrogen reductions.
The four completed CAPs resulted in an estimated modeled additional reduction of 367,000 pounds of phosphorus. When the remaining counties in Pennsylvania's portion of the Chesapeake Bay watershed complete their respective CAPs, the total estimated modeled load reduction will be 918,000 pounds.

Table 2.1. Summary of Pennsylvania's Modeled Reductions to the Chesapeake Bay

Reduction to the Chesapeake Bay	Nitrogen Reduction	Phosphorus Reduction	Sediment Reduction
	EOT* (pounds)		
State Reductions	15,335,000	551,000	432,075,000
Pilot County Reductions	9,163,000	367,000	281,635,000
N:P Conversion	308,000	**0**	**0**
Total Reductions	**24,806,000****	**918,000****	**713,710,000****

* Loads represented in the table are delivered to the Chesapeake Bay (EOT).
** Values do not include reductions from existing programs that have not reported progress on accepted Bay Program BMPs in the past but will begin to report progress going forward

Table 2.1 summarizes the modeled reduction estimates as a result of Pennsylvania's Phase 3 WIP strategy. Additional reductions will include: programs that have not been documented prior to 2018 but that have begun to track progress for credit in the

Chesapeake Bay Watershed Model; statewide sector initiatives for all counties without a completed CAP; new sector initiatives that were added since the draft WIP; and continued quantification of undocumented practices including non-cost share BMPs. Through adaptive management, Pennsylvania also intends to gain accreditation of new practices that improve water quality and reduce nutrient and sediment pollution. Pennsylvania commits to have practices and controls in place by 2025 necessary to achieve the final Phase 3 WIP phosphorus and nitrogen targets.

III. EXISTING REDUCTION EFFORTS TO DATE

A. Introduction

Pennsylvania has been working in support of Chesapeake Bay restoration since the mid-1980s. The establishment of the Chesapeake Bay Total Daily Maximum Load (TMDL) in 2010 increased the need for improved data collection to support TMDL compliance tracking and initiated additional local watershed restoration planning.

Figure 2.2 shows nitrogen loads from Pennsylvania to the Chesapeake Bay between 1985 and 2017. Loading rates from 1985 to 2017 reflect annual load results reported from annual BMP Progress Runs. In 1985, 122 million pounds (M pounds/year) of nitrogen flowed from Pennsylvania to the Chesapeake Bay. By 2017, that amount had dropped by 14.71 million pounds/year to a loading rate of 107 million pounds/year. Current efforts will continue to reduce this rate. This progress to date does not include programs and practices that remain undocumented through voluntary implementation or lack of credit recognition within the Chesapeake Bay Program Partnership. Remedying this situation is part of Pennsylvania’s strategy to achieve the nutrient and sediment planning targets by 2025. These planning targets require Pennsylvania to decrease its annual load of nitrogen to 73.18 million pounds/year (an additional reduction of 34.13 million pounds of nitrogen).

Figure 2.2. Pennsylvania's Nitrogen Load to the Chesapeake Bay

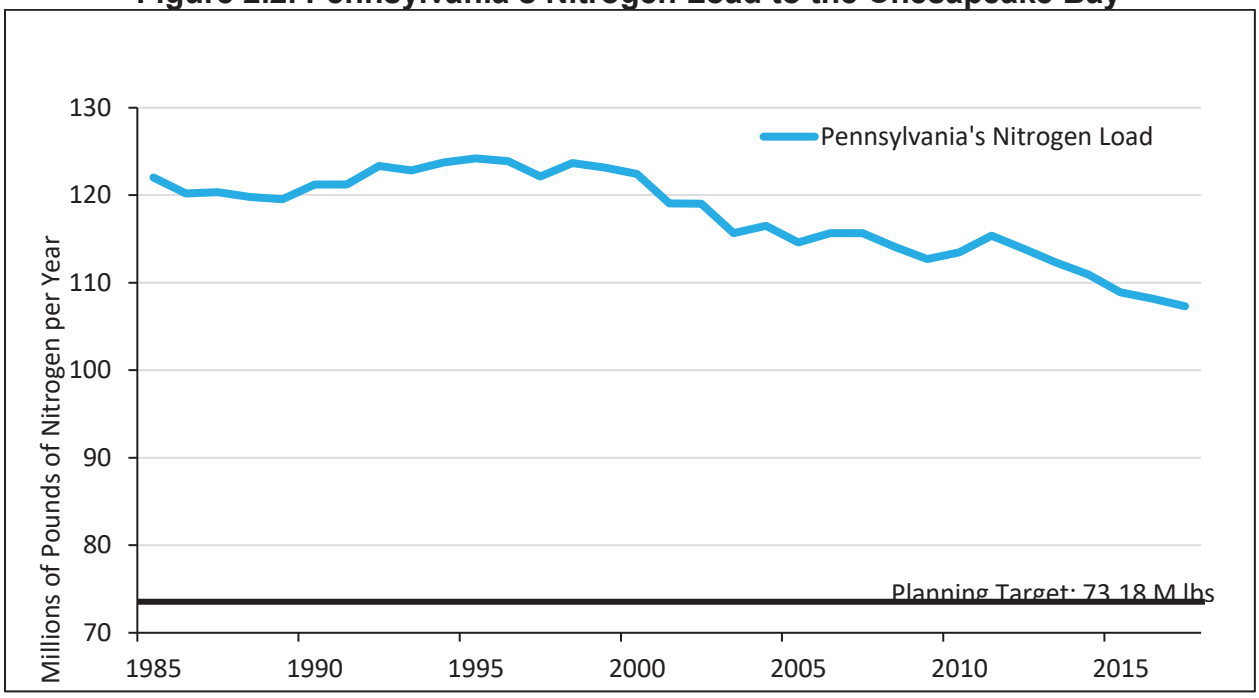
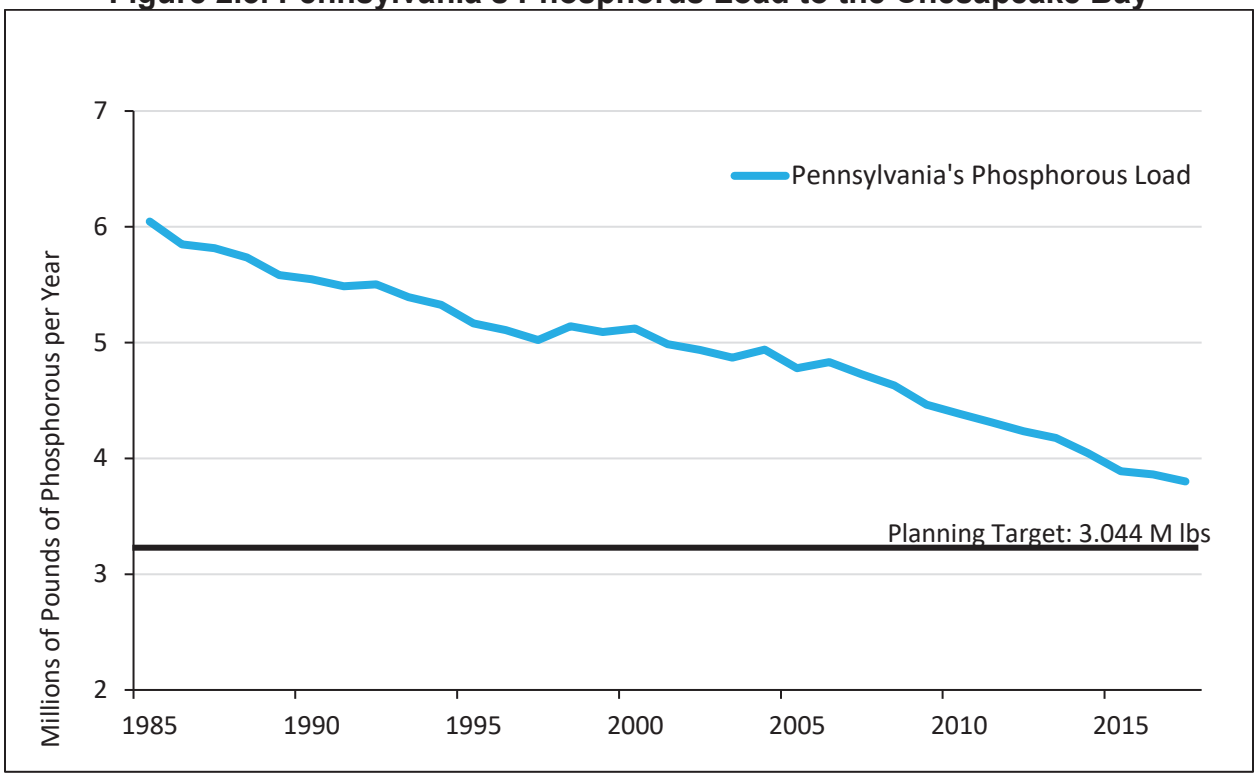


Figure 2.3 shows phosphorus loads from Pennsylvania to the Chesapeake Bay between 1985 and 2017. Loading rates from 1985 to 2017 reflect load results reported from annual BMP Progress Runs. In 1985, six million pounds/year of phosphorus flowed from Pennsylvania to the Chesapeake Bay. By 2017, this rate had decreased by 2.25 million pounds of phosphorus to a loading rate of 3.8 million pounds/year of phosphorus. Current efforts will continue to reduce this rate. The TMDL requires that by 2025, Pennsylvania will have practices in place to reduce its loading rate of phosphorus to 3.044 million pounds/year (an additional reduction of 0.756 million pounds of phosphorus).

Figure 2.3. Pennsylvania's Phosphorus Load to the Chesapeake Bay



The achievement of nitrogen reductions will continue to be a primary driver in Pennsylvania's overall attainment of the TMDL goals.

With the establishment of the TMDL, the need for consistent and broad-ranging BMP data is critically important to attain adequate yearly progress. These data sources and systems include permit programs, grant and cost-share awards, and special efforts to collect and report BMPs that have not been previously accounted for or are implemented outside of government oversight. There have been growing pains in developing this capacity while also working with limited funding. Since 2010, improvements in data collection through the programs described below and new data sources has been steady. Improving the data management protocols and the capability to document progress was one of six priorities identified as part of the 2016 Pennsylvania Restoration Strategy announced by Governor Wolf to accelerate progress. The results have shown that with each refinement of the Chesapeake Bay Watershed Model, Pennsylvania is able to demonstrate increased reductions.

Each year on December 1, Pennsylvania reports these BMPs to the EPA Chesapeake Bay Program Office. The process of data collection and reporting to EPA is documented in the Pennsylvania Quality Assurance Project Plan (QAPP) which is updated annually with this submittal. The QAPP also describes assurances that reporting and crediting efforts are not double counted. These annual Progress Run submissions are the basis of the numeric assessment of Pennsylvania's BMP implementation. Progress on other programmatic BMP goals are reported every six months and revised every two years in

milestone documents. These documents are prepared for and reviewed by EPA as part of EPA's evaluation of TMDL compliance.

B. The 2016 Chesapeake Bay Restoration Strategy

In 2016, DEP, PDA and DCNR worked with several partners and stakeholders to collaborate on the 2016 Chesapeake Bay Restoration Strategy (2016 Restoration Strategy). This strategy included several short, mid, and long-term recommendations aimed at augmenting the approach to water quality improvements in the Chesapeake Bay watershed. The Phase 3 WIP builds on the progress achieved in implementing the 2016 Restoration Strategy, as described below.

1. Increased Compliance Program Efforts

DEP and County Conservation District staff increased inspection and compliance efforts in the agriculture sector using existing staff who have inspected 10 percent of the farms in the Chesapeake Bay watershed annually since 2016. The Chesapeake Bay Agricultural Inspection Program (CBAIP) is now an integral part of DEP's compliance efforts. This program is now successfully reporting implemented BMPs to the EPA Chesapeake Bay Program for progress reporting based on the results of these inspections. DEP also increased outreach and program development for urban stormwater systems. As part of the 2018 Progress Run, practices from this program resulting in 487,000 pounds of nitrogen and 13,400 pounds of phosphorus reduction were reported to the EPA Chesapeake Bay Program Office.

2. Quantification of Undocumented Practices

The 2016 Restoration Strategy called for increased focus on local water quality improvement and protection by locating and quantifying previously undocumented BMPs, and putting new high-impact, low-cost BMP projects on the ground in watersheds that are currently impaired by agriculture or stormwater. An additional 15% of available statewide water quality funding ($1,250,000) was shifted to Bay work to create the whole data system to track BMPs and report to the Chesapeake Bay Program, including completing the Pennsylvania State University survey detailed below, purchasing the PracticeKeeper software, and developing the BMP warehouse that PracticeKeeper informs.

The Chesapeake Bay Program Partnership approved the procedures and protocols developed as part of the two projects below for future BMP verification efforts. As a result, any state in the Chesapeake Bay watershed can use these two methodologies as part of their BMP verification program. Both methodologies are an integral part of Pennsylvania's BMP Verification Plan moving forward, as described below in Section 6, Documenting, Tracking and Verifying (see Figure 6.2).

a. The Pennsylvania State University Survey

In January 2016, Penn State University developed and mailed a survey to roughly 22,000 Pennsylvania Chesapeake Bay watershed farmers requesting that they voluntarily report non-cost share BMPs. In response, 6,751 farmers completed surveys (30%, a notably good response) and Penn State Extension staff completed verification of 10% of voluntary practices installed and identified in the surveys across the watershed. On December 16, 2016, the survey results were announced. These results demonstrated overwhelmingly that many farmers have, and will continue to, install BMPs without state and federal financial support. The survey catapulted the Commonwealth's commitment to documenting these previously unreported, voluntarily installed BMPs within the Chesapeake Bay Watershed Model.

The survey results were as follows:

- 475,800 acres of nutrient/manure management;
- 97,562 acres of enhanced nutrient management;
- 2,164 animal-waste storage units;
- 2,106 barnyard runoff-control systems;
- 55,073 acres of agricultural erosion and sedimentation control plans;
- 228,264 acres of conservation plans;
- more than 1.3 million linear feet of stream-bank fencing;
- 1,757 acres of grass riparian buffers; and
- 5,808 acres of forest riparian buffers.

DEP reported these results to the EPA Chesapeake Bay Program Office to include in the Chesapeake Bay Watershed Model for progress reporting. Using Scenario Builder and CAST, Pennsylvania received credit reduction of approximately 1,047,704 pounds of nitrogen per year, 79,620 pounds of phosphorus per year and 10,395,906 pounds of sediment per year as a result of these practices.

The lessons learned from this effort have been incorporated into the revised BMP Verification Plan. This includes the implementation of future producer surveys on a regular three to five-year basis, depending on funding availability. These surveys will be implemented using the protocols approved by the Chesapeake Bay Program Partnership as part of this pilot project to verify agricultural BMPs.

Additionally, plans for Penn State University to conduct a second round of the non-cost share agricultural BMP survey were announced in August 2019. While details were still being worked out at the time the final Phase 3 WIP was published, early indications are that the second round of this survey is planned to be conducted during the winter of 2020, with a primary focus on farms in Tier 1 and Tier 2 counties. The results of the second round of this survey of BMPs installed by farmers without state or federal financial support will help further advance the documentation of previously undocumented BMPs in Pennsylvania.

b. NRCS Remote Sensing Project

The United States Department of Agriculture's (USDA) Natural Resources and Conservation Services (NRCS) explored the use of aerial photography and digital land cover data as a means of documenting and verifying the installation of over 28 different BMPs through a pilot project. Using the results of this pilot project, the Chesapeake Bay Program Agricultural Workgroup approved a standard methodology for verifying undocumented BMPs using remote sensing technologies on January 26, 2017. As long as states show that these standard methodologies are utilized, the data collected using these technologies will now be accepted into the Chesapeake Bay Watershed Model to document progress. The lessons learned from this pilot project were incorporated into the revised BMP Verification Plan regarding the types of practices this methodology can be used to verify. Future verification using this methodology will be done utilizing the approved Chesapeake Bay Program Partnership protocols developed from this pilot survey regarding statistical variability of the data, the amount of onsite validation required and the qualifications of the staff completing the onsite validation.

3. Data Management and Tracking System

The 2016 Restoration Strategy also called for improving reporting, recordkeeping, and data systems to provide better and more accessible documentation of progress made toward Pennsylvania's restoration effort, including consideration of establishing mandatory reporting requirements for the agriculture sector. Data management-oriented web-based training modules have been created and released via the new Clean Water Academy (CWA) to the conservation districts and DEP staff to consistently document, track, and report outputs and BMPs implemented through the Nutrient Management Program, the Chesapeake Bay Agriculture Inspection Program, and the Chesapeake Bay Technician/Engineer Agreements. A new data management and tracking system is now in place, as described in Section 6, Documenting, Tracking and Verifying.

4. Strategic Legislative, Programmatic and Regulatory Changes

The 2016 Restoration Strategy also recommended identifying strategic legislative, programmatic, or regulatory changes that would give Pennsylvania the additional tools and resources necessary to meet the 2025 TMDL reduction goals. The process of identifying these changes resulted in the key programmatic initiatives described below.

5. Create a Chesapeake Bay Office within DEP

The 2016 Restoration Strategy also called for establishing a new Chesapeake Bay Office within DEP to assure the proper development, implementation, and coordination of the Commonwealth's efforts to restore the Chesapeake Bay, and administer DEP's Chesapeake Bay Program grant.

This DEP office has been in place since March 2016. A complete description of this office's role, responsibilities and proposed expansion is contained below under State Agency Capacity.

6. Seek Additional Resources for Water Quality Improvement

Finally, the 2016 Restoration Strategy called for obtaining additional resources for water quality improvement by seeking new sources of funding, with Chesapeake Bay compliance as a primary goal. As a result, DEP has set aside additional grant monies for the Chesapeake Bay for the past two Growing Greener grant rounds. In addition, at the 2016 Chesapeake Bay Executive Council meeting, EPA, USDA, and the Commonwealth committed an additional $28 million dollars to enhance federal and state investments in Pennsylvania to accelerate nutrient reductions. This joint strategy strengthened existing partnerships between EPA, USDA, state agencies, and the conservation districts to assist farmers and provided some agriculture-led initiatives to improve local water quality. These agriculture-led initiatives are highlighted below and include the new Agriculture Plan Reimbursement Program implemented by DEP and the Multi-functional Buffer Program implemented by DCNR.

IV. STATE AND FEDERAL PROGRAMS THAT RESULT IN REDUCTIONS (purple bar)

Table 2.2 is a summary of the programs that have reported nutrient and sediment reductions to the DEP Chesapeake Bay Office. This is an example of the types of reductions that are achieved from these programs on an annual basis. This table is not a total summary of all reductions achieved as it does not include the reductions from the wastewater sector, or the cumulative impact from these programs from the beginning in 1985, since these programs started reporting progress at different points in time. The majority of the reported annual reductions from nonpoint sources in this table are from the agriculture sector. It also does not include BMPs individuals implement on their own without state or federal cost-share assistance that are not reported.

Most of the reductions from the urban stormwater sector are through the implementation of the 25 Pa. Code Chapter 102 NPDES construction stormwater permits (Chapter 102 Permits). The Chapter 102 Permits include requirements for post construction stormwater management BMPs and erosion and sedimentation control BMPs. These permit requirements cover multiple programs. Some of these programs have reported practices installed from implementing the permit requirements. These reported practices result in the reductions included in the existing 2017 progress numbers. These reductions are included in Table 2.2. DEP captured the reductions achieved from these additional programs covered by these regulations. These reductions are summarized below in Table 2.3.

There are also reductions attributed to the forestry, or the natural sector. These reduction categories in Table 2.2 are described in more detail below the table.

An important takeaway from Table 2.2 is the relative significance of agricultural field practices such as conservation tillage, cover crops, and nutrient management. These “annual” management practices are applied across such significant acreages that even modest changes in implementation have a significant impact in documenting nutrient reductions.

Table 2.2. Modeled Existing Programs Resulting in Reductions

Source: CAST modeling of 2017 Progress Run input files by SRBC, March 2019.

Sector	Agency / Program	Description	Reductions		
			Nitrogen (EOT)	Phosphorus (EOT)	Sediment (EOT)
Agriculture	State Conservation Commission (SCC) Act 38 Nutrient Management Program	Nutrient Management Plans and BMPs on CAOs and CAFOs	867,000	14,000	0
		Manure Transport	9,000	(237)	0
	DEP Agriculture Inspection Program	Manure Management Plans and Ag E&S BMPs	487,000	13,400	31,959,000
	Resource Enhancement and Protection Program (REAP)	Agriculture practices	23,000	1,000	708,400
	DEP Stream Bank Fencing Program	Agriculture Pasture Fencing Practices	1,000	200	99,800
	Natural Resource Conservation Service and Farm Service Agency, Conservation Reserve Enhancement Program	Technical and Financial Assistance Programs	210,000	6,100	649,800
	Capital Resource Conservation and Development	Conservation Tillage	4,221,000	426,700	696,372,500
		Cover Crops	572,000	200	360,400
Forestry	Department of Conservation Natural Resources (DCNR), Bureau of Forestry	Forest harvest BMPs on state lands	55,000	700	1,198,000
	Pa Game Commission	Forest harvest BMPs on state lands	16,000	200	323,700
Urban Stormwater	Chapter 102 Post Construction Stormwater Management	PCSM BMPs E&S BMPs	28,000	1,000	3,273,000
	State Conservation Commission, Penn State University -- Dirt and Gravel Road Program	Rural Road BMPs	Sediment Only		457,700
	Department of Defense (DOD) - Federal land	Federal land BMPs	14,000	1,100	2,310,500
Combination	DEP Growing Greener	Agriculture and Urban BMPs.	3,000	400	313,000
	DEP-Waterways Engineering Chapter 105 Program	Stream restoration/ stabilization data	6,000	1,600	3,874,000
	EPA Chesapeake Bay Grants	Agriculture and Urban Stormwater Practices	38,000	900	132,900
	EPA Section 319 Nonpoint Source Program	Agriculture and Urban Stormwater Practices	4,000	200	359,100
	National Fish and Wildlife Foundation	Practices installed as part of projects	3,000	400	575,000
	PENNVEST (NPS only)	Nonpoint source control practices through grants and loans	4,000	200	13,400
TOTAL			**6,966,000**	**543,800**	**766,029,000**

*This table includes both structural and annual practices. The sum of this table is not an accurate representation of the total progress for Pennsylvania from 1985 to 2017.

A. Agriculture

1. *National Pollutant Discharge Elimination System (NPDES) Concentrated Animal Feeding Operation (CAFO) Program*

DEP has been administering the NPDES CAFO program in Pennsylvania for approximately 20 years. A discharge of pollutants from the production area is not authorized except during extraordinarily heavy precipitation events called “design storm events.” CAFO permits require the use of BMPs that meet certain “design-storm” requirements to prevent pollutant discharges during storm events.

The inspection frequency of CAFOs in Pennsylvania is robust. All CAFOs are inspected annually as part of the Nutrient Management Program, as described below. Additionally, as part of the NPDES CAFO program each CAFO is inspected by DEP staff at least once every five years.

2. *Nutrient Management Program*

Pennsylvania’s Nutrient Management Law, Act 6 of 1993, was among the first in the nation to establish specific nutrient management planning requirements through law and regulation. The Pennsylvania State Conservation Commission (SCC) is responsible for implementing the law, with the Nutrient Management Advisory Board (NMAB), which serves the SCC in an advisory capacity.

In 2005, the legislature amended the original nutrient management law by enacting Act 38 of 2005. The implementing regulations placed a greater emphasis on phosphorus management in addition to the existing nitrogen management practices. The Act 38 nutrient management regulations also establish year-round setbacks for regulated entities for manure applications with respect to certain bodies of water; specifically, perennial and intermittent streams, lakes, ponds, and existing open sinkholes.

All agricultural operations that are permitted as CAFOs under the federal NPDES permit are required to have and implement an Act 38 Nutrient Management Plan (NMP). All Concentrated Animal Operations (CAOs) that meet the animal density threshold of 2.0 Animal Equivalent Units (AEUs) per acre are required to have and implement an NMP. These NMPs are written by certified planners, reviewed by certified conservation district or SCC staff, and publicly approved or disapproved by the local conservation district board of directors. All farms with approved NMPs are inspected by conservation district or SCC staff annually. This inspection includes identifying that current NMPs and Ag E&S plans exist and that the plans are being implemented in accordance with the schedule of operations.

In addition to the annual status review inspections, on-site farm visits are executed for all new and amended NMPs. NMPs are amended at least once every three years. This farm visit and plan review includes verifying the existence of a current Agriculture E&S

plan and that the NMP includes a schedule of operations for BMP implementation complementary to the current Agriculture E&S plan.

As provided to the Chesapeake Bay Program in 2017, a comparison of 2012 Ag Census Data to 2017 data provided in NMPs shows that 99% of all chickens, 98% of all swine, 70% of all turkeys, and 20% of all dairy related cattle are covered by NMPs and the associated Nutrient Management Program.

3. *Chesapeake Bay Agricultural Inspection Program (CBAIP)*[2]

DEP and conservation districts inspect the agricultural land within Pennsylvania's portion of the Chesapeake Bay watershed. The required compliance metric is that the agricultural operations meet the environmental planning requirements for DEP Chapter 102 Agriculture E&S and Chapter 91 Manure Management Planning (MMP). Beginning in 2016, as part of the Chesapeake Bay Restoration Strategy, DEP's Chesapeake Bay Agricultural Inspection Program focused on less intensive, smaller scale agricultural operations (those operations that are not regulated by NPDES CAFO permits or the Act 38 Nutrient Management Program).

4. *Resource Enhancement and Protection (REAP) Program*

The Resource Enhancement and Protection (REAP) program was established in 2007 as an opportunity for farmers and landowners to offset costs associated with the implementation of conservation BMPs and the purchase of conservation equipment (like no-till planting equipment). It is a first-come, first-serve program administered by the SCC. Eligible applicants can receive 50% or 75% (depending on the BMP) of out-of-pocket expenses in the form of Pennsylvania tax credits.

In July 2019, the REAP program was expanded by $3 million under the Pennsylvania Farm Bill, and eligible applicants can now receive 90% of eligible costs in the form of tax credits for certain high-priority BMPs that are implemented within a watershed covered under an approved TMDL, including: riparian forest buffers; livestock exclusion from streams; stream crossings; cover crops; soil health best management practices; and other BMPs as determined by the SCC. The Farm Bill includes language that authorizes the SCC to target up to $3 million of the total $10 million REAP program for geographic areas and BMPs within the Chesapeake Bay watershed.

An applicant's eligibility for the REAP program is determined by compliance with the Pennsylvania Clean Streams Law, namely compliance with the Conservation or Agriculture E&S Plan, and Nutrient/Manure Management Plan obligations. Individuals that are qualified to verify a REAP applicant's compliance status include conservation district employees, NRCS employees and private sector agriculture technical service

[2] More information regarding this inspection program can be found in Chesapeake Bay Agricultural Inspection Program Standard Operating Procedure (BCW-INSP-018) at www.dep.pa.gov **Keyword: Agricultural Compliance**

providers who have Act 38 Nutrient Management Certification. A farmer must have their Agriculture E&S and MMP compliance status verified each time they apply.

Farmers must be on-schedule for full implementation of the plans and any animal concentration area-related practice listed in the plan must be fully implemented before an applicant is eligible for REAP credits. Often, REAP applicants have completed NRCS/EQIP projects or have worked closely with their conservation district on other projects on the farm. Since 2007, approximately 70% of REAP applicants had their compliance status verified by either a conservation district or NRCS. The rest have been verified by qualified private service providers.

B. Forestry

1. *State-Owned Forest Lands*

Commonwealth-owned lands are periodically timber harvested as part of on-going forest management. Contracts awarded for these activities mandate that Forest Harvesting BMPs are implemented throughout this process and acreages of implemented BMPs are reported from the Pennsylvania Game Commission and DCNR annually.

C. Urban Stormwater

1. *Chapter 102 Erosion and Sediment Control Program*

DEP and delegated conservation districts administer the statewide E&S Control and PCSM program under 25 Pa. Code Chapter 102. Inspections are performed on active sites and upon permit termination. Permits are required for the following activities: construction activities with earth disturbances on one acre or more require an NPDES permit; timber harvesting activities or road maintenance activities 25 acres or more require an E&S Permit; and Oil and Gas Activities that involve five acres or more of earth disturbance also require an E&S Permit. Agriculture plowing and tilling and animal heavy use areas are exempt from permitting, but are still required to have and implement an Agriculture E&S Plan. All Chapter 102 permits for construction activities require E&S control and PCSM BMPs.

Prior to 2010, General or Individual NPDES permits were required for persons proposing construction activities equal to or greater than five acres in size. This requirement also includes mining activities, and waste management activities such as municipal landfills, land recycling and the reclamation of brownfields. Since 2010, the threshold for the NPDES permit requirement has been one acre or greater. The permit requires E&S control BMPs to be implemented during construction to minimize accelerated erosion and sedimentation. The permit also requires PCSM BMPs and establishment and maintenance of vegetation in perpetuity.

2. *Dirt and Gravel Road Program*

Pennsylvania's Dirt Gravel, and Low Volume Road Maintenance Program provides funding to eliminate stream pollution caused by runoff and sediment from the Commonwealth's comprehensive network of unpaved and low volume public roads. The program was enacted into law in April 1997 as Section 9106 of the Pennsylvania Vehicle Code and expanded in 2014 to dedicate $20 million to unpaved roads and $8 million to paved low volume roads. The goal of the program is to implement Environmentally Sensitive Maintenance practices aimed at reducing the environmental impacts of public roads, while reducing long-term maintenance costs.

3. *Stream Restoration, Flood Protection*

DEP administers the Waterway and Wetland Protection, and the Submerged Lands License Agreement (SLLA) programs under the Pennsylvania's Dam Safety and Encroachments Act, Pennsylvania's Clean Streams Law, and the 25 Pa. Code Chapter 105 regulations. Stream restoration and stabilization projects associated with this regulatory program contribute pollutant reductions to Pennsylvania's Chesapeake Bay goals.

D. Grant and Low-Interest Loan Programs

1. *PENNVEST*

The Pennsylvania Infrastructure Investment Authority (PENNVEST), supports communities and citizens of Pennsylvania by funding sewer, storm water, and drinking water projects throughout the Commonwealth. These projects not only contribute to improving Pennsylvania's environment and the health of its people, they also provide opportunities for economic growth and jobs for Pennsylvania's workers.

In funding point source (treatment plants), stormwater and non-point source (e.g. manure storage) projects, PENNVEST's low-cost financial assistance and grants help improve rivers and streams in communities for the enjoyment of citizens and the protection of natural resources.

2. *Growing Greener*

Voter-approved bond initiatives, Growing Greener I and II, have provided significant funding to reduce the backlog of farmland preservation projects, protect open space, eliminate the maintenance backlog in state parks, clean up abandoned mines, and restore watersheds. These funds have also been used for recreational trails and local parks, to help communities address land use, and provide new and upgraded water and sewer systems. The funds are distributed among four state agencies: (1) the Department of Agriculture to administer farmland preservation projects; (2) the Department of Conservation and Natural Resources for state park renovations and improvements; (3) PENNVEST for water and sewer system upgrades; and (4) DEP is

authorized to allocate these funds in grants for watershed restoration and protection, abandoned mine reclamation, and abandoned oil and gas well plugging projects.

3. *EPA Grant Programs*

Both the EPA Chesapeake Bay Implementation Grant Program and the Section 319 Nonpoint Source Program Grant are used to implement agriculture, urban stormwater, and stream restoration projects. The Chesapeake Bay Implementation Grant was also the funding source for the DEP Streambank Fencing Program.

V. EXISTING STATE AND FEDERAL PROGRAMS THAT HAVE NOT BEEN DOCUMENTED FOR PROGRESS (purple bar)

Table 2.3 is a tabulation of the programs discussed below and the expected reductions Pennsylvania would have received credit for if the practices installed from the implementation of these programs from 2013 through 2018 had been reported. These reductions have been included in Pennsylvania's expected reductions summarized in Table 2.1 above. Pennsylvania will work with the Chesapeake Bay Program Partnership to report and document these practices in accordance with approved protocols and procedures. Additionally, several programs were identified as likely having practices installed through implementation of those programs, but further coordination is needed to determine associated nutrient reductions.

Table 2.3. Additional Existing Programs That Will Result in Reductions

Sector	Agency/Program	Description	Reductions		
			Nitrogen (EOT)	**Phosphorus** (EOT)	**Sediment** (EOT)
Agriculture	Nutrient Trading Program	Manure Treatment Technology; Manure Transport; Agriculture BMPs	**9,196 pounds** per year	**12,602 pounds** per year	**453,224 pounds** per year
Forestry	Chapter 105 Wetland Mitigation Banking, Compliance	Forest Buffers; Stream Restoration; Wetland Restoration; Wetland Enhancement; Wetland Creation	**1,542 pounds** per year (further coordination needed)	**548 pounds** per year (further coordination needed)	**1,275,012 pounds** per year (further coordination needed)
Stormwater	Oil and Gas – Erosion & Sediment Control General Permits (ESCGP)	E&S Control Level 3; Bioretention/Rain Garden; Vegetated Swale; Wet Ponds and Wetlands; Dry Extended Detention Ponds; Infiltration Practices; Stormwater Performance Standards (New); Forest Buffers	**12,757 pounds** (per year based on 2016, the program will report 2013-2018 in December)	**638 pounds** (per year based on 2016, the program will report 2013-2018 in December)	**1,819,752 pounds** (per year based on 2016, the program will report 2013-2018 in December)
	Industrial Stormwater Permits		Further coordination needed	Further coordination needed	Further coordination needed
Wastewater	Act 537 Sewage Facilities Program	Septic Denitrification; Septic Secondary Treatment; Septic Pumping	**1,969 pounds** per year (not cumulative)	**0 pounds** per year (not cumulative)	**0 pounds per year** (not cumulative)
Waste	Municipal Waste Landfills	102.8(g)(2)(ii) Post Construction Stormwater Management BMPs	**28,848 pounds** (further coordination needed)	**1,112 pounds** (further coordination needed)	**2,592,699 pounds** (further coordination needed)
	Land Recycling		Further coordination needed	Further coordination needed	Further coordination needed
	Environmental Cleanup and Brownfields		Further coordination needed	Further coordination needed	Further coordination needed
Air	Reductions from the VW Settlement		**410,798 pounds**	N/A	N/A

* Pennsylvania does not receive full credit for these practices; improvements in data collection around them are currently being addressed.

* Pennsylvania programs are estimated based on an annual year of data collection, or unreported structural BMPs.

A. Agriculture

1. Nutrient Trading Program

DEP issued an interim Final Trading Policy in October 2005, which was finalized in November 2006. This policy was the basis for the development of the Nutrient Credit Trading Program. The primary purpose of the program is to provide a more cost-efficient way for National Pollutant Discharge Elimination System (NPDES) permittees in the Chesapeake Bay watershed to meet their effluent cap load limits for nutrients.

On October 9, 2010, DEP published its nutrient trading program regulations (25 Pa. Code § 96.8), entitled "Use of offsets and tradable credits from pollution reduction activities in the Chesapeake Bay Watershed," in the Pennsylvania Bulletin (40 Pa.B. 5790). Requirements for generating credits were updated effective October 1, 2015 in the Phase 2 Watershed Implementation Plan Nutrient Trading Supplement.

The Program involves three steps: certification, verification, and registration:

1. *Certification* means DEP has given approval for a pollutant reduction activity to generate credits. The approved credit generator may or may not generate credits during a compliance year. Generated credits must be verified by DEP before they may be sold and registered to an NPDES permit.

2. *Verification* means DEP has given approval that a generator has used their approved verification plan to demonstrate that a pollutant reduction activity generated credits during the compliance year. Verified credits may be sold.

3. *Registration* means DEP has given approval for a sale of credits upon review of an agreement between a buyer and seller. Registered credits may be applied to meet NPDES permit cap load requirements or resold.

Trades can take place through direct communication between credit buyers and credit generators, or the participating parties may use PENNVEST nutrient credit auctions to buy or sell credits. Credits bought/sold through PENNVEST auctions must still go through all three steps in the DEP Nutrient Trading Program.

Pennsylvania has a very active Nutrient Trading Program within its Chesapeake Bay watershed. During compliance year 2018, Pennsylvania registered 160 sales of nutrient credits, to 61 buyers, for a total of over 628,000 N credits and 31,000 P credits. Pennsylvania has a limited need or market for credits and therefore nutrient credit sales are limited by permitted entities' need to buy credits, not by the number of nutrient credits generated.

DEP is currently working with the World Resources Institute (WRI) and the Texas Institute for Applied Environmental Research (TIAER) to determine the extent of work needed to revise the current Chesapeake Bay Nutrient Trading Tool (CBNTT) to allow

Pennsylvania's Nutrient Trading Program to transition into the use of this EPA and regionally accepted credit calculation and tracking tool. Transitioning to the CBNTT tool will allow Pennsylvania to incorporate the performance based, TMDL linked agriculture baseline analysis for determining NPS nutrient credits as has been requested by EPA. Making this transition to the new trading tool and baseline methodology is dependent on funding to make this transition, with the funding planned to come from DEP's EPA Chesapeake Bay Implementation Grant. DEP intends to work with WRI and TIAER to make the necessary revisions to the CBNTT tool by the end of calendar year 2019, allowing Pennsylvania to transition to using this new tool, and the new TMDL-based agriculture baseline analysis in early 2020.

Pennsylvania is interested in continually enhancing its Nutrient Trading Program, as evidenced by its work to move its program toward using the EPA-supported CBNTT trading tool, and incorporating a performance-based TMDL-linked agriculture baseline analysis into its nutrient credit calculations through Pennsylvania's transition to the CBNTT tool. DEP remains interested in working directly with EPA to discuss program enhancements that EPA may suggest to improve the state's Nutrient Trading Program.

Once the CBNTT tool is revised to accommodate Pennsylvania's program and DEP transitions to using this new tool, DEP will revise the Phase 2 WIP Nutrient Trading Supplement to be consistent with the new model, the Phase 3 WIP, and the revised CBNTT tool. Updates to this Trading Supplement are expected to be made in Spring 2020.

B. Forestry

1. Wetland, Stream Restoration, and/or Riparian Buffer Restoration or Replacement Above 1:1 Ratio

The Chesapeake Bay Model does not acknowledge that wetland gains established under state regulatory permitting and compliance programs can be reported for purposes of meeting wetland restoration and enhancement goals. DEP believes that it is both reasonable and practicable to track the regulatory wetland gains greater than the 1:1 ratio impact to mitigation within Pennsylvania's portion of the Chesapeake Bay watershed, especially considering that the standards that are commonly associated with these practices are the same. To accomplish this, DEP will track all wetland restoration and enhancement acreage gains through regulatory means via DEP's eFACTS database to ensure such efforts are credited toward achieving the Pennsylvania Chesapeake Bay goals going forward. This database currently has the components to track this information. Further collaboration by DEP with the Wetland Expert Panel and the Chesapeake Bay Program Modeling Team to improve wetland reporting is also anticipated. The reductions included in Table 2.3 are only those attributed to existing wetland, stream and/or riparian buffer mitigation banks, which are a portion of the larger regulatory permitting and compliance program.

C. Stormwater

DEP and delegated conservation districts administer the statewide E&S Control program under 25 Pa. Code Chapter 102. Inspections are performed on active sites and upon permit termination. Permits are required for the following activities:

1. Erosion and Sediment Control Permits for Oil and Gas Activities

Oil and gas activities (e.g., exploration, production, processing, treatment operations or transmission facilities) involving five or more acres of earth disturbance. The E&S permit is required under Pennsylvania's Clean Streams Law for these activities. If eligible, persons conducting these activities may submit a Notice of Intent (NOI) for coverage under the E&S General Permit (ESCGP-3).

2. Industrial Stormwater Permits

Certain specific classes of industrial facilities must apply for Industrial Stormwater NPDES permit coverage. For those facilities that qualify for PAG-03 General Permit coverage, an alternative to obtaining permit coverage is to request "No Exposure Certification" if the facility qualifies. In general, all industrial materials and activities must be stored and conducted indoors or under roof for a facility to qualify for No Exposure Certification. The No Exposure Certification alternative is not available to facilities in High Quality or Exceptional Value watersheds and must be renewed every five years. Some industrial stormwater permittees utilize practices that reduce Chesapeake Bay pollutants. DEP will further coordinate to identify opportunities to achieve additional reductions from these permittees through incentivized priority BMP installation and reporting.

D. Wastewater

1. Act 537 Sewage Facilities Program

Septic denitrification, septic secondary treatment and septic pumping can achieve net reductions in Chesapeake Bay pollutants of concern and will be tracked to ensure such efforts are credited toward achieving the Pennsylvania Chesapeake Bay goals going forward.

E. Waste

1. Municipal Waste Landfills

Municipal Waste Landfills (MWLFs) located within the Chesapeake Bay watershed have implemented many stormwater BMPs. The regulation at 25 Pa. Code § 273.151 relates to soil erosion and sedimentation control Plans for MWLFs. That regulation requires that each proposed MWLF application includes a plan based on the requirements of 25

Pa. Code Chapter 102 (relating to erosion and sediment control), 25 Pa. Code §§ 273.242 to 273.244 (relating to soil erosion and sedimentation control, sedimentation ponds, and discharge structures, respectively) and other applicable state and federal requirements. MWLFs are required to manage surface water and control erosion and sedimentation based on the 24-hour precipitation event expected once in 25 years. Surface drainages from disturbed areas are required to pass through a sedimentation pond or multiple sedimentation ponds constructed, maintained and operated in accordance with 25 Pa. Code Chapters 102 and 105 prior to leaving the site, unless deemed unnecessary by DEP. Discharges from dams, ponds, embankments, impoundments and diversions are controlled by energy dissipaters, riprap channels or other devices when necessary to reduce erosion, to prevent deepening or enlargement of stream channels and to minimize disturbance to surface and groundwater. Those discharge controls are required to be designed and maintained in accordance with Chapter 105. DEP will further coordinate to identify opportunities to achieve additional reductions from MWLF permittees through incentivized priority BMP installation and reporting.

2. Land Recycling (Act 2)

Pennsylvania's Land Recycling Program (LRP) was established in law in 1995 and is commonly known as Act 2. LRP is a voluntary cleanup program that has no permitting or enforcement functions associated with it. The objective of this program is to reuse former industrial sites in any capacity possible, but the program is also available for sites where recent spills or pollution releases have occurred. Sites that have participated in the program range from gas stations and small commercial properties that may have had a single heating oil tank that leaked to large heavy industrial areas such as chemical or pesticide plants and steel mills. The focus of the program is to ensure that the property is cleaned up to an Act 2 standard and that the property is safe for the intended use. There are no permits associated with the LRP, but any program activities requiring permits must go through the usual process for obtaining those permits. For example, any type of stream restoration or floodplain reconnection implemented as part of the LRP would require permits under Chapters 102 and 105. DEP will further coordinate to identify opportunities to achieve additional reductions from these permittees through incentivized priority BMP installation and reporting.

3. Environmental Cleanup and Brownfields

Pennsylvania's LRP is one program within DEP's Bureau of Environmental Cleanup and Brownfields. DEP will further coordinate to identify opportunities to achieve additional reductions from programs in this bureau.

F. Air

The EPA and California Air Resource Board (CARB) filed a complaint against the Volkswagen Corporation and its subsidiaries (VW) that alleged that VW violated the Clean Air Act (CAA) by selling motor vehicles with emissions defeat devices that would

contribute to more vehicle air pollutant emissions of nitrogen oxides (NOx) than allowed under the Act. Atmospheric NOx is harmful to human health because it is a precursor to ground level ozone and to fine particulate matter (PM2.5), both damaging to the lung. The emissions defeat devices involved about 590,000 motor vehicles containing 2.0- and 3.0-liter diesel engines in model years 2009 to 2016. Through three partial settlements, agreements were reached between the U.S. Justice Department and VW. VW agreed to pay $16.35 billion to settle allegations of emissions standard cheating. The settlement is divided into four separate parts:

- $10 billion will be used to buy back or modify offending diesel vehicles from consumers.

- $2 billion will be used on zero emission vehicles (ZEV) infrastructure and programs and brand neutral media activities aimed at increasing public awareness of zero emission vehicles. The amount will be divided between California ($800 million) and the rest of the U.S. ($1.2 billion).

- $1.45 billion civil penalty for the alleged civil violations of the CAA and conjunctive relief to prevent future violations.

- $2.9 billion will be used to establish an Environmental Mitigation Trust (Trust), which states and territories may use to invest in eligible transportation projects to reduce NOx emissions.

All of the States, including the Chesapeake Bay Program (CBP) partnership States and the District of Columbia (DC), have been allocated a portion of the trust based on the number of violating vehicles in their jurisdiction and must file as “beneficiaries” to receive their allocations. Such filings cannot occur until the Trust agreement is finalized by the court. All requests for funding made by beneficiaries must be approved by a court appointed Trustee. Trust funds can only be spent on 10 categories of eligible mitigation projects defined in the final settlement agreements.

Governmental and nongovernmental entities are eligible to apply for Trust funds. Beneficiaries, including the CBP partnership States and DC, are required to develop a “beneficiary mitigation plan” that provides a high-level summary of how they intend to spend their allocated funds. Beneficiaries are required to submit a mitigation plan 30 days in advance of submitting a funding request to the Trustee.

Eligible mitigation actions include projects to reduce NOx from heavy duty diesel sources near population centers, such as large trucks that make deliveries and service ports, school and transit buses, and freight switching railroad locomotives. Thus, for example, eligible mitigation actions could include replacing or repowering older engines for newer engines at a rail switchyard; or could include replacing older city transit buses with new electric-powered transit city buses. Eligible mitigation actions may also include, in a more limited capacity, charging infrastructure for light duty zero emission

passenger vehicles. Beneficiaries have the flexibility to choose which projects on the list of eligible mitigation actions are the best options for their citizens.

Pennsylvania's Final Beneficiary Mitigation Plan proposes 55,525,940 pounds of NOx reductions. Of these reductions, only 2.43% of this load reduction will reach the tidal estuary. After stoichiometric transformation from NOx to nitrogen, a reduction of 410,798 pounds of nitrogen will be realized through Air Program reductions above planned Clean Air Act reductions.

Citation: Influence of Volkswagen Settlement Agreements on Chesapeake Water Quality, August 20, 2018, and www.epa.gov/enforcement/volkswagen-clean-air-act-civil-settlement.

G. Abandoned Mine Reclamation

Pennsylvania has 1,891 miles of Abandoned Mine Discharge impacted streams which have limited biologic activity and nutrient uptake. These discharges are the second largest source of impairment in the state behind agriculture.

With federal and state funding, such as the 2006 re-authorization of the Abandoned Mine Lands Fund, Pennsylvania has successfully restored 55 stream miles to attain designated use criteria with a fully functioning ecosystem. Table 2.4 is a summary of the amount of funding received by each county between 2013 and 2018 for these types of projects.

In addition, previously-mined areas on State Forest lands are reclaimed or reforested through work of DEP's Bureau of Abandoned Mine Reclamation (BAMR), in partnership with DCNR's Bureau of Forestry, and other partner organizations including Pennsylvania Environmental Council (PEC). When mine land is reclaimed to grass or forested landcover, pollution reductions occur. BMPs will be reported from DCNR and DEP BAMR annually, and resulting reductions accounted for if the reclaimed or reforested land is within the Chesapeake Bay watershed of Pennsylvania.

Table 2.4. Abandoned Mine Land Funding by County, 2013 – 2018

County	Total Dollars Spent	Total Number of Projects
Bedford	$1,278	1
Blair	$1,385,897	2
Cambria	$3,634,530	30
Centre	$3,336,437	12
Clearfield	$33,643,110	150
Clinton	$11,476,371	5
Columbia	$42,028,883	7
Dauphin	$1,016	1
Elk	$2,667,716	6
Lackawanna	$12,767,838	77
Luzerne	$15,388,792	97
Northumberland	$2,704,877	29
Schuylkill	$3,271,760	28
Susquehanna	$57,783	2
Tioga	$1,884,621	5
Wyoming	$38,049	2
TOTAL	**$134,288,958**	**454**

VI. PHASE 3 WIP PRIORITY INITIATIVE STATE NUMERIC COMMITMENTS (REDUCTIONS FROM 2018 THROUGH 2025) (green bar)

DEP, PDA, DCNR, the other members of the Phase 3 WIP Steering Committee and workgroups plus many other local government, agriculture, environmental, community, academic and business partners (Phase 3 WIP partners) participated in development of the priority initiatives and numeric commitments described in this section.

The programs described in this section will move forward as part of a broader, watershed-wide effort in concert with the CAPs. These initiatives will become part of each county's CAP as they are developed as described in Section 3, Countywide Actions. Through the planning process implemented at the county level, these recommendations will be tailored to meet the county-specific demographics, conditions, and priorities. The specific goals, recommendations and action steps are summarized below. Table 2.5, Summary of Reductions, provides the estimated reductions as calculated from the Chesapeake Bay Watershed Model for each priority initiative, assuming full implementation by 2025.

Table 2.5 Summary of Modeled Reductions from Priority Initiatives for Pennsylvania's 39 Counties without Countywide Action Plans

Priority Initiative	Final WIP Nitrogen Reduction (EOS)	Draft WIP Nitrogen Reduction (EOS)	Final WIP Phosphorus Reduction (EOS)	Draft WIP Phosphorus Reduction (EOS)	Final WIP Sediment Reduction (EOS)
Agriculture					
Total	**17,099,000**	**16,240,000**	**827,000**	**1,057,000**	**1,350,704,000**
Agriculture Compliance	4,562,000	4,562,000	176,000	176,000	635,253,000
Soil Health	3,874,000	3,874,000	177,000	177,000	475,498,000
Expanded Nutrient Management	1,570,000	460,000	62,000	19,000	0
Manure Storage Facilities	4,097,000	4,084,000	131,000	130,000	0
Precision Feeding	584,000	278,000	67,000	32,000	0
Integrated Systems for Elimination of Excess Manure	441,000	421,000	65,000	48,000	0
Grass Riparian Buffers	1,971,000	2,562,000	148,000	475,000	204,815,000
Stormwater[1]					
Total	**607,000**	**171,000**	**62,000**	**30,000**	**274,375,000**
Meet Current MS4 Permit Requirements	93,000	93,000	27,000	27,000	102,097,000
New Riparian Forest Buffers	5,000	5,000	400	400	1,173,000
Control Measures for Illicit Discharge	1,000	1,000	100	100	0
Industrial Stormwater	1,000	1,000	20	20	583,000
Fertilizer Legislation	71,000	71,000	3,000	3,000	0
Meet Current Erosion and Sediment (E&S) Control and Post Construction Stormwater Management (PCSM) Requirements[3]	433,000	0	32,000	0	152,517,000
Dirt and Gravel Roads	0	0	0	0	18,005,000
Forestry					
Total	**5,053,000**	**4,793,000**	**532,000**	**671,000**	**574,929,000**
Forest Riparian Buffers[1]	4,898,000	4,641,000	504,000	643,000	486,806,000
Tree Canopy	110	110	8	8	7,000
Woods and Pollinator Habitat	56,000	59,000	3,900	3,800	6,423,000
Forest, Farm, and Natural Areas Conservation	6,000	N/A	1,000	N/A	1,788,000
Stream and Wetland Restoration	93,000	93,000	24,000	24,000	79,906,000
Wastewater					
Onsite Septic Management Program	1,000	0		0	0
Other					
Air Reductions	410,798	0		0	N/A
Total Sector Initiatives Reductions (EOS)	**22,622,000**	**19,250,000**	**1,489,000**	**1,291,000**	**2,196,592,000**
Reductions Delivered to Chesapeake Bay (EOT)	**15,335,000**	**12,912,000**	**551,000**	**462,000**	**433,725,000**

[1]These forest buffers will be installed on a combination of agriculture and urban stormwater acres not covered by an MS4 pollutant reduction plan.

A. Agriculture

The 15-member Agriculture Workgroup produced an action plan that seeks to maintain a vibrant and productive agricultural sector while also meeting local water quality goals that will contribute to cleaning up the Chesapeake Bay and the Pennsylvania Partners and other stakeholders are adopting the action plan as part of the Phase 3 WIP. In addition to compliance with basic regulatory obligations, the plan focuses on three key elements: Soil health; Manure and nutrient management; and riparian ecosystem improvements and restoration.

These reductions will be made as part of seven priority initiatives:

1. Agricultural Compliance
2. Soil Health
3. Expanded Nutrient Management
4. Manure Storage Facilities
5. Precision Feeding
6. Integrated Systems for Elimination of Excess Manure
7. Forest and Grass Riparian Buffers

As stated throughout the Phase 3 WIP, there are several challenges that need to be overcome to attain the reductions via these priority initiatives. This includes financial, technical, and cultural hurdles, as well as statewide coordination and federal acceptance of data.

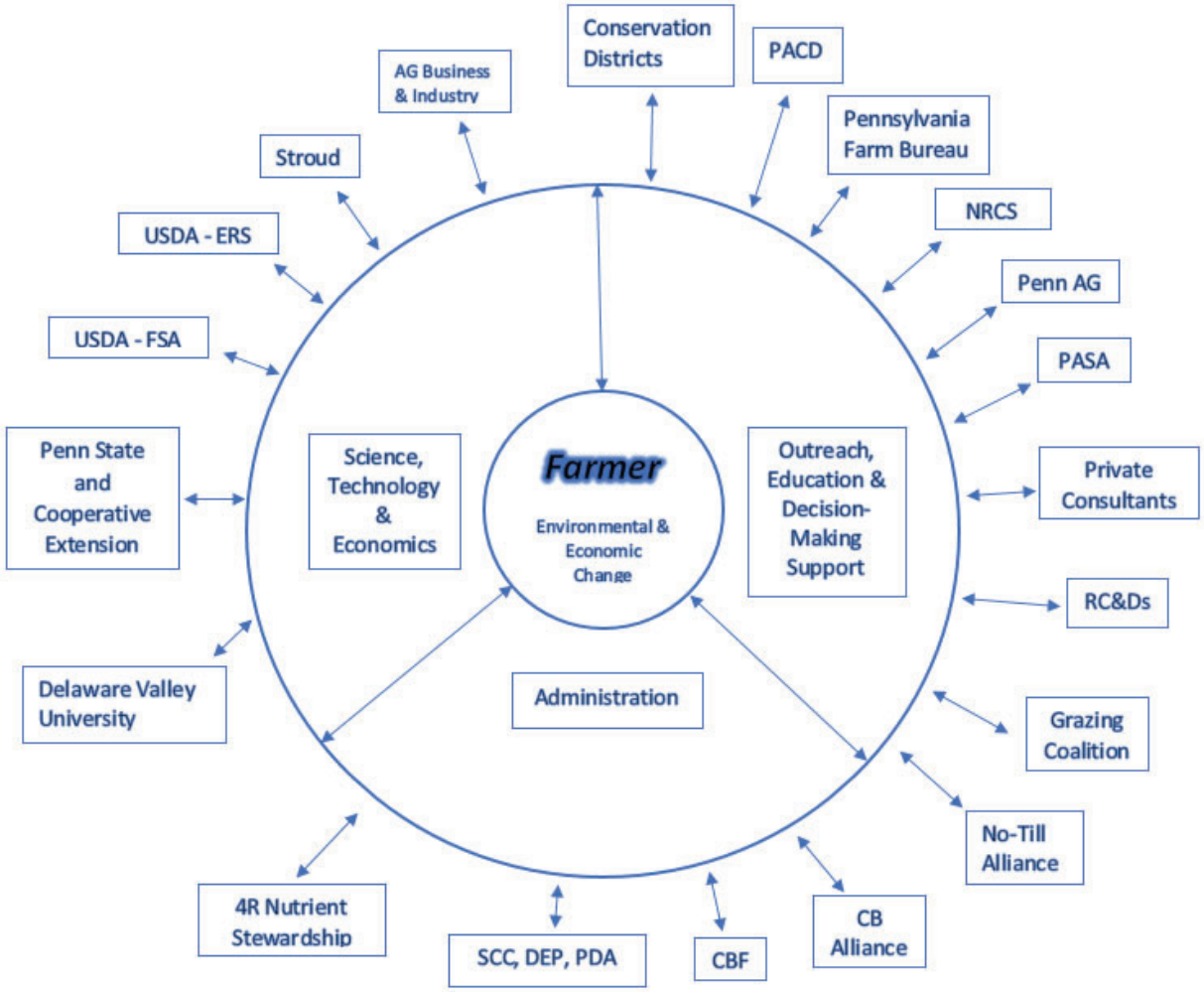
Culture is the largest intangible challenge to implementation. Agriculture within Pennsylvania's Chesapeake Bay watershed is widely diverse, with significant differences among farm operators in size, types of commodities produced, degree of mechanization and incorporation of technology, religious beliefs, and willingness to accept and use innovative ideas purported to improve profitability and/or environmental effectiveness of their farm operations. Given the unpredictability in outcomes arising from management of nonpoint pollution, many farmers remain skeptical of incurring real costs or financing real debt in response to projections by others that environmental or farm operational efficiency will be improved. Substantial time and effort will be dedicated to ensuring collaboration with farmers through education and demonstration that investment in conservation measures is economically viable and will improve not only their farm's quality and function, but also local water quality.

Farms are holistic systems. All seven priority initiatives are integrated as one whole system, so programs instituted to educate, assist, manage, regulate, and mitigate are used interchangeably for all initiatives. Management of nutrients, to include timing of nutrient application through the use of manure storage systems, plays a significant role in the ability to improve soil health through minimum tillage and planting of cover crops. Using conservation tillage and no-till systems, alongside planting cover crops, minimizes accelerated erosion and sedimentation, which is one piece of agriculture compliance. Dairy precision feeding reduces the amount of nutrients available to

application and dealing with excess manure through treatment and export also minimizes the amount of available nutrients to be applied. Nutrient application setbacks from surface waters, wells and sinkholes are also implemented alongside grassed and forested buffers.

Figure 2.4 shows the numerous entities involved in agriculture BMP implementation efforts and is by no means all-inclusive. Many of these entities are multi-faceted in their approach. This partnership builds on the concept that farmers, and farm-level decision making, are the central focus. Member agencies and organizations are cooperating in their area of expertise to develop a well-articulated, coordinated, science-based, farmer support network aimed at improving decision making and practice implementation at the farm level.

Figure 2.4. Graphic Representation of Agriculture Partners (Not All-Inclusive)



1. *Agricultural Compliance*

Action: Ensure farmers are implementing their state required Ag E&S plan or conservation plan, Manure Management/Nutrient Management Plan, and implementing required barnyard runoff controls, where needed.

- Goal 1: Continue the compliance, inspection and enforcement programs associated with Pennsylvania's Clean Streams Law and federal requirements.

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

2. *Soil Health*

Action: Use crop and soil management practices that improve long-term soil health and stability.

- Goal 1: Conservation tillage on 20% of croplands.
- Goal 2: High Residue Low Disturbance tillage (No-till) on 47% of croplands.
- Goal 3: Non-harvested cover crops on 33-50% of croplands.
- Goal 4: Prescribed grazing on 50% of pastures, including exclusion fencing, where appropriate.

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

3. *Expanded Nutrient Management*

Action: Non-manured farmlands use nutrient management plans and precision nutrient management practices.

- Goal 1: 20% of non-manured croplands have and implement Nutrient Management Plans.
- Goal 2: 20% of manured and non-manured croplands use the "4Rs" principles of "Right Source, Right Rate, Right Time and Right Place" for increased nitrogen and phosphorus reductions.

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

4. ***Manure Storage Facilities***

Action: Install and use manure storage systems that meet federal standards.

- Goal 1: 90% of swine and poultry operations have adequate manure storage facilities.
- Goal 2: 75% of other livestock operations have adequate manure storage facilities.

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

5. ***Dairy Precision Feeding***

Action: Use precision feed management to reduce nitrogen and phosphorus in manure.

- Goal 1: 70% of dairy cows fed with precision management.

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

6. ***Integrated Systems for Elimination of Excess Manure***

Action: Create integrated (county/regional) programs for removal of or beneficial use of excess manure.

- Goal 1: Develop coordinated county/regional systems for removing excess manure (through treatment or transportation) from the Chesapeake Bay watershed.

Table 2.6 presents the percentage of nutrients a crop needs compared to the nutrients applied from biosolids, fertilizer and manure combined in the Phase 3 WIP scenario. The crop need was established by data from land grant universities and the Agriculture Modeling Subcommittee of the Chesapeake Bay Program Partnership Agriculture Workgroup. Nutrients applied is calculated from fertilizer sales data and animal numbers provided by the Agriculture Census. Counties that are over 100% (over their crop need) are highlighted in yellow. Therefore, these counties should be the first to document and

report manure transport and nutrient management implementation to address excess nutrients.

Table 2.6. Counties with Excess Manure

County	Total N Applied to Crop Need
Adams	86%
Bedford	105%
Berks	115%
Blair	117%
Bradford	100%
Cambria	91%
Cameron	106%
Carbon	90%
Centre	100%
Chester	105%
Clearfield	87%
Clinton	120%
Columbia	97%
Cumberland	113%
Dauphin	115%
Elk	89%
Franklin	124%
Fulton	120%
Huntingdon	109%
Indiana	90%
Jefferson	90%
Juniata	149%

County	Total N Applied to Crop Need
Lackawanna	96%
Lancaster	161%
Lebanon	161%
Luzerne	85%
Lycoming	97%
McKean	90%
Mifflin	127%
Montour	103%
Northumberland	104%
Perry	124%
Potter	103%
Schuylkill	120%
Snyder	189%
Somerset	103%
Sullivan	97%
Susquehanna	91%
Tioga	100%
Union	163%
Wayne	90%
Wyoming	86%
York	96%

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

7. *Forest and Grass Riparian Buffers*

Action: Plant forest buffers and grassy vegetation along streams. For accreditation buffers must be a minimal of 35 feet in width up to 300 feet in width from the edge of the stream.

- Goal 1: 25% of non-buffered streamside farm lands add 35 ft wide forest buffer. (based on up to 300 feet available streamside area)

- Goal 2: 15% of non-buffered streamside farm lands add 35 ft wide grass buffer (based on up to 300 feet available streamside area)

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

Table 5.3 in Section 5, Existing and Needed Resources, provides a summary of the existing and new state agency resources needed within DEP, PDA, and the State Conservation Commission to implement these priority initiatives. In addition to these resources, the Phase 3 WIP Agriculture Workgroup performed a workload analysis and estimated 87 people from a combination of private industry, non-governmental organizations and federal agencies dedicated to the delivery of technical assistance, planning BMP practice design and engineering above what is already dedicated to this effort may be needed. The amount of existing resources or the cost of these additional resources is unknown at this time.

B. Forestry

Forestry best management practices such as riparian forest buffers and upland tree plantings are both cost-effective for improving water quality while also providing significant environmental and social benefits in both agricultural and developed areas. Trees along streams improve habitat, reduce flooding impacts, and provide shade to cool waterways. Trees in backyards and communities increase property values and improve human health. These restoration activities help connect citizens to their local watersheds.

The 15-member Forestry Workgroup produced an action plan with forestry practices that seek to reduce nitrogen and phosphorus pollution and meet water quality standards and the Pennsylvania Partners and other stakeholders are adopting the action plan as part of the Phase 3 WIP.

This action plan is divided into the following five priority initiatives:

1. Forest Riparian Buffers
2. Tree Canopy
3. Woods and Pollinator Habitat
4. Forest and Natural Area Conservation
5. Stream and Wetland Restoration

In developing these priority initiatives, overarching themes emerged. These overarching themes include:

- Increased coordinated and comprehensive outreach and communications strategies;

- Engagement of leadership at all levels to prioritize effective best management practices;
- Increased technical assistance in the governmental, private, and non-profit sectors to assist landowners of all types;
- Development of new comprehensive funding and cost-share options and mechanisms for landowners;
- Improved reporting and tracking of all priority BMPs; and
- Further development of BMP maintenance and establishment care programs.

Whether working with established programs, like riparian forest buffer programs; or starting a brand-new statewide effort, like a turf conversion program, there will be many challenges to adding staffing and capacity, finding new funding, and coordinating communications to reach Pennsylvania's planning targets. However, by working through groups like Pennsylvania's Riparian Forest Buffer Advisory Committee and forming similar groups for new efforts as they emerge, Pennsylvania will accelerate progress and coordinate the delivery of these BMPs and associated reductions in a more efficient manner than in the past.

Note that some of the forestry priority practices are developed specifically to reduce nitrogen and phosphorus, but some are being instituted for other reasons where nitrogen and phosphorus reductions are co-benefits.

1. *Forest Riparian Buffers*

Action: Plant trees and shrubs along streams. For accreditation, buffers must be a minimum of 35 feet in width up to 300 feet in width from the edge of the stream.

- Goal 1: 83,000 acres of forest riparian buffer on agricultural lands.
- Goal 2: 2,650 acres of forest riparian buffer in developed areas.

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

2. *Tree Canopy*

Action: Plant trees in developed areas.

- Goal 1: 50 acres of urban tree canopy planted (15,000 trees).

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority

initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

3. Woods and Pollinator Habitat

Action: Convert lawn and turf areas to woods and meadows.

- Goal 1: 5,000 acres of lawns to woods.
- Goal 2: 5,000 acres of lawns to meadows.

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

4. Forest, Farm and Natural Area Conservation

Action: Provide credits for land conservation and revise zoning and ordinances to conserve existing natural areas.

- Goal: 20,000 acres of land conserved annually.

  NOTE: The estimated annual cost for these actions cannot be determined due to variations in the cost of land "crediting" programs across the watershed.

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

5. Stream and Wetland Restoration

Action: Support efforts to restore local streams and wetlands.

- Goal 1: 60,000 linear feet of urban and non-urban streams restored per year utilizing appropriate measures for the site such as stabilization, natural stream channel design, floodplain restoration, etc.
- Goal 2: 400 acres of wetlands restored per year.

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

In Table 5.3 in Section 5, Existing and Needed Resources, there is a summary of the existing and new state agency resources needed within DCNR and the conservation districts to implement these forestry priority initiatives.

C. Stormwater

The 12-member Phase 3 WIP Stormwater Workgroup developed an action plan for BMPs to help localities reduce nitrogen and phosphorus and meet local water quality standards and the Pennsylvania Partners and other stakeholders are adopting the action plan as part of the Phase 3 WIP.

This action plan prioritized:

1. MS4 Pollutant Reduction Plans
2. Riparian Forest Buffers
3. Control measures for illicit discharge
4. Industrial stormwater
5. Fertilizer Legislation
6. Erosion and Sediment (E&S) Control and Post Construction Stormwater Management (PCSM) Program

1. Implement Pollutant Reduction Plans (PRPs) for Municipal Separate Storm Sewer System (MS4) Communities

Action: As one component of the 2018 permit, MS4 Permittees must implement management practices to achieve the reductions identified in their respective PRPs by 2023.

- Goal 1: MS4s in the Chesapeake Bay watershed implement BMPs in current MS4 NPDES permits by 2023.
- Goal 2: Implement the PennDOT and Turnpike Commission MS4 Permits in concert with the other MS4 NPDES permits by 2023

DEP recognizes that the BMPs installed by MS4 permittees typically reduce only limited amounts of nitrogen. Urban stormwater is not a major source of nitrogen, and most stormwater BMPs capture limited nitrogen. The primary purpose of urban stormwater permits (MS4, Industrial Stormwater and Construction) is to protect local waters. Streams within and downstream of developed areas are frequently impaired because most older development was built without consideration of urban stormwater impacts. The result is often habitat destruction, extreme flow variability, high temperature in dry weather, illicit discharges, and sediment deposition. The MS4 permits and PRPs are designed to address these impacts. Since these urban stormwater BMPs do also capture some nitrogen, it is appropriate to also include these reductions in the Phase 3 WIP.

PRPs within the Bay drainage are in various stages of implementation. The reductions are required to be operational within five years of the PRP approval. Virtually all of these reductions will therefore be in place before 2025.

DEP anticipates additional reductions from PennDOT and Turnpike Commission and other institutional MS4 permits that have not yet been renewed with the new PRP requirement. PennDOT and the Turnpike Commission are actively pursuing BMP installation, both independently and in collaboration with municipalities, with the understanding that qualifying BMPs will be creditable to their upcoming permit term.

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

2. New Riparian Forest Buffers

Action: Plant trees and shrubs alongside streams.

- Goal 1: Incentivize and facilitate new acres of riparian forest buffers associated with the MS4 Pollutant Reduction Plans.

These acres are in addition to the riparian forest buffers identified as part of the Forestry and Agriculture Workgroups and are listed here due to their association with MS4 communities.

A large proportion of developed lands are not regulated under MS4 permits because they are not included in the federal Bureau of the Census “Urbanized Area.” The expectation is that a limited acreage of buffers will be voluntarily constructed in those developed, non-regulated areas.

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

3. Control Measures for Illicit Discharges

Action: DEP facilitates municipal ordinance amendments to control illicit discharges to storm sewer systems.

- Goal 1: Municipal ordinance adoption for control of pool drainage.
- Goal 2: Municipal ordinance adoption for control of residential car washing draining.

Many municipalities need to update their stormwater ordinances to make them consistent with the current DEP model ordinance. The needed changes vary from municipality to municipality, but virtually all of them need to reflect the new 2018 MS4-required controls on pool drainage and car washing.

The changes are prompted through MS4 permit processes for those municipalities with MS4 permits. They are prompted for non-MS4s when counties update their Stormwater Management Plans; those plans include a county-recommended model ordinance for municipalities to enact.

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

4. Industrial Stormwater

Action: DEP develops technical guidance, intended to supplement existing requirements, to inform industrial stormwater discharge permittees engaged in these activities.This guidance will list appropriate BMP utilization, design standards and implementation to reduce pollution which are acceptable to manage industrial stormwater.

- Goal 1: Implementation of Chesapeake Bay BMPs by industrial stormwater discharge permittees.
- Goal 2: Identify appropriate industrial stormwater permits suitable for impervious surface retrofit BMPs with the goal of facilitating industrial impervious surface to pervious cover or other volume reduction retrofit BMP.

Industrial stormwater permits vary because of the many types of industrial facilities. Those permits control the quality and quantity of stormwater to a degree, but do not require a current load calculation or a specific load reduction. Nevertheless, there are opportunities for voluntary BMPs appropriate to each industry classification.

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

5. Fertilizer Legislation

Action: Pass the legislation described below under Programmatic Commitments, Other Legislation to Facilitate Reductions.

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

In addition to the Priority Initiatives developed by the Stormwater Workgroup, the following priority initiatives are added based on DEP's analysis of existing programs described above:

6. Continue to Implement Erosion and Sediment (E&S) Control and Post Construction Stormwater Management (PCSM) Program

Action: Continue permitting, inspecting, and ensuring compliance with Pennsylvania's erosion and sediment control and post-construction stormwater permit requirements, found in 25 Pa. Code Chapter 102 for all activities including construction, timber harvest, oil and gas exploration, mining, and waste management.

- Goal 1: Increase the number of county conservation districts with post-construction stormwater delegation.
- Goal 2: Increase the inspection outputs as well as DEP staff to ensure compliance with NPDES permit and Chapter 102 obligations.
- Goal 3: Improve the tracking and reporting to include all DEP programs implementing the provisions of these regulations.

Load reductions from BMPs required by Chapter 102 permits are creditable to the Chesapeake Bay Watershed Model and should therefore continue to be reported. Their continued operation should also be ensured and reported to maintain reduction credit in the Chesapeake Bay Watershed Model into the long-term future. Strengthened County Conservation District and DEP compliance staff resources will support that goal, along with improved DEP Chapter 102 data management using the PracticeKeeper system.

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

Table 5.3 in Section 5, Existing and Needed Resources, provides a summary of the existing and new state agency resources needed within DEP to implement these stormwater priority initiatives.

7. Dirt and Gravel Roads

Action: Continue to implement the Dirt and Gravel Roads Program through the Center for Dirt and Gravel Roads.

Responsible Parties: See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement this priority initiative. A summary of the key action steps that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

In Table 5.3 in Section 5, Existing and Needed Resources, is a summary of the existing and new state agency resources needed within DEP to implement this priority initiative.

D. Wastewater

Wastewater is the liquid waste, sewage or industrial waste from homes, businesses, schools, industrial facilities, and other institutions. Treated wastewater makes its way directly or indirectly into our waters. If wastewater contains excess nitrogen and phosphorus, it supports the growth of algae blooms that create low-oxygen "dead zones" that suffocate marine life. Excess nitrogen and phosphorus in fresh water streams can impact aquatic life and other surface water uses. Wastewater treatment provides protection of water resources and public health and allows water to return to the environment safely.

Previously, the Pennsylvania wastewater sector was required to reduce their contribution of nitrogen (N) and phosphorus (P) from their treatment plants. The original wastewater contribution to receiving streams was 11% of the nitrogen load, and 18% of the phosphorus load (found in the 2004 Pennsylvania Bay Tributary Strategy, DEP). Their 33% required reduction would result in a 4% nitrogen decrease, and a 6% phosphorus decrease by 2025. The 190 wastewater plants, using Biological Nutrient Reduction (BNR) techniques (with some plants treating to a level between BNR and Enhanced Nutrient Reduction (ENR)) proved highly successful in removing nutrients, and allowed these plants to meet both their 2017 midpoint goals and 2025 final goals years ahead of schedule. These goals were achieved at an estimated cost of $1.4 billion. The cost projections were done by the former Metcalf and Eddy engineering firm (now AECOM), under contract with the state, spending six months studying Pennsylvania wastewater plants in the Chesapeake Bay watershed.

Significant Industrial Wastewater (Sig IW) Dischargers are defined as non-sewage dischargers with loadings of 75 pounds/day total nitrogen (TN) and 25 pounds/day total phosphorus (TP) or greater. Nutrient cap loads for significant IW dischargers were based on the facility specific nutrient reduction evaluations. There are 23 Sig IW facilities with nutrient cap load in their permits. Industrial facilities waste streams vary widely (food processors, paper mills, landfill leachate dischargers), so an across the board concentration-based load limit is not feasible. A site-specific nutrient reduction evaluation allowed each facility to propose reductions based on what was possible at that facility. IW discharger expansion for significant or non-significant dischargers is not permitted without offsetting the resulting nutrient discharge increase. Nonsignificant discharges are sewage dischargers with design flow less than 0.4 MGD and non-sewage dischargers who do not meet the definition of significant IW. Non-significant sewage dischargers who propose expansion are provided with nutrient cap loads in

their NPDES permits. Typically, the load will be based on the existing load, but the cap load will not be greater than a load based on 0.4 million gallons per day (MGD) and 6.0 mg/liter TN and 0.8 mg/liter TP.

A consistent approach to reporting the non-significant discharger loads is necessary. Pennsylvania is currently reporting many of the non-significant load assuming that the facility is at its design flow capacity, which is not true for most circumstances. The reporting assuming design flow condition results in inflated TN reporting. DEP has required many of its facilities to electronically report their discharge monitoring data. The resulting data will allow for a more accurate accounting of nutrient loads from non-significant facilities. All non-significant dischargers to the Chesapeake Bay will be electronically reporting nutrient loads by the end of reporting year 2020. Any facility not reporting nutrient information will have reporting incorporated into their NPDES permit at the next renewal.

Current information on Wastewater Treatment Plants (WWTPs) in the Chesapeake Bay may be found in the *Phase 2 Watershed Implementation Plan Wastewater Supplement.* This supplement provides an update on Chesapeake Bay TMDL implementation activities for point sources and DEP's current implementation strategy for wastewater. This document is updated periodically to reflect changes due to DEP's permit actions as well as changes to strategies in managing the wastewater sector's allocated loads under the TMDL.

Pennsylvania and other states also have created nutrient trading programs that allow wastewater treatment plants to design upgrades with greater nutrient reductions, then sell nutrient credits to other facilities. This promotes cost-effective reduction.

The 14 members of the Wastewater Workgroup researched the feasibility of treating to ENR in Pennsylvania. ENR effluent total nitrogen and total phosphorus concentrations are 3.0 mg/l and 0.4 mg/l, respectively. Currently, the 190 significant wastewater treatment systems with BNR effluent load limits, reached their 2025 nitrogen and phosphorus reduction goals in 2018 (seven years ahead of schedule). BNR effluent total nitrogen and total phosphorus concentrations are 6.0 mg/l and 0.8 mg/l, respectively. Although a number of these systems are treating to a level between BNR and ENR, they are currently obligated to meet an annual load limit based on BNR requirements.

Priority initiatives that have the potential to directly result in nutrient reductions that will be explored for Wastewater include:

1. Continue Current Treatment Course
2. Plant Optimization Program
3. Municipalities Implement Onsite Septic System Inspection and Pumping Programs

1. *Continue Current Treatment Course*

Given the ongoing reduction success, one priority initiative is to continue the treatment course described above. The ongoing tracking of the 190 publicly-owned treatment works and their wasteload allocations is described in the Phase 2 Watershed Implementation Plan Wastewater Supplement that will continue to be updated on a regular basis.

2. *Plant Optimization Program*

DEP's treatment plant optimization program helps troubled facilities get into compliance with permitting requirements. DEP will further investigate the feasibility of how this program could be expanded to help facilities optimize their process for nutrient removal by establishing a facility nutrient removal optimization program. The existing DEP optimization program does not have the capacity to run such a program, and expansion of the program would include a section dedicated to statewide implementation. Varying degrees of implementation could be considered to make the effort slightly less costly; however, the reduction in proposed DEP staffing would shift the burden to the facility to hire operations consultants.

Table 5.3 in Section 5, Existing and Needed Resources, provides a summary of the existing and new state agency resources needed within DEP to implement this initiative. These costs include the cost for staff, as well as the additional costs for equipment and lab analyses.

3. *Municipalities Implement Onsite Septic System Inspection and Pumping Programs*

Properly operated and maintained systems provide better protection of local ground water resources as well as a reduction to the total nitrogen loading to the Chesapeake Bay. If all municipalities with on-lot systems would implement sewage management programs that include inspection of the on-lot system and pumping of septic tanks 55,000 pounds of total nitrogen reduction could be realized.

Sewage management programs that incorporate septic system inspection and pumping are recommended. On-lot system oversight is the responsibility of municipalities per the Pennsylvania Sewage Facilities Act.

To facilitate the implementation of this recommendation, DEP proposes to develop a GIS-based online monitoring and reporting program that municipalities can use to report on-lot system operation and maintenance and permitting information for Chesapeake Bay reporting. See the action step on the Progress and Reporting Template and in Section 7, Milestones and Progress Tracking.

VII. NEW PROGRAMS THAT SUPPORT IMPLEMENTATION OF THE STATE NUMERIC COMMITMENTS (green bar)

In the past two years, several new initiatives and programs were developed to accelerate Pennsylvania's progress towards achieving the nutrient and sediment reduction planning targets. Since these programs are new, the results of these programs have not been captured in the progress reports to date, but will support achievement of the priority numeric commitment initiatives described in Section 2, VI. above and further ensure implementation of priority initiatives.

See the Progress and Tracking Template for a specific listing of individual agencies involved in specific action steps designed to implement many of these initiatives. A summary of the key action steps relative to some of these programs that will be reported every six months can be found in Section 7, Milestones and Progress Tracking.

A. Agriculture

1. Pennsylvania Farm Bill

In recognition of the need for new, targeted investments and in response to EPA's comments, Governor Wolf proposed, and the Pennsylvania General Assembly passed, with near unanimous approval, the 2019 Pennsylvania Farm Bill. This historic $23.1 million investment in Pennsylvania agriculture includes new and expanded conservation funding with priority given to the Tier 1, 2 and 3 Counties in the Chesapeake Bay watershed and creates a new delivery mechanism to drive a mix of loans, tax credits and grants to the local level. The State Conservation Commission will oversee more than $9 million in new and expanded funds, with new tools offering more competitive assistance for priority practices identified by the Phase 3 WIP Agriculture Workgroup, including cover crops, buffers, stream fencing, livestock crossings, manure storage and more.

The new and expanded funds include: $2.5 million for Conservation Excellence grants, an additional $3 million for the Resource Enhancement and Protection tax credit program, and $500,000 for AgriLink low interest loans, anticipated to make available $3-$4 million in low interest loans.

Other Pennsylvania Farm Bill programs will support the Commonwealth's conservation efforts, such as the new Agricultural Business Development Center, which will connect producers to business planning resources, including conservation resources.

2. Agriculture Plan Reimbursement Program

DEP's Agriculture Plan Reimbursement Program provides direct reimbursement to farmers for the costs incurred for the development of nutrient management, manure management and agriculture erosion and sediment control plans for their farms.

Farmers have until April 1 of each year to apply to participate in the program and May 30 to submit the completed plans to one of DEP's two contractors for reimbursement. Team Ag administers the program for DEP in the southcentral part of the watershed; Larson Design in the northcentral and northeast part of the watershed. This program completed its second year in spring 2019. At the end of the first year, the program had reimbursed farmers for 750 plans, covering approximately 180,000 acres for approximately $770,000.

3. Funding for Piloting Chesapeake Bay Agriculture Inspection Program - Phase 2

The initial phase of the Chesapeake Bay Agriculture Inspection Program (CBAIP) has been very successful and has resulted in bringing 96% of those inspected into compliance without the need for an enforcement action. The main reason for the success of this program is due to conservation districts and DEP regional offices having the tools and funding available to provide planning-related compliance assistance before it reaches a level requiring enforcement.

Conservation districts typically provide planning assistance or refer farmers needing a plan to a list of private consultants while also providing information about DEP's Agriculture Plan Reimbursement Program. DEP Regional Offices either refer farmers to conservation districts or to private consultants while also providing information about DEP's Agriculture Plan Reimbursement Program. Without compliance assistance, through both technical assistance and funding, there would be a significantly higher rate of continued non-compliance. The need for enforcement would then also be significantly higher, but with very limited staffing available to meet that need.

To that end, more than $2.5 million in state funding has been allocated to pilot "Phase 2" of the CBAIP in four counties that will be selected by DEP in the fall of 2019. The selection criteria for the four counties will include the county's participation in the Chesapeake Bay Technician Agreement, the local impact on agriculture-impaired streams, the impact to the Chesapeake Bay, and the ability and willingness to pilot the next phase of the inspection program. The focus of this funding would strictly be for farms that have been or will be inspected in targeted watersheds selected in the counties' inspection strategies, with a maximum cap on funding per farm. The goal is to assist farmers found to be in non-compliance to attain compliance quickly by offsetting costs for BMPs such as grassed waterways, terraces and diversions, barnyard runoff controls, fencing, etc.

4. Pennsylvania Agriculture Conservation Stewardship Program (PACS)

PDA, DEP and SCC have developed a new and voluntary program, known as the Pennsylvania Agricultural Conservation Stewardship (PACS) Program. The program's objective is to recognize and reward Pennsylvania agricultural producers who volunteer to document, with proper verification, the performance of practices demonstrating their

farms meet required state erosion and sediment and manure management standards, as well as all recommended Phase 3 WIP practices applicable to their operations. Farmers successfully participating in this program will receive a PACS program certification which will remain valid as long as the farmer continues to sufficiently demonstrate that the farm meets minimum criteria for PACS certification.

The PACS program will focus on engaging qualified third-party personnel to perform environmental assessments of farms to determine if the operation meets the minimum criteria necessary for recognition. Commitment of resources for recruiting, training, and authorizing qualified and supportive third-party individuals will be a key measure for this program's success. Qualified third-party personnel who work practically with farmers to achieve and affirm legal compliance and additional conservation measures will help to significantly move the needle toward Pennsylvania's TMDL goals.

PDA, DEP and SCC will initiate implementation of the PACs program by January 2020.

B. Forestry

1. *DCNR Community Conservation Partnerships Program (C2P2) Buffer Grants*

The DCNR Riparian Forest Buffer Program provides financial assistance to identify locations in need of riparian forest buffers and to design, establish, monitor, and provide short-term maintenance for those buffers. Applicants are encouraged to include the Multifunctional Buffer Concept in their proposed project. Eligible activities include landowner outreach, buffer design, site preparation and buffer installation, plant materials and tree shelters, and short-term maintenance (approximately 3 years). DCNR considers a variety of forest buffer project types, including conventional riparian forest buffers and multifunctional buffers. Approximately $500,000 is awarded to partners annually through this program, if funding is available.

Each annual grant round typically results in 75-100 acres of Riparian Forest Buffer plantings across Pennsylvania, both within and outside of the Chesapeake Bay watershed. Because this grant program just launched in 2016, the first round of grantees have not completed projects and reported final implemented acres, as the grants are awarded with a several year grant period. Implemented acres will be reported to DEP through grantees and DCNR when the projects are completed. Grants require a 1:1 match from partners. Matches can be cash or non-cash, such as in-kind staff, volunteers, equipment usage, etc. Eligible applicants include local governments in Pennsylvania, non-profits, and educational organizations.

2. *DCNR/PENNVEST Pilot Grants*

DCNR has partnered with the Pennsylvania Infrastructure and Investment Authority (PENNVEST), to provide a special grant round through the C2P2 program for three years specifically for testing the "multifunctional buffer concept". A multifunctional buffer is a riparian forest buffer that provides opportunities for harvesting products such as

nuts, berries, woody florals, forbs, and potentially woody biomass, with the idea that the potential to gain an income from buffered streamside land might interest new landowners in buffer implementation.

The final round of the current pilot grants will be opened to applicants in late 2019. During each round to date, approximately $1 million has been awarded to partners. Because this grant program started in 2017, the first round of grantees have not completed projects and reported final implemented acres, as the grants are awarded with a several year grant period. Grantees and DCNR will report implemented acres to DEP when the projects are completed. At this point, it is unclear whether PENNVEST and DCNR will be able to make additional funds available to partners through this effort beyond the final $1 million to be awarded in late 2019 or early 2020. As available, funds are awarded to partners for implementation projects both within and outside of the Chesapeake Bay watershed in Pennsylvania.

3. *TreeVitalize Grants*

TreePennsylvania, an independent non-profit agency, manages the statewide TreeVitalize grant program. Funding is provided by DCNR to promote and develop sustainable urban forestry programs in Pennsylvania. Annual grant terms provide the opportunity for funding in three priority areas: tree planting, urban riparian buffers and community forestry management. Tree planting grants provide assistance for tree plantings in community and urban areas along streets, parks, and other publicly-accessible areas. Urban riparian buffer grants provide assistance for urban riparian buffer tree plantings adjacent to community and urban waterways. Community forestry management grants provide assistance for tree care management plans, tree inventories, pruning, short term employment (including internships), educational workshops, webinars, urban wood utilization, ordinance development, land banks design, urban agriculture design, and other aspects of urban forestry.

Approximately $100,000 is currently awarded annually. Because this grant program started in 2016, the first round of grantees have not finalized projects and reported final implemented acres, as the grants are awarded with a several year grant period. Grantees and DCNR will report implemented acres to DEP when the projects are completed.

4. *Stream ReLeaf*

A DCNR project funded by National Fish and Wildlife Foundation (NFWF) through a $750,000 Innovative Nutrient and Sediment Reduction (INSR) grant, Stream ReLeaf funded buffers in seven southcentral Pennsylvania counties through a streamlined, flat-rate method to help partners implement projects in areas of high nutrient-loading. While the original funds made available through this program are nearly expended as of spring 2019, a valuable lesson learned through the implementation of this program is that a large appetite exists for riparian forest buffer implementation, even in traditionally buffer-resistant areas, if a streamlined, easy-to-access, flexible, flat-per-acre-rate buffer

implementation program is available to partners. In less than three years, 95 acres of buffer will be planted with $380,000. These acres will be reported when this grant is completed in 2021.

5. *Fish and Boat Commission Stream Restoration Initiative*

The Pennsylvania Fish and Boat Commission (PFBC) works with a diverse group of partners including local, state, and federal agencies, nonprofit organizations, and landowners to develop and implement stream restoration projects in the Northcentral Region of the Susquehanna River watershed. The current program focuses on instream fish habitat enhancement and bank stabilization but plans to expand the program include the incorporation of riparian buffer plantings and streambank fencing when feasible.

Using the current program as an example, DEP and the PFBC will expand this initiative into other areas of the watershed, starting with one or more of the four pilot counties including Franklin, Adams, York and/or Lancaster. To accomplish this, additional staff resources at the PFBC will be funded from the EPA Chesapeake Bay Implementation Grant starting with the EPA FY20 grant allocation.

6. *Chesapeake Bay Foundation Keystone 10 Million Trees Partnership (K10)*

The Keystone 10 Million Trees Partnership (K10), coordinated by the Chesapeake Bay Foundation, is a collaborative effort to add 10 million trees by the end of 2025 by increasing agricultural, urban, and suburban forest riparian buffers, urban and suburban tree canopy, and abandoned mine land reclamation.

Launched in spring 2018, a coalition of diverse organizations are committed to making the Keystone 10 Million Trees Partnership goal a reality. This growing list of partners includes a range of local, regional, and national conservation groups; Commonwealth and federal government organizations; nursery and tree supply businesses; and other businesses throughout Pennsylvania and the Mid-Atlantic.

The Partnership will accelerate native tree planting efforts in identified locations, raise public awareness, and help establish sustainable, science-based management of tree planting and ongoing tree care and maintenance. It hopes to galvanize all efforts to plant streamside, urban and other trees in Pennsylvania, to eventually reach ten million trees.

Ultimately, adding 10 million native trees to Pennsylvania’s landscape will not only help achieve local and regional water quality goals, but also reduce nuisance flooding, improve air quality, beautify communities, protect sources of public drinking water, along with boosting the local economy.

C. Stormwater and Agriculture

1. Training, Technical Guidance, Frequently Asked Questions

In order to ensure statewide consistency, DEP has focused attention on tools and resources such as web-based training, technical guidance documents, Frequently Asked Questions (FAQ) documents, Standard Operating Procedures (SOPs) and other publications for agency and external staff as well as the regulated community. Knowing that communication and consistent application is key to the success of any program, the Clean Water Academy (CWA) has been established. The CWA houses web-based training modules for sewage enforcement officers (SEOs), municipalities, conservation districts and DEP staff. The goal of the CWA is to reach more people with relevant information and to conduct effective and efficient training, using staff time and resources appropriately.

Additional guidance, to be finalized in 2019, includes the new Agriculture Erosion and Sediment Control (Ag E&S) Manual, a Technical Guidance Document that provides a detailed description of what is required of farms for Ag E&S planning and plan implementation.

FAQ documents and SOPs relating to permitting and compliance for construction stormwater (E&S and PCSM) are posted on the stormwater website and have been provided to county conservation districts. The CWA houses many web-based training modules for new and existing construction stormwater permitting, inspection, and compliance staff. Multiple in-person trainings have been provided for conservation district and DEP regional staff relating to construction and municipal stormwater permitting, compliance, inspection, and enforcement.

VIII. ANTICIPATED REDUCTIONS FROM CAP DEVELOPMENT AND IMPLEMENTATION / MERGING THE STATE PRIORITY INITIATIVES FOR NUMERIC REDUCTIONS WITH THE CAPS (blue bar)

This section describes how priority initiatives described above and summarized in Table 2.5, Summary of Reductions from Priority Initiatives (above) will be merged with the local initiatives identified as part of the CAP planning process described in Section 3, Countywide Actions**.** The reductions identified in this table account for the entire Pennsylvania Bay watershed and do not account for individual county progress. Watershed-wide runs cannot account for variation in county plans.

The variation in county plans and nutrient reductions is summarized in Table 2.7, Pennsylvania Nitrogen Reduction Priority Initiatives at the County Scale, and Table 2.8, Pennsylvania Phosphorus Reduction Priority Initiatives at the County Scale.

Table 2.7. Nitrogen Modeled Reduction Priority Initiatives at the County Scale

Total Nitrogen Reductions Local Waterways vs. Bay Totals

County	TN Reductions Needed by 2025 (EOS)	TN Reduction- Local Waters (EOS)	TN Reduction- Bay (EOT)
Lancaster*	**11,464,659**	**8,658,474**	**5,542,383**
York*	**4,004,187**	**3,063,682**	**2,036,329**
Franklin*	**2,897,707**	**1,297,683**	**1,076,799**
Lebanon	2,198,023	1,763,173	1,209,809
Cumberland	2,187,058	1,477,605	1,001,243
Centre	1,811,199	944,091	573,021
Bedford	1,675,646	1,119,330	596,434
Adams*	**1,494,803**	**847,652**	**507,965**
Northumberland	1,478,229	1,163,630	853,650
Perry	1,461,306	1,038,893	749,099
Snyder	1,432,987	1,089,206	775,965
Huntingdon	1,421,771	1,007,112	707,108
Columbia	1,405,898	979,609	705,578
Mifflin	1,195,579	857,377	633,053
Lycoming	1,185,197	790,461	538,514
Schuylkill	1,085,295	754,693	468,263
Bradford	927,527	881,096	540,386
Union	925,290	712,493	526,920
Juniata	909,086	629,296	455,662
Chester	879,599	544,132	480,927
Clinton	863,251	465,899	312,191
Tioga	853,261	451,078	223,410
Susquehanna	809,288	375,606	181,257
Dauphin	792,736	757,135	547,643
Clearfield	660,315	247,766	136,433
Fulton	647,657	417,179	326,656
Berks	631,403	452,750	306,821
Blair	537,015	988,220	655,008
Lackawanna	522,618	282,155	142,662
Luzerne	498,311	628,845	456,700
Montour	487,503	377,172	259,774
Cambria	468,539	286,820	138,134
Sullivan	312,697	189,683	103,356
Potter	279,369	153,914	76,268
Somerset	160,117	107,822	91,715
Wyoming	152,952	131,966	82,389
Elk	102,930	28,591	14,028
Indiana	99,730	61,951	30,277
Cameron	95,167	28,902	13,843
Wayne	41,408	22,569	8,717
McKean	4,319	1,163	389
Jefferson	2,727	1,433	744
Carbon	0	+82	+54
Total	**51,062,490**	**36,078,000**	**24,087,000**

County*: Represents a county that has completed their Countywide Action Plan

** Values do not include all reductions from existing programs that have not reported progress on accepted Bay Program BMPs in the past but will begin to report progress going forward

Table 2.8. Phosphorus Modeled Reduction Priority Initiatives at the County Scale

Total Phosphorus Reductions Local Waterways vs. Bay Totals

County	TP Reductions Needed by 2025 (EOS)	TP Reduction- Local Waters (EOS)	TP Reduction- Bay (EOT)
Lancaster*	**468,305**	**536,266**	**283,562**
York*	**0**	**68,270**	**25,581**
Franklin*	**99,992**	**65,050**	**36,915**
Lebanon	74,382	99,110	41,083
Cumberland	29,512	76,381	30,675
Centre	43,893	52,161	14,574
Bedford	104,751	102,640	25,104
Adams*	**39,509**	**46,807**	**20,398**
Northumberland	31,395	47,361	19,785
Perry	62,222	63,302	21,787
Snyder	72,759	67,296	24,561
Huntingdon	60,710	68,058	22,630
Columbia	58,499	64,893	25,323
Mifflin	46,024	49,260	18,000
Lycoming	62,858	45,949	15,455
Schuylkill	35,752	33,658	12,206
Bradford	123,295	84,100	30,284
Union	30,413	39,576	15,287
Juniata	46,205	44,652	14,956
Chester	29,694	24,549	20,419
Clinton	64,093	42,277	14,009
Tioga	77,969	47,273	14,775
Susquehanna	81,239	46,407	15,420
Dauphin	0	41,878	17,782
Clearfield	61,631	17,623	4,686
Fulton	46,420	41,048	16,937
Berks	16,882	20,520	8,877
Blair	0	45,228	19,812
Lackawanna	10,206	32,015	14,386
Luzerne	17,894	95,865	45,301
Montour	0	8,581	3,090
Cambria	31,757	16,303	4,115
Sullivan	25,306	13,124	3,894
Potter	41,604	23,943	5,284
Somerset	12,485	8,597	3,717
Wyoming	3,648	11,573	4,142
Elk	12,254	3,619	749
Indiana	5,767	3,742	650
Cameron	13,739	3,533	949
Wayne	4,126	2,750	936
McKean	819	190	42
Jefferson	103	56	12
Carbon	246	+29	+12
Total	**2,048,358**	**2,205,000**	**918,000**

County*: Represents a county that has completed their Countywide Action Plan

** Values do not include all reductions from existing programs that have not reported progress on accepted Bay Program BMPs in the past but will begin to report progress going forward

Figure 2.5 shows nitrogen reduction progress and projected reductions for the 43 Pennsylvania counties in the Chesapeake Bay watershed. This graphical representation is not to scale.

- The **purple bar** represents the progress each county has achieved to date. The programs represented by the **purple bar** will support the statewide actions outlined in the **green bar** (Section 2, State Actions) and the county actions identified in the **blue bar** through funding and resource support.
- The **green bar** represents the statewide actions that Pennsylvania is planning to achieve by 2025 for counties that have not completed a Countywide Action Plan (Section 2, State Actions). These statewide actions will be supported by existing, new and undocumented programs represented in the **purple bar**. The statewide actions support the actions defined by the 43 Pennsylvania counties in their respective Countywide Action Plans (CAPs) and act as surrogates until the final county specific plans are submitted.
- The **blue bar** represents the CAPs. Four of these CAPs were finalized as part of the drafting of the Phase 3 WIP. The results of these four CAPs are described in Section 3, Countywide Actions**.** Counties that have not completed their CAPs are represented under the statewide actions **green bar,** until they submit a final CAP. Counties will use the recommendations in the **green bar** as a foundation in developing their CAPs. As each county completes its CAP, the bar will shift toward a **blue bar.** The **purple** and **green** bars are designed to support the CAPs.
- Further coordination needs to occur to: continue documentation of currently undocumented practices; continue coordination with the Partnership to achieve credit for additional practices and programs that achieve water quality improvement in Pennsylvania and that are not currently credited in the Chesapeake Bay Watershed Model; and document completion of the CAPs.
- Each county's strategy is built on the foundations of the programs and practices represented by the **purple**, **green** and **blue** bars in addition to the further coordination needed to achieve the 2025 planning target. The **purple bar** will continuously grow as county actions are implemented. Counties without CAPs will continue to develop comprehensive plans that build on the statewide recommendations. Pennsylvania commits to have practices and controls in place by 2025 necessary to achieve the final Phase 3 WIP phosphorus and nitrogen targets.

Figure 2.6 shows the same information for phosphorus reduction.

The state nutrient reduction priority initiatives serve as a starting point for counties as the counties complete their individual planning processes. The state priority initiatives will be identified for easy reference in each county's Community Clean Water Technical Toolbox. Once a county's planning process is completed, that county's progress will be updated to reflect the results of its planning process. After all of the planning and implementation is complete for the state priority initiatives and for BMPs identified by the counties, Pennsylvania will reach the 2025 reduction goal.

Figure 2.5. Nitrogen Reductions by County

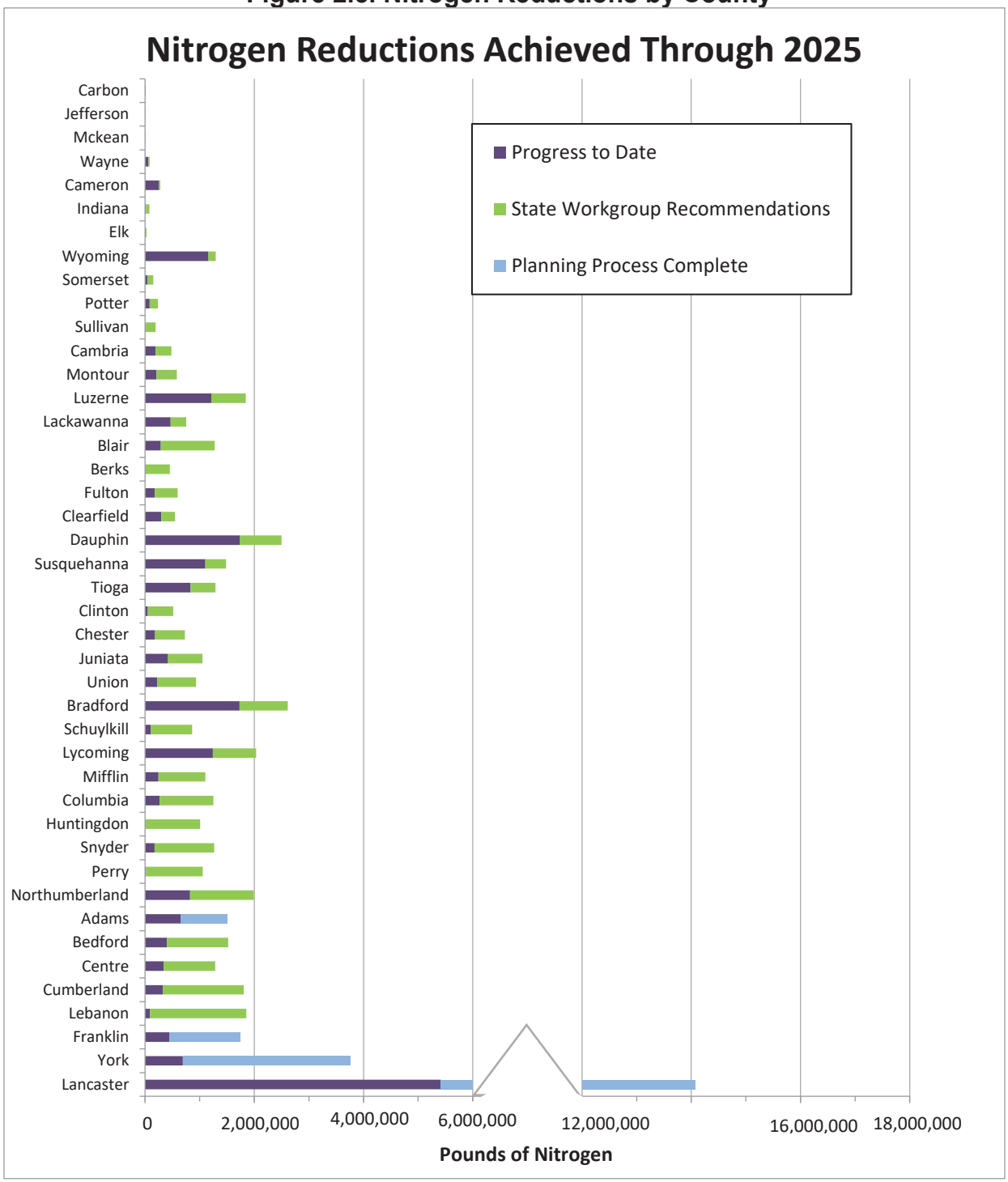
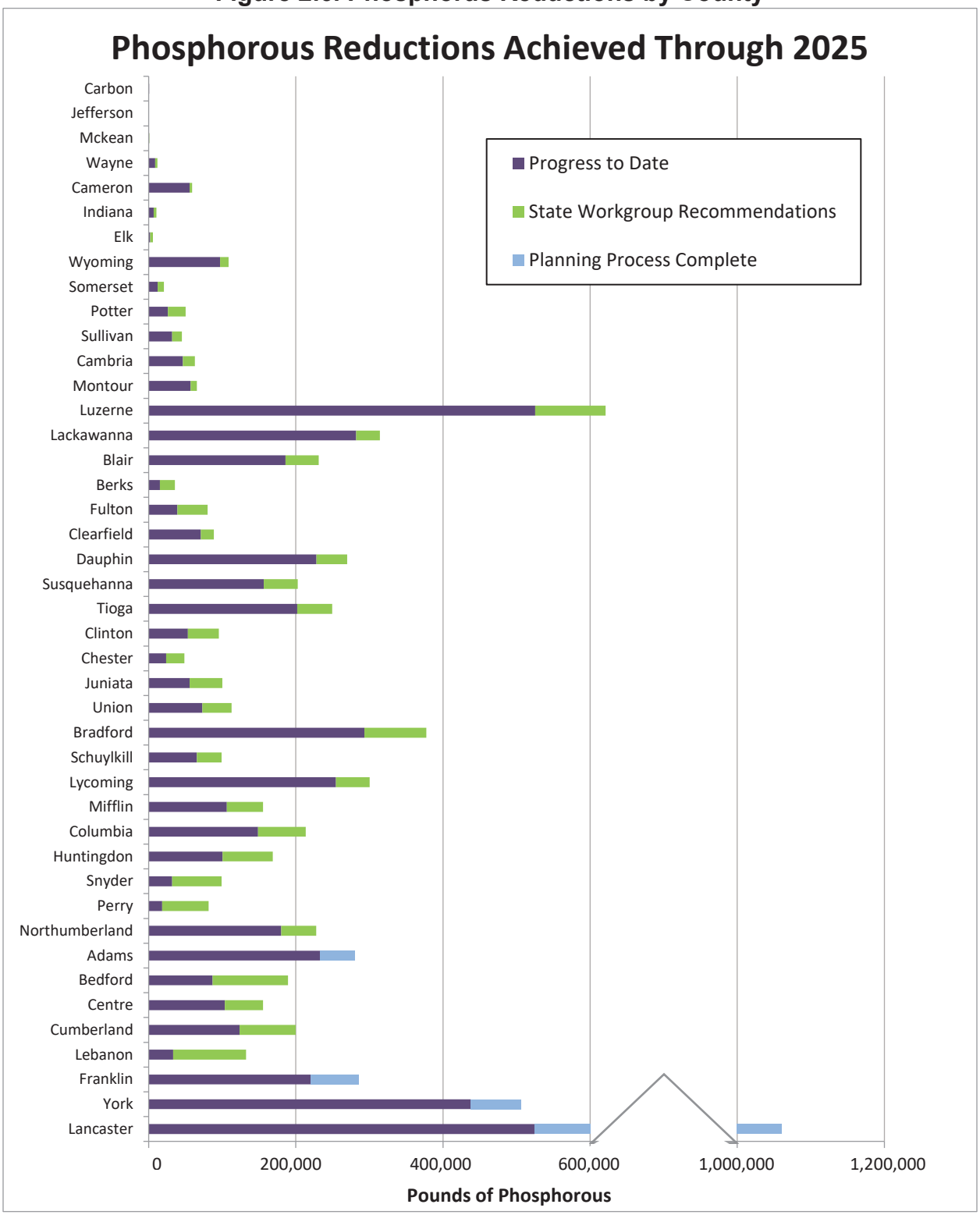


Figure 2.6. Phosphorus Reductions by County



IX. PHASE 3 WIP PRIORITY INITIATIVE STATE PROGRAMMATIC AND NARRATIVE COMMITMENTS

A. Legislative

Several legislative actions have been introduced related to funding, practice implementation or authority for further reductions in the state legislature. When passed, Governor Wolf's Restore Pennsylvania proposal, introduced with bi-partisan support in the General Assembly in 2019, will be the single largest investment in environmental programming in Pennsylvania history. Below is a tabulation of legislative actions specific to environmental and natural resources to include funding, practice implementation and authority for further actions.

1. Provisions and Options for a Dedicated Fund

To meet 2025 reduction goals, the estimated funding gap between existing and available funding is approximately $324 million annually. While some of this gap may already be covered through private investments not currently tracked, a significant increase in public funding is necessary if the Phase 3 WIP is going to be successful. This is based on the summary results in Table 2.9, Implementation Costs for Top Priority Initiatives. These four priority initiatives alone will help to achieve 50% of the nitrogen reduction goal and 86% the phosphorus reduction goal. Some amount of the $52 million identified for existing and new agency and external staff resources for technical support would also be needed to implement this effort. A minimum of five percent of the cost of implementation is recommended.

Table 2.9. Implementation Costs for Top Priority Initiatives

Priority Initiative	**Cost** (in millions)	**Nitrogen Reduction**	**Phosphorus Reduction**
Agricultural Compliance	$33.1	14%	12%
Soil Health	$32.9	14%	14%
Forest Buffers	$28.1	16%	49%
Grass Buffers	$3.3	8%	37%
TOTAL	**$97.7**	**50%**	**86%**

Any funding program legislation should include provisions for local water quality improvement across the state. However, targeting funding to the Chesapeake Bay watershed is recommended.

The following is a list of legislative proposals that are being contemplated or actively considered, and upon passage by the General Assembly could achieve further nutrient reductions, to varying degrees, and offer a sustainable funding source.

a. Restore Pennsylvania

The Restore Pennsylvania initiative proposes a $4.5 billion bond initiative to restore critical infrastructure in Pennsylvania. The initiative includes investments for critical flood

control infrastructure, green infrastructure, and municipal and institutional stormwater management improvements. Among other things, the initiative will fund BMPs on farms, clean up abandoned mines and restore watersheds, protect open space, address maintenance needs in state parks, preserve working farms, provide funds for recreational trails and local parks, help communities address land use, and provide new and upgraded water and wastewater systems.

b. Water Use Fee

This proposal would assess a fee on large non-residential entities that take water for commercial use. A 2018 study by the Legislative Budget and Finance Committee estimated that modest fees on each gallon of water withdrawn over 10,000 gallons per day could generate millions of dollars statewide.

c. Bottled Water Tax

This proposal would remove the sales tax exemption for bottled water, tea, and similar beverage purchases.

d. Keystone Tree Fund

The Keystone Tree Fund initiative proposes to create a fund where individuals could contribute to the fund through a check-off box on their driver's license. The funds would be used to support buffer and urban tree plantings.

e. Specialty License Plate

Create a "Clean Water PA" license plate, enabling car buyers to show their support for environmental protection and to contribute to the goals of water quality improvement.

2. Legislation to Facilitate Practice Implementation

The following is a list of legislative options that could facilitate the implementation of priority BMPs to achieve the necessary nutrient and sediment reductions to restore local water quality and the Chesapeake Bay:

a. Revisions to Pennsylvania's Clean Stream Law

Existing language in Section 702 of Pennsylvania's Clean Streams Law, 35 P.S. § 691.702, prohibits Commonwealth agencies or political subdivisions from requiring fencing for the purpose of keeping farm livestock out of the streams. This statutory provision impedes progress in water quality improvement and could be repealed or amended, with adequate timeframes and financial resources made available to producers that would have to come into compliance.

b. Nutrient Reduction Procurement Program

Proposals for a nutrient reduction procurement program in Pennsylvania have been designed such that the Commonwealth would achieve nutrient and sediment reductions through direct purchase of credits generated from load reduction activities. These purchases would be executed in long-term contracts selected through a request-for-proposals process. For this proposed program to be successful, a source of funding for the Commonwealth to buy these reductions is needed.

c. Integrators and Private Investors, Public-Private Partnerships

A public-private partnership is a contractual agreement between a public agency and a private entity that allows for greater private sector participation in the delivery and (in some cases) financing of a project. This form of public-private partnership is difficult for local governments to implement due to procurement limitations at the municipal level. Legislation to amend provisions governing municipal procurement may help to allow local governments to solicit proposals to implement stormwater management programs using one of the following contract arrangements:

- Operation and Maintenance Management – Through this arrangement, the contractor commits to providing operation and maintenance services to a specific performance standard and accepts the risk of managing certain costs through their expertise, asset management and economies of scale.
- Design, Build, Operate and Maintain (DBOM) – Through this arrangement, the contractor agrees to not only design and build a project or practice, but operate and maintain what is built for a defined period of time.
- Design, Build, Finance and Maintain (DBFM) – This arrangement is like the DBOM arrangement, only the contractor also agrees to finance the project or practice and any improvements or enhancements. The contractor may be able to finance the project or practice at a lower cost than the public entity needing the project or practice completed.
- Lease and Concession – This is a long-term lease of a project or practice in return for either an upfront payment, or long-term payments over time.

3. Other Legislation to Facilitate Reductions

The following four legislative actions would facilitate nutrient and sediment reductions. These legislative actions have either been introduced already for the 2019-2020 session or will be in upcoming sessions in the near future.

a. Revisions to Pennsylvania's Right to Know Law

The Phase 3 WIP partners recommend an amendment of the Pennsylvania Right to Know Law to create exemptions from public record production requirements and to extend confidentiality protections to any farm-specific information reported by the

agricultural industry. Without this protection, many landowners are reluctant to report BMPs that they have installed with their own resources. Such an amendment ensuring the confidentiality of information submitted to regulatory agencies would facilitate the Commonwealth's efforts to track and verify the implementation of best management practices (BMPs) at agricultural facilities. Lack of confidentiality is hindering Pennsylvania's ability to track progress toward meeting reduction goals.

c. Fertilizer Legislation

The current version of the proposed legislation intends to (1) provide for the labeling, application, recordkeeping, packaging, use, sale, and distribution of agricultural fertilizer as well as turf or other specialty fertilizer; (2) provide consumer protection through licensing, labeling, and sampling; (3) establish professional fertilizer applicator certification; (4) provide a means of consumer education and outreach; and (5) ensure that applicators follow best practices when applying fertilizer and comply with the Chesapeake Bay Program Partnership protocols for achieving nutrient reductions. This legislation could reduce nitrogen runoff by 105,000 pounds per year to Pennsylvania's streams. Phosphorus runoff could be reduced by 4,000 pounds per year.

d. Restore Act 167 Funding

Support restoration of the Act 167 stormwater management planning reimbursement funding to be restored in future budget cycles.

B. Regulatory

1. *Chapter 105 Regulatory Amendments*

DEP is drafting regulatory amendments to Chapter 105 including clarifying waiver provisions and a new section to clearly outline the environmental assessment requirements associated with a restoration project such as a stream, wetland, or a floodplain restoration project within the watershed context. In the interim, DEP will also consider revisions or clarifications to existing permits, policy, guidance, and other information that promotes and enhances water quality and aquatic resources through existing requirements. This will help with the implementation of stream and wetland restoration projects.

2. *Enhanced BMP Requirements for Agriculture Erosion and Sediment Control*

If needed in the future, DEP may consider revisions to current language in the Chapter 102 Erosion and Sediment Control regulations to provide authority in the agricultural erosion and sediment control requirements for mandatory installation of additional priority BMPs in watersheds identified by DEP as impaired.

C. Programmatic & Policy

The following programmatic and policy enhancements will be implemented to address either the four-pilot county or Phase 3 WIP workgroup recommendations.

1. *Enhanced Nutrient Management Planning for Biosolids*

Municipal biosolids may be land applied onto Pennsylvania's agricultural lands, including those agricultural lands in the Chesapeake Bay watershed. While providing nutrient benefits to those farms that utilize biosolids, the increased presence of biosolids is adding to the nutrient management challenge that already exists on Pennsylvania's lands. Current regulatory standards require generators of biosolids to perform nitrogen-based nutrient management planning and implementation when land applying biosolids on agricultural land. DEP will explore the expansion of required management planning and implementation for biosolids to also include management of phosphorus consistent with the nutrient management planning standards established for animal manure. DEP believes this can be addressed through further consideration of the Phosphorus Index and potentially incorporating a revised Phosphorus Index into future planning requirements.

2. *Enhanced NPDES Stormwater Construction Consideration of MS4 Priority Restoration BMPs*

During the development of the Phase 3 WIP, it was recommended that greater collaboration occur between NPDES Stormwater Construction permit applicant use of BMPs identified as MS4 priorities, such as impervious surface restoration, storm sewer disconnection, and other retrofitting activities to address increases in stormwater. DEP will evaluate the best mechanisms to enhance this coordination.

3. *Expanded Coordination of MS4 and Nonpoint Source Nutrient Pollution Reduction Actions and Offsetting*

Allow and encourage MS4-regulated communities to offset with nonpoint sources, such as neighboring farms, to meet their permitting obligations. This locally led, holistic approach would mitigate nutrient and sediment impairments through implementation of sediment-reducing BMPs such as stream restoration, riparian forest buffers, legacy sediment removal and ecosystem restoration, etc.

4. *Chapter 102 Erosion and Sediment Control and Stormwater Management*

DEP is currently updating the Stormwater BMP Manual, which will include updated recommendations for calculating BMP water quality, volume, and rate efficiencies. Future initiatives related to the stormwater management programs include prioritized reviews of permit applications within the Chesapeake Bay watershed or with specific Chesapeake Bay improvement BMPs, such as Forest Buffers or other Restoration

BMPs (such as Stream Restoration, Wetland Restoration, Landscape Restoration, etc.) Additionally, a Pennsylvania General Permit (PAG-01) for construction sites between one and five acres is being developed; prioritized reviews of permit applications within the Chesapeake Bay watershed or with BMPs that would net the greatest improvement to water quality may also incentivize implementation. These programs will be tracking and reporting those outputs for Chesapeake Bay Program annual progress.

5. *Stormwater Management Act (Act 167) Program Improvements*

The multiple recommendations related to the Act 167 Program also focused on integration of Act 167 plans with other planning efforts and more robust compliance and enforcement. DEP will prioritize Act 167 compliance and enforcement to align with Phase 3 WIP priorities and will undertake education and outreach related to the benefits of Act 167. DEP will also undertake outreach and training refinements to these programs underway since 2002, and as reflected in the 2010 amendments to the Chapter 102 regulations. DEP will propose hiring two additional employees to implement these efforts.

6. *Bradford County Stream Reconstruction Pilot Program*

DEP has provided, by delegating the Bradford County Conservation District, the ability to authorize stream reconstruction actions under the Chapter 105 Water Obstructions and Encroachments Program Emergency Permit. The activities authorized under this special Emergency Permit will utilize the “Bradford County Stream Reconstruction Pilot Program” and the “Emergency Stream Intervention Protocol Manual” during a 3-year trial and assessment period. Work under these Emergency Permits includes removal of debris, bank stabilization and removal of accumulated silt and sediment from stream channels beyond the normal maintenance area. The authorization for the excavation/removal of debris, sand, gravel, bedrock material, deposited or collected in and along the floodway will be addressed using this Emergency Permit. DEP will meet periodically with the conservation district to assess the capacity and level of accomplishment that the pilot program provides through the implementation of remedial actions and alleviation of adverse public health, safety, and environmental conditions before and after flood events.

The three-year trial and assessment period should be a sufficient time period to determine the pilot program’s effectiveness because flooding is likely to occur during that time period. Once the pilot program assessment is complete, a determination will be made as to whether the program should be expanded to other areas or counties. The timeline for this three-year trial period is July 2019 to July 2022.

7. *Real-time Water Quality Data*

Currently, DEP’s Division of Water Quality (DWQ) operates the Water Quality Network (WQN). WQN data is used to generate pollutant loads, yield and trends. These statistical evaluations of water quality data are one of the most powerful water quality

datasets that inform water quality improvements in the Chesapeake Bay watershed. They answer questions like, “How much nitrogen, phosphorus and sediment has the Susquehanna River contributed to the Bay at any specific time?” These data and evaluations have been incorporated into the Phase 3 WIP development. In addition to WQN, DWQ staff operate and coordinate the collection of continuous instream water quality data that is available, at least initially as preliminary data, on the USGS website. This data is supplemental to the WQN data and provides real-time information, but is not appropriate to be used as a real-time barometer of water quality. Water quality conditions fluctuate greatly and are primarily driven by the amount and timing of precipitation. As such, it is very difficult to provide real-time characterization of water quality and creates the need to rely on long-term water quality data to measure changes in water quality.

One complicating factor in characterization is that it does not account for water quality improvements that may be occurring on a much smaller scale. The difficulty lies in the time lag from implementation of BMPs to actual resulting change in water quality. DWQ staff, along with regional DEP biologist and county staff, are actively pursuing these characterizations, with the goal of deploying additional WQN stations and gages in the lower Susquehanna River and potentially some bad-acting tributaries (Conestoga River). The real-time data would be available and would also provide additional information for bi-annual and milestone reporting.

In an attempt to characterize nitrogen, phosphorus and sediment, data collection at new and existing stations would need to occur for a period of at least two years. This data would be used to develop models that could display nitrogen, phosphorus, and sediment information in a real-time format. DWQ is currently evaluating additional locations and the potential for gage installation, as well as the resources necessary to deploy multiple monitoring stations that would provide results akin to one “Super Gage.”

This effort will require a moderate reorganization of effort, approximately $600,000 and at least one additional staff member.

D. *Incentives or Methods to Accelerate Practice Implementation*

There are several different funding sources across multiple Commonwealth agencies that can contribute to nutrient reductions for the Chesapeake Bay. Each program has their own procedures, timeline, criteria, and goals for selecting and awarding program funds. In many cases, these criteria and goals are similar. More importantly, where appropriate, the funding from these programs could be combined or better coordinated to achieve additional workforce and economic development and the promotion of new businesses goals within the Commonwealth in a more efficient and cost-effective manner. To achieve this outcome, the Commonwealth will look at the programmatic goals of the different agency funding sources and combine them where appropriate or, at a minimum, look for ways to better coordinate them.

1. *Use of "Block Grants"*

DEP's Chesapeake Bay Office and its Office of Water Resources Planning continue to work jointly on the development of a block grant program to allow "one-stop" service to the four WIP pilot counties and the remaining four Tier 2 counties (for a total of eight counties; if successful, other counties). To be eligible for block grant funds, counties would need to have completed a Chesapeake Bay CAP utilizing the Phase 3 WIP County Clean Water Technical Toolbox and Planning Guide. As projects are identified and developed, applicants would be "pre-approved" to receive funds to implement these projects.

The fluidity associated with designing, financing, and implementing BMPs creates a need to be able to allocate funds quickly and to the intended party. Those responsible for the coordination, implementation, installation, and long-term maintenance of these BMPs should be provided flexibility to determine and prioritize the proportionate amounts of disbursement of funds to expedite this work. Where possible, the combination of different state and federal funding sources can be more effectively utilized if provided in the form of a "block grant" where the funds can be managed to meet changing local conditions.

These "block grants" would be awarded using comprehensive local water quality plans, such as the CAPs, as the scope of work where funding from different sources can be combined to implement different aspects of the plan, depending on the criteria of the funding source. The availability of these grants is planned to begin with the award of the County Clean Water Coordinator agreements to the four pilot counties and remaining Tier 2 counties in Fall 2019.

2. *Creation of County State Revolving Loan Fund*

PENNVEST will utilize federal State Revolving Loan Fund monies to facilitate the creation of county or regional revolving loan funds to implement practices in a streamlined manner. With these funds, PENNVEST will offer counties or other local/regional entities low-interest loans for capital improvements and grants for practices, coordinate loans with other existing programs, or supplement other federal and state funding programs with low interest loans. These County State Revolving Loan Funds will be administered by a county or regional governmental agency or other entity with the financial capability to coordinate the use of such funds.

3. *Expansion of Existing Funding Programs Like REAP, TreeVitalize and Growing Greener*

The Phase 3 WIP Funding Workgroup looked at different existing funding programs and made recommendations such as expanding the REAP program, revising the criteria of the TreeVitalize program and creating a Growing Greener 3 program, with Chesapeake Bay-focused funding. These recommendations were identified as effective means to accelerate implementation of priority practices. Act 39 (Conservation Excellence

Grants), Act 37 (AgriLink) and Act 13 (REAP) were passed on July 1, 2019, which expanded the amount of funding available in these three programs.

4. *Establishment of a Center for Water Quality Excellence*

A Center for Water Quality Excellence would create a level of coordination among governmental agencies and stakeholders to facilitate cohesion of state and local interests, programs and projects, and funding to support initiatives.

The purpose of the Center is to support the efforts of Pennsylvania's Chesapeake Bay Program to reduce nutrient loading to local waters by providing much needed facilitation, coordination, technical assistance, and support in simplifying the process to fund projects. The Center will serve as a clearinghouse for sharing ideas, proposals and projects for effective conservation management, financing and assistance on a countywide, inter-county, regional and watershed-wide basis. The Center will be success- and results-driven while providing the necessary outreach and engagement to all sectors with a focus on agriculture and stormwater. The Center will be flexible, adaptable and use various methods to supplement and/or complement the services already provided by Pennsylvania's many committed partners such as: practice design standards, regulatory obligations, technical assistance, data collection, progress summarization, project prioritization and financial assistance.

PENNVEST, in partnership with DEP, plans to issue a Request for Proposals to pilot this concept in the four pilot counties with completed CAPs (Lancaster, York, Adams and Franklin) using EPA State Revolving Loan Fund administrative funds to allow the Center to be implemented by an entity outside of a state or federal agency structure. Depending on the results of this pilot project, this "One-Stop-Shop" concept may be expanded to other counties.

5. *Practice Installation on State Lands*

Pennsylvania state agencies and state-affiliated agencies should put buffers and other BMPs in place on state-owned lands wherever feasible. Possibilities include roadways, parks, school and college campuses, and prisons. To accelerate Pennsylvania's progress towards achieving the nutrient reduction planning targets, agency planning goals for all state agencies will be established. Also, state agency specific plans, much like the federal agency plans in Section 4, Federal Actions and Coordination, will be developed to achieve these planning goals within the next two years.

6. *Enhanced BMP Requirements for Agriculture Erosion and Sediment Control*

DEP will evaluate how to ensure Ag E&S Plans include enhanced BMP requirements in watersheds identified by DEP as impaired or having a TMDL. At a minimum, DEP will revise the appropriate technical guidance documents to highlight the recommended priority practices identified within the Phase 3 WIP to achieve the priority initiatives

identified. DEP will also consider developing applicable technical guidance documents specific to the implementation of the priority initiatives defined by the Phase 3 WIP.

7. *Review and Consideration of DEP Permitting Process Modifications*

DEP is evaluating its permitting requirements to facilitate a smooth process for farmers and others seeking to resolve existing resource concerns or prevent future impacts by increasing implementation of BMPs. Projects reducing or even eliminating existing discharges or having an overall positive environmental benefit will be considered for prioritization and an incentivized process to ensure BMPs are installed in an efficient, cost-effective manner as soon as possible. Chapter 105 regulatory amendments, PAG-01 and the Bradford County Pilot Project described in other sections, are examples of efforts underway.

A companion effort to these permitting modifications includes the necessary alterations to existing permitting program procedures to continue to collect and report the practice data identified during the undocumented practices effort moving forward. Existing data gathering and reporting will continue, and all feasible new data gathering and reporting efforts will be implemented moving forward. These regulatory programs include a high likelihood of practice implementation due to permitting requirements and compliance efforts. This combination of practice data gathering and reporting efforts also provides reasonable assurance that Pennsylvania will meet its Chesapeake Bay TMDL commitments.

8. *Improvements to DEP's Cross-Program Reporting*

There is a DEP-wide initiative to institute electronic permitting (ePermitting) and electronic inspections (eInspection), with linkages between the two in DEP's eFACTS database. As these tools progress, much more information will be available to extract and report. For instance, the Bureau of Oil and Gas was the first to institute ePermitting and eInspection applications, with other programs currently developing these applications. DEP will work to ensure that long-term, agency-wide reporting is integrated for annual progress reporting.

9. Incentivizing Industry-Driven Programs

Regional producer cooperatives and businesses regionally purchasing or processing agricultural products may provide a meaningful opportunity for developing effective and integrated programs. These programs would work with and provide technical and financial assistance to farmers marketing products through the cooperative, or to the business in planning and performing conservation measures on farms. The industry-based (and industry-led) programs allow farmers to obtain needed financial and technical assistance on a higher scale than what many are capable of obtaining individually. A prime example of such a program is the Turkey Hill Clean Water Partnership project – a cooperative effort of Turkey Hill Dairy, Maryland & Virginia Milk Producers Cooperative Association (MDVA) and the Alliance for the Chesapeake Bay.

These three partners have worked collaboratively to provide Pennsylvania cooperative farmers with technical and financial assistance in reviewing and updating erosion and sedimentation management and nutrient management plans, and where needed, providing financial support to improve management practices to levels to meet standards required under state law. Incentives should include a higher ranking of industry-led projects in priority areas for state funding.

X. STATE AGENCY CAPACITY

A. DEP Chesapeake Bay Office

There are several roles and responsibilities for the DEP Chesapeake Bay Office. Three of these roles and responsibilities are:

1. The Coordination of the Development of the Phase 3 WIP

The Chesapeake Bay Office coordinated development of the Phase 3 WIP, which includes updating milestones and action steps on a two-year basis and progress reporting on a six-month basis. The milestones will be updated using the same template used by the workgroups and counties to develop their respective action plans. Progress reporting will be done using Figure 7.1, Progress Reporting Template. The action steps that will be tracked on a six-month basis using this template are identified in Section 7, Milestones and Progress Tracking.

2. The Coordination and Oversight for the Implementation of Support Elements of the Phase 3 WIP

The Chesapeake Bay Office Phase 3 WIP implementation and support includes development processes associated with: 1) the CAP described in Section 3, Countywide Actions .2) the BMP Verification Program Plan that ensures successful tracking of progress and verification that practices installed on the ground are properly operating; and 3) the EPA Chesapeake Bay Accountability and Regulatory Program and Chesapeake Bay Implementation Grants.

3. The Coordination of Pennsylvania's Activities Related to the Other Identified Goals and Outcomes

The Chesapeake Bay Partnership identified additional goals and outcomes in the 2014 Chesapeake Bay Watershed Agreement. Those goals and outcomes focus on activities or areas that can have a direct impact on, and facilitate successful implementation of, the Phase 3 WIP. The goals and outcomes most relevant to Pennsylvania's Phase 3 WIP identified by the Chesapeake Bay Program Partnership relate to the following: Brook Trout; Climate Resiliency; Fish Habitat; Forest Buffers; Healthy Watersheds; Protected Lands; Public Access; Stream Health; Tree Canopy and Wetlands.

The Chesapeake Bay Office currently has five people filling the different roles and responsibilities described above. Table 5.4 in Section 5, Existing and Needed Resources includes a list of these staff and the additional 12 staff needed to implement the additional work described in this Section and in Section 3, Countywide Actions. DEP has taken action to hire three of the additional 12 staff needed; two of these staff are Internal Coordinators for the implementation of the CAP development process and one staff to accelerate the implementation of Pennsylvania's BMP Verification Plan.

B. Other DEP and State Agency Capacity

1. *SCC and Conservation Districts – CAFO and NMP Oversight*

The State Conservation Commission (SCC) employs a Nutrient and Odor Management Program Director who oversees all Act 38-related activities. An additional staff of five people (four nutrient managers and one odor manager) work in conjunction with staff from 57 delegated county conservation districts, to implement and enforce the provisions of the Act 38 nutrient management regulations.

Conservation districts are delegated authority to review and approve Nutrient Management Plans; to perform site visits for new and amended Nutrient Management Plans; to investigate complaints; and to perform annual status reviews (inspections) of all Act 38-regulated agricultural operations. Where there is no delegation, the SCC takes on those tasks.

In addition to the annual on-site inspections, conservation districts also perform complaint investigations under the Nutrient Management and Chapter 91 Manure Management delegation agreement. Complaint processing and follow-up include both CAFO and non-CAFO agricultural operations.

2. *Other Agency Staff*

To implement the various initiatives and enhancements described above, DEP, DCNR, PDA and the SCC have existing staff resources to devote to this effort. However, additional resources will also be needed. Table 5.4 in Section 5, Existing and Needed Resources includes a listing of both the existing and additional staff resources needed.

XI. KEY ACTION STEPS

To track and report progress, key action steps were selected to be reported on a six-month basis for the initiatives described above. These are summarized on Section 7, Milestones and Progress Reporting. The details on the action steps can be found in the Progress and Reporting Template.

SECTION 3. COUNTYWIDE ACTIONS

I. BACKGROUND

Since April 2017, a collaborative effort has been underway to develop Countywide Action Plans (CAPs). The initiative includes representatives from government agencies, the state legislature, county and local governments, industry associations, non-governmental organizations (NGOs), and citizens. The Environmental Protection Agency (EPA) expressed support for jurisdiction-specific plans tailored to the unique considerations of each state and the District of Columbia. To that end, Pennsylvania created a Local Area Goals Workgroup to investigate options and make recommendations for local planning in the Commonwealth.

In fall 2017, the workgroup looked at several geographic options for assigning local planning goals for nitrogen and phosphorus (from land-river segments (505) to sub-basins (6)). Based upon their recommendation, the Phase 3 WIP Steering Committee decided that county-based goals would be the most feasible in terms of size, number, existing data levels, and ability to organize resources. Pennsylvania's nitrogen and phosphorus reduction targets are broken down into local planning goals for each of these counties. As a group, these local pollution reductions will help Pennsylvania reach its clean water goals. To calculate the local planning goal for each county, it was further decided that each county would achieve an equal percentage of the total level of effort possible, (or "Everybody does Everything, Everywhere.")

The 43 counties in Pennsylvania's Chesapeake Bay watershed were further divided into four tiers, based on the relative opportunity to improve water quality in the Chesapeake Bay through nutrient reductions in each county. Each tier is assigned 25% of the total planning targets for Pennsylvania. Table 3.1 is a listing of each county in the watershed and the tier to which they were assigned.

Table 3.1. County Tiers

Tier 1 – First 25% of Reductions	Tier 2 - Second 25% of Reductions	Tier 3 - Third 25% of Reductions		Tier 4 - Last 25% of Reductions	
Lancaster	Franklin	Adams	Schuylkill	Union	Potter
York	Lebanon	Northumberland	Bradford	Chester	Somerset
	Cumberland	Perry	Juniata	Dauphin	Wyoming
	Centre	Snyder	Clinton	Berks	Elk
	Bedford	Huntingdon	Tioga	Blair	Indiana
		Columbia	Susquehanna	Lackawanna	Cameron
		Mifflin	Clearfield	Luzerne	Wayne
		Lycoming	Fulton	Montour	McKean
				Cambria	Jefferson
				Sullivan	Carbon

II. THE FOUR COUNTY PILOT PROJECT

With support from the EPA Chesapeake Bay Program Office, the Susquehanna River Basin Commission (SRBC), DEP and the Communications and Engagement Workgroup, the Local Area Goals Workgroup developed a planning process and a county-specific Community Clean Water Toolbox. The purpose of this planning process and toolbox was to assist in the developing the local CAPs intended primarily to improve local water quality and provide related benefits for those localities.

As part of the Phase 3 WIP planning process, four counties participated in a pilot project to develop local CAPs. Lancaster and York counties began in spring 2018, with Adams and Franklin counties beginning in late summer 2018.

During this process, pilot counties gathered to share updates including their local planning process, identified challenges, lessons learned, and recommendations for a more effective process. Additionally, joint planning meetings were held to share both county planning team and state Phase 3 WIP workgroup draft recommendations for nutrient reduction, identify overlaps and resulting nutrient reductions, explore areas for further reductions, and recommend and decide next steps for moving forward together.

The final CAPs for the four counties are a merging of the Phase 3 WIP priority state initiatives numeric commitments described in Section 2, State Actions and the identified local initiatives and priorities. The result of this process is a brand new, county-based clean water planning approach that brings all levels of partners together for collaboration. Using this locally-driven planning approach, the state and local communities can share responsibilities, resources, and plan how to address local water quality goals, resulting in CAPs that are realistic and implementable.

The Commonwealth will continue to work closely with the pilot counties as they implement their CAPs, providing resources and coordination efforts, as well as facilitation and outreach support to counties as they build their coalitions and developing action teams around their plans. The Commonwealth will also continue to hold meetings with the pilot counties to encourage information sharing among and between the Commonwealth and county partners, and to provide and seek feedback on the process in order to continually build on and support the implementation process.

A. Numeric Results for the Four Pilot Counties

Table 3.2 represents the total reductions achieved from Pennsylvania's four completed CAPs. The percentage for the counties is based on each county's respective planning goal, and the total percentage is based on Pennsylvania's overall 2025 planning goal. These are the total reductions from each county's respective breakout of sector.

Table 3.2. Summary of Pilot County Results

County	Nitrogen (pounds)	Percent of County Goal	Phosphorus (pounds)	Percent of County Goal
Adams	847,652	56%	46,807	115%
Franklin	1,297,683	45%	65,050	65%
Lancaster	8,658,474	76%	536,266	118%
York	3,063,682	77%	68,270	Goal Met
Total	13,867,000	27% (PA)*	716,000	35% (PA)*

* Reductions provided in the table represent load reductions delivered to local streams (EOS)

1. Lancaster County's Countywide Action Plan Summary

Lancaster County's Clean Water Partners (CWP) are taking the lead in implementing Lancaster County's CAP. The below summary includes current conditions for Lancaster County, pollution reduction progress, and BMPs identified to achieve these reductions. All numbers below represent nutrient goals and reductions to local waterways. The process Lancaster County underwent to develop their plan was used to modify the Community Clean Water Planning Guide that will be provided to other counties.

a. Current Conditions

Lancaster County is the highest loading county in Pennsylvania's Chesapeake Bay watershed. Lancaster County's situation is unique, as there are twice as many dairy cows in Lancaster County as there are in all of Maryland and 25 percent more than found grazing in all of Virginia; twice as many farms in the county than all of Delaware; and the number of layer chickens, beef cattle and pigs is more than in all the rest of the parts of Pennsylvania, Maryland, Virginia, Delaware and New York that are located in the Chesapeake Bay watershed. Current loading rates are 27.19 million pounds of nitrogen and 1.27 million pounds of phosphorus. By 2025, Lancaster County's goal is to reduce that loading to 11.46 million pounds of nitrogen and 0.47 million pounds of phosphorus. Table 3.3 shows Lancaster County's current load for nitrogen and phosphorus and the reduction goals for each.

Table 3.3. Summary of Lancaster County's Pollutant Reduction Goal

	Nitrogen (pounds)	Phosphorus (pounds)
Current Loading Rate	27,193,871	1,265,040
2025 Loading Rate	15,729,211	796,735
Reduction Goal	11,464,660	468,305

b. Pollutant Reduction Progress

Lancaster County developed a plan to reduce approximately 8.66 million pounds (76%) of the nitrogen goal and approximately 0.54 million pounds (115%) of the phosphorus goal. There is no planning target for sediment, but the CAP reduced approximately 297.69 million pounds of Sediment (33%) of the current load. Table 3.4 shows

Lancaster County's reduction goal for nitrogen and phosphorus and the reduction amount and percentage achieved in the plan for each.

Table 3.4. Summary of Lancaster County's Pollutant Reduction Progress

	Nitrogen (pounds)	**Phosphorus** (pounds)	**Sediment** (pounds)
Goal	11,464,871	468,305	No Goal
Amount Achieved	8,658,474	536,266	297,689,000
Percent Achieved	76%	115%	33%*

*Represents percent of current loading rate

c. Best Management Practices

Lancaster County has identified a list of BMPs that result in a total reduction of approximately 8.66 million pounds of nitrogen and approximately 0.54 million pounds of phosphorus. Table 3.5 provides their list of specific BMP commitments and quantities of each. The full details of their BMPs are included in their CAP. Appropriate flexibility for practices is allowed in order to meet or exceed their proposed reductions.

Table 3.5. Lancaster County's BMP List

BMP Name	Quantity	Units
Animal Waste Management System	100,000.00	Animal Units
Barnyard Runoff Control	100.00	Acres
Bioretention/raingardens	202.00	Acres Treated
Bioswale	1,998.50	Acres Treated
Cover Crop Commodity	11,000.00	Acres
Cover Crop Traditional	2,500.00	Acres
Cover Crop Traditional with Fall Nutrients	100,000.00	Acres
Dirt and Gravel Roads	158,000.00	Feet
Dry Detention Ponds and Hydrodynamic Structures	74.10	Acres Treated
Dry Extended Detention Ponds	224.79	Acres Treated
Dry Ponds	312.00	Acres Treated
Erosion and Sediment Control Level 2	500.00	Acres
Extended Dry Basin	77.00	Acres Treated
Filter Strip Runoff Reduction	10.00	Acres Treated
Filtering Practices	610.10	Acres Treated
Forest Buffer - Narrow	100.00	Acres
Forest Buffer (Ag)	6,000.00	Acres
Forest Buffer (Urban)	211..31	Acres
Grass Buffer-Streamside with Exclusion Fencing	2,500.00	Acres
Grey Infrastructure	23,772.00	Acres Treated
Impervious Surface Reduction	50.00	Acres
Infiltration Basin	18.60	Acres Treated
Infiltration Practices	70.00	Acres Treated
Land Retirement to Ag Open Space	500.00	Acres
Manure Incorporation	10,000.00	Acres
Manure Transport	150,000.00	Dry Tons
Manure Treatment Technologies	20,000.00	Tons

BMP Name	Quantity	Units
Mechanical Broom Technology - 1 pass/4 weeks	92.00	Acres
Non-Urban Stream Restoration	63,900.00	Linear Feet
Nutrient Management Core N	150,000.00	Acres
Nutrient Management Core P	150,000.00	Acres
Nutrient Management N Placement	6,661.00	Acres
Nutrient Management N Rate	6,661.00	Acres
Nutrient Management N Timing	6,661.00	Acres
Nutrient Management P Placement	6,661.00	Acres
Nutrient Management P Rate	6,661.00	Acres
Nutrient Management P Timing	6,661.00	Acres
Permeable Pavement	0.89	Acres Treated
Precision Intensive Rotational/Prescribed Grazing	10,000.00	Acres
Pumpout	10,000.00	Number of Systems
Septic Connection	3,000.00	Number of Systems
Soil Conservation and Water Quality Plans	200,000.00	Acres
Storm Drain Cleanout	29,610.00	Pounds of Sediment
Stormwater Performance Standard-Runoff Reduction	892.44	Acres Treated
Stormwater Performance Standard-Stormwater Treatment	118.34	Acres Treated
Street Sweeping	63.00	Acres
Tillage Management-Conservation	80,000.00	Acres
Tillage Management-High Residue	110,000.00	Acres
Tree Planting - Canopy	50.00	Acres
Urban Nutrient Management Plan	10,577.00	Acres
Urban Stream Restoration	29,146.00	Linear Feet
Vegetated Open Channel	384.00	Acres Treated
Wet Ponds and Wetlands	290.00	Acres Treated
Wetland Creation - Floodplain	2.00	Acres
Wetland Restoration - Floodplain	50.00	Acres

d. Local Benefits

Hard work is needed to address pollution and restore the health of Lancaster County watersheds and streams. Collaboration between groups will increase the pace as well as collective impact of the work. Increased support for restoration efforts will improve habitat for fish and waterfowl, prevent erosion, improve soil quality, and provide recreational and economic opportunities to all Lancaster County residents.

e. Additional Details

The planning process in the Community Clean Water Planning Guide was piloted and refined by the steps taken to develop Lancaster County's CAP. Additional information on Lancaster County's CAP can also be found in the following documents posted on the DEP website at www.dep.pa.gov/chesapeakebay/phase3.

- Snapshot summary
- CAP Narrative

- Planning Templates (6)

2. York County's Countywide Action Plan Summary

The York County Coalition for Clean Water, led by the York County Planning Commission and the York County Conservation District, coordinated the transparent planning process for York County's CAP. The summary below includes current conditions for York County, pollution reduction progress, and Best Management Practices (BMPs) identified to achieve these reductions. All numbers below represent nutrient goals and reductions to local waterways. The process that York County underwent to develop their plan was used to modify the Community Clean Water Planning Guide that will be provided to other counties.

a. Current Conditions

York County is the second highest loading county in Pennsylvania's Chesapeake Bay watershed. By 2025, York County's goal is to reduce their loading to 4.0 million pounds of nitrogen, they have already achieved their phosphorus goal. Table 3.6 shows York County's current load for nitrogen and phosphorus and the reduction goals for each.

Table 3.6. Summary of York County's Pollutant Reduction Goal

	Nitrogen (pounds)	**Phosphorus** (pounds)
Current Loading Rate	11,993,095	446,995
2025 Loading Rate	7,988,907	452,352
Reduction Goal	4,004,188	0

b. Pollutant Reduction Progress

York County has developed a plan to reduce approximately 3.06 million pounds (77%) of nitrogen and approximately 68,270 pounds (already meeting their goal) of phosphorus. There is no planning target for sediment, but York County's plan reduced approximately 366.03 million pounds (38%) of the current load. Table 3.7 shows York County's reduction goal for nitrogen and phosphorus and the reduction amount and percentage achieved in the plan for each.

Table 3.7. Summary of York County's Pollutant Reduction Progress

	Nitrogen (pounds)	**Phosphorus** (pounds)	**Sediment** (pounds)
Goal	4,004,187	0	No Goal
Amount Achieved	3,063,682	68,270	366,026,000
Percent Achieved	77%	Goal Met	38%*

*Represents present of current loading rate

c. Best Management Practices

York County has identified a list of BMPs in their CAP that result in a total reduction of approximately 3.06 million pounds of nitrogen. Table 3.8 provides their list of specific

BMP commitments and quantities of each. The full details of their BMPs are included in their CAP.

Table 3.8. York County's BMP List

BMP Name	Amount	Units
Animal Waste Management System	3,000	Animal Units
Barnyard Runoff Control	70	Acres
Bioretention/raingardens	39.50	Acres Treated
Bioswale	7.80	Acres Treated
Cover Crop Traditional	55,000	Acres
Dirt & Gravel Road Erosion & Sediment Control – Driving Surface Aggregate + Raising the Roadbed	31,680	Feet
Dirt & Gravel Road Erosion & Sediment Control – Driving Surface Aggregate with Outlets	168,960	Feet
Dirt & Gravel Road Erosion & Sediment Control – Outlets only	31,680	Feet
Erosion and Sediment Control Level 2	17,500	Acres
Forest Buffer	6,020	Acres
Forest Buffer (Urban)	98.20	Acres
Forest Buffer-Narrow with Exclusion Fencing	2.50	Acres
Forest Buffer-Streamside with Exclusion Fencing	2.50	Acres
Grass Buffer	6,005	Acres
Grass Buffer - Narrow	5	Acres
Grass Buffer-Narrow with Exclusion Fencing	5	Acres
Grass Buffer-Streamside with Exclusion Fencing	5	Acres
Infiltration Basin	32.40	Acres Treated
Land Retirement to Ag Open Space	1,500	Acres
Manure Incorporation	10,000	Acres
Non-Urban Stream Restoration	78,500	Linear Feet
Nutrient Management Core N	185,000	Acres
Nutrient Management Core P	88,400	Acres
Nutrient Management N Rate	88,400	Acres
Nutrient Management N Timing	88,400	Acres
Off Stream Watering Without Fencing	500	Acres
Precision Intensive Rotational/Prescribed Grazing	16,000	Acres
Soil Conservation and Water Quality Plans	180,000	Acres
Stormwater Performance Standard-Runoff Reduction	0.34	Acres Treated
Stormwater Performance Standard-Stormwater Treatment	216.48	Acres Treated
Tillage Management - Conservation	35,000	Acres
Tillage Management - High Residue	90,000	Acres
Tree Planting - Agriculture	100	Acres
Tree Planting - Canopy	4.25	Acres
Urban Nutrient Management Plan	50,000	Acres
Urban Stream Restoration	63,688	Linear Feet
Wetland Creation - Floodplain	7	Acres
Wetland Creation - Headwater	7	Acres
Wetland Restoration - Floodplain	32	Acres
Wetland Restoration - Headwater	7	Acres

d. Local Benefits

Storm events are the number one way for nutrients and sediment to enter waterways. Increased runoff impacts flooding, water quality, habitat, etc. Flooding affects safety, property, infrastructure, and economics. York County relies on local water sources to supply drinking water to residents. Livestock, just like humans, depend on clean water.

e. Additional Details

The planning process in the Community Clean Water Planning Guide was piloted and refined by the steps taken to develop York County's CAP. Additional information on York County's CAP can also be found in the following documents posted on the DEP website at www.dep.pa.gov/chesapeakebay/phase3.

- Snapshot summary
- CAP Narrative
- Programmatic Recommendations Template
- Planning Templates

3. Franklin County's Planning Process

Franklin County's Planning Commission took the lead, in partnership with the Franklin County Conservation District, in developing and implementing the Franklin County CAP. The below summary includes current conditions for Franklin County, pollution reduction progress, and BMPs identified to achieve these reductions. All numbers below represent nutrient goals and reductions to local waterways. The process Franklin County underwent to develop their plan was used to modify the Community Clean Water Planning Guide that will be provided to other counties.

a. Current Conditions

Franklin County is the third highest loading county in Pennsylvania's Chesapeake Bay watershed. By 2025, Franklin County needs to reduce it loading to approximately 2.90 million pounds of nitrogen and approximately 99.99K pounds of phosphorus. Table 3.9 shows Franklin County's current load for nitrogen and phosphorus and the reduction goals for each.

Table 3.9. Summary of Franklin County's Pollutant Reduction Goal

	Nitrogen (pounds)	**Phosphorus** (pounds)
Current Loading Rate	7,793,008	394,218
2025 Loading Rate	4,895,301	294,226
Reduction Goal	2,897,707	99,992

b. Pollutant Reduction Progress

Franklin County developed a plan to reduce approximately 1.3 million pounds (45%) of the nitrogen goal and approximately 65.05 thousand pounds (65%) of the phosphorus goal. There is no planning target for sediment, but Franklin County's plan reduced approximately 66.96 million pounds of sediment (20%) of the current load. Table 3.10 shows Franklin County's reduction goal for nitrogen and phosphorus and the reduction amount and percentage achieved in the plan for each.

Table 3.10. Summary of Franklin County's Pollutant Reduction Progress

	Nitrogen (pounds)	**Phosphorus** (pounds)	**Sediment** (pounds)
Goal	2,897,708	99,992	No Goal
Amount Achieved	1,297,683	65,050	66,961,000
Percent Achieved	45%	65%	20%*

*Represents Percent of Current Load

c. Best Management Practices

Franklin County identified a list of BMPs that results in a total reduction of approximately 1.3 million pounds of nitrogen and approximately 65.05 thousand pounds of phosphorus. Table 3.11 provides their list of the specific BMP commitments and quantities of each. The full details of their BMPs are included in their CAP.

Table 3.11. Franklin County's BMP List

BMP Name	Quantity	Units
Animal Waste Management System	30,000	Animal Units
Barnyard Runoff Control	134	Acres
Bioretention/raingardens	363.94	Acres Treated
Bioswale	68.09	Acres Treated
Cover Crop Commodity	0	Acres
Cover Crop Traditional	32,000	Acres
Cover Crop Traditional with Fall Nutrients	16,000	Acres
Dairy Precision Feeding and/or Forage Management	3,000	Animal Units
Forest Buffer	100	Acres
Forest Buffer - Narrow	50	Acres
Forest Buffer (Urban)	164.11	Acres
Forest Buffer-Narrow with Exclusion Fencing	50	Acres
Forest Buffer-Streamside with Exclusion Fencing	50	Acres
Grass Buffer	100	Acres
Grass Buffer - Narrow	50	Acres
Grass Buffer-Narrow with Exclusion Fencing	50	Acres
Grass Buffer-Streamside with Exclusion Fencing	50	Acres
Infiltration Basin	62.64	Acres Treated
Land Retirement to Ag Open Space	500	Acres
Manure Transport	10,000	Dry Tons
Non-Urban Stream Restoration	12,000	Linear Feet
Nutrient Management Core N	161,400	Acres
Nutrient Management Core P	161,400	Acres
Nutrient Management N Rate	17,000	Acres
Nutrient Management N Timing	17,000	Acres
Nutrient Management P Rate	17,000	Acres
Nutrient Management P Timing	17,000	Acres
Off Stream Watering Without Fencing	8,500	Acres
Permeable Pavement	0.31	Acres Treated
Precision Intensive Rotational/Prescribed Grazing	6,500	Acres
Soil Conservation and Water Quality Plans	184,000	Acres
Stormwater Performance Standard-Runoff Reduction	35.12	Acres Treated
Stormwater Performance Standard-Stormwater Treatment	340.08	Acres Treated
Street Sweeping	5.52	Miles
Tillage Management - Low Residue	10,000	Acres
Tillage Management - Conservation	29,000	Acres
Tillage Management - High Residue	57,000	Acres
Tree Planting - Agriculture	40	Acres
Tree Planting - Canopy	160.00	Acres
Urban Stream Restoration	24,502	Feet
Wetland Restoration	65.00	Acres Treated
Wetland Restoration - Floodplain	50	Acres

d. Local Benefits

Franklin County promotes voluntary conservation and good stewardship of natural resources to maintain a balance and harmony between a profitable agricultural economy and other land uses to enhance their quality of life. The efforts of this planning project are indicative of this local mind set and are intended to protect their resources and those of their neighbors downstream.

e. Additional Details

The planning process in the Community Clean Water Planning Guide was piloted and refined by the steps taken to develop Adams County's CAP. Additional information on Adams County's CAP can also be found in the following documents posted on the DEP website at www.dep.pa.gov/chesapeakebay/phase3.

- Snapshot summary
- CAP Narrative
- Programmatic Recommendations Template
- Planning Templates

4. Adams County's Countywide Action Plan Summary

Adams County's Planning Commission took the lead, in partnership with the Adams County Conservation District, in developing and implementing the Adams County CAP. The below summary includes current conditions for Adams County, pollution reduction progress, and BMPs identified to achieve these reductions. All numbers below represent nutrient goals and reductions to local waterways. The process that Adams County underwent to develop their plan was used to modify the Community Clean Water Planning Guide that will be provided to other counties.

a. Current Conditions

Adams County is one of the higher loading counties in Pennsylvania's Chesapeake Bay watershed. Adams County's goal is to reduce their loading to approximately 1.49 million pounds of nitrogen and approximately 39.5K pounds of phosphorus. Table 3.12 shows Adams County's current load for nitrogen and phosphorus and reduction goals for each.

Table 3.12. Summary of Adams County's Pollutant Reduction Goal

	Nitrogen (pounds)	**Phosphorus** (pounds)
Current Loading Rate	4,721,732	360,406
2025 Loading Rate	3,226,929	320,897
Reduction Goal	1,494,803	39,509

b. Pollutant Reduction Progress

Adams County developed a plan that intends to reduce approximately 847.65 thousand pounds. (56%) of the nitrogen goal and approximately 46.81 thousand pounds. (118%) of the phosphorus goal. Sediment reductions are not required but this planning effort provides for a reduction of approximately 72.92 million pounds (22%) of the current load. Table 3.13 shows Adams County's reduction goal for nitrogen and phosphorus and the reduction amount and percentage achieved in the plan for each.

Table 3.13. Summary of Adams County's Pollutant Reduction Progress

	Nitrogen (pounds)	**Phosphorus** (pounds)	**Sediment** (pounds)
Goal	1,494,803	39,509	No Goal
Amount Achieved	847,652	46,807	72,919,000
Percent Achieved	56%	118%	22%*

*Represents Percent of Current Load

c. Best Management Practices

Adams County has identified a list of BMPs that results in a total reduction of approximately 847.65 thousand pounds. of nitrogen. Table 3.14 provides their list of the specific BMP commitments and quantities of each. The full details of their BMPs are included in their CAP. Appropriate flexibility for practices is allowed to meet or exceed their proposed reductions.

Table 3.14. Adams County's BMP List

BMPs	Amount	Units
Barnyard Runoff Controls	15	Acres
Conservation Till	13,000	Acres
Cover Crop with Fall Nutrients	10,000	Acres
Cover Crops	30,000	Acres
Dairy Precision Feeding	8,000	Dairy Cows
Dry Detention Ponds	0.5	Acres Treated
Forest Buffer (Urban)	16	Acres
Forest Buffers	500	Acres
Forest Harvesting Practices	100	Percent
Forrest Buffer with Exclusion Fencing	100	Acres
Grass Buffer	1,000	Acres
Grass Buffer with Exclusion Fencing	200	Acres
High Residue Till	55,500	Acres
Land Retirement to Open Space	1,500	Acres
Manure Incorporation	10,000	Acres
Non-urban Stream Restoration	10,000	Linear Feet
Nutrient Management Core	104,000	Acres
Nutrient Management Core N	104,000	Acres
Nutrient Management Rate N	10,000	Acres
Nutrient Management Rate P	10,000	Acres
Nutrient Management Time N	10,000	Acres
Nutrient Management Time P	10,000	Acres
Permeable Pavement	2.5	Acres
Prescribed Grazing	3,500	Acres
Retrofit Runoff Reduction	144.75	Acres Treated
Soil Conservation/Water Quality Plans	101,000	Acres
Street Sweeping	60	Miles
Urban Stream Restoration	3,750	Linear Feet
Waste Storage Facilities	4,000	Animal Units
Wetland Restoration	25	Acres

d. Local Benefits

Adams County promotes voluntary conservation and good stewardship of natural resources to maintain a balance and harmony between a profitable agricultural economy and other land uses to enhance their quality of life. The efforts of this planning project were indicative of this local mind set and intended to protect their resources and those of their neighbors downstream.

e. Additional Details

The planning process in the Community Clean Water Planning Guide was piloted and refined by the steps taken to develop Adams County's CAP. Additional information on Adams County's CAP can also be found in the following documents posted on the DEP website at www.dep.pa.gov/chesapeakebay/phase3.

- Snapshot summary
- CAP Narrative
- Programmatic Recommendations Template
- Planning Templates

III. TIER 2, 3 AND 4 COUNTY ENGAGEMENT

A. The CAP Development Process

The county-based planning process provides an opportunity for everyone involved to learn more about their local waters. The planning process will start with a review of the county waters, the nutrients and pollutants running into them, and how local actions can reduce this. It will end with the development of CAPs for all 43 counties in Pennsylvania's Chesapeake Bay watershed. To assist with the development of a CAP, each county planning team will receive county-specific planning tools, templates, a customized technical toolbox, and technical support resources described below as they complete the process. The development process is detailed in the Community Clean Water Planning Guide.

B. Agency Support Team

Each county planning team will be provided technical support resources to complete the planning process and begin implementation of CAPs. The technical support team will be comprised of:

- **Internal Coordinator:** This coordinator is a member of the DEP Chesapeake Bay Office. The internal coordinator serves as the point of contact for the technical support team and the county planning team. The internal coordinator is responsible for:

    - managing external coordinators, facilitator, and technical contract staff.
    - oversight and management of technical contracts.
    - facilitating state resources for local planning and implementation.
    - assisting with the permitting and grant process for external coordinators.
    - helping in coordination with the verification process.
    - management and oversight of annual reporting and two-year milestone tracking.

- **County Community Clean Water Action Plan Coordinator:** The external coordinators serve as the point of contact to their assigned county or counties and are funded through an agreement between DEP and the lead agency of the county planning team. These coordinators provide regular progress updates to the DEP internal coordinator. They would support county efforts to develop and implement the CAP by:

    - facilitating planning team efforts and coordinating regular meetings.

- seeking financial resources to support county efforts (grants, partnerships, etc.).
- helping counties with permitting of plan related projects.
- developing and updating county plans and progress as needed.
- submitting annual reports.
- coordinating verification process within their designated county or counties.

- **Technical Coordinator**: The technical coordinator(s) are either a member of the EPA Chesapeake Bay Program Office or contracted by DEP to provide technical support to the county planning team. These coordinators report to the DEP Internal Coordinator. The Technical Coordinator will:

  - be responsible for providing information and facilitation of planning tools through the planning and implementation process.
  - assist with reporting and tracking of milestones and annual progress.
  - assist in model runs for plan development and during annual milestone updates.

- **Planning Coordinator:** The planning coordinator is a member of the Department of Community and Economic Development (DCED). The Planning Coordinator will:

  - provide expertise and assistance with local planning, the implementation of zoning principles and local ordinances to promote advance planning for sector growth

- **Facilitation Coordinator:** The facilitation coordinator reports to the DEP Internal Coordinator. This coordinator is contracted by DEP to provide:

  - facilitation services
  - organizational support

C. Schedule for Implementation

The completion and implementation of the CAPs will be done in a staged approach, incrementally scaling the resources and coordination of planning efforts. The staged approach rolls out in two phases over 18 months. Phase 1 completes the CAPs in the remaining four Tier 2 counties. There will also be a focus on beginning implementation in the four pilot counties where CAPs are completed, with an emphasis on the two Tier 1 counties of Lancaster and York. These seven counties encompass 54% of PA's nitrogen and 42% of PA's phosphorus loads. This approach also allows for additional outreach to Tier 3 and 4 counties before their planning starts.

1. *Staged Approach, Phase 1*

Staged Approach, Phase 1, focuses on planning and long-term implementation of the Phase 3 WIP. It includes continuation of the pilot process in the four pilot counties as they transition into implementation of their CAPs.

Phase 1 also begins the planning process for the four remaining Tier 2 counties of Bedford, Centre, Cumberland, and Lebanon. These Tier 2 counties will be given 6 to 8 months to build countywide coalitions and develop CAPs. The Tier 2 counties begin the implementation phase immediately after plan development. This stage is proposed to begin in September 2019.

2. Staged Approach, Phase 2

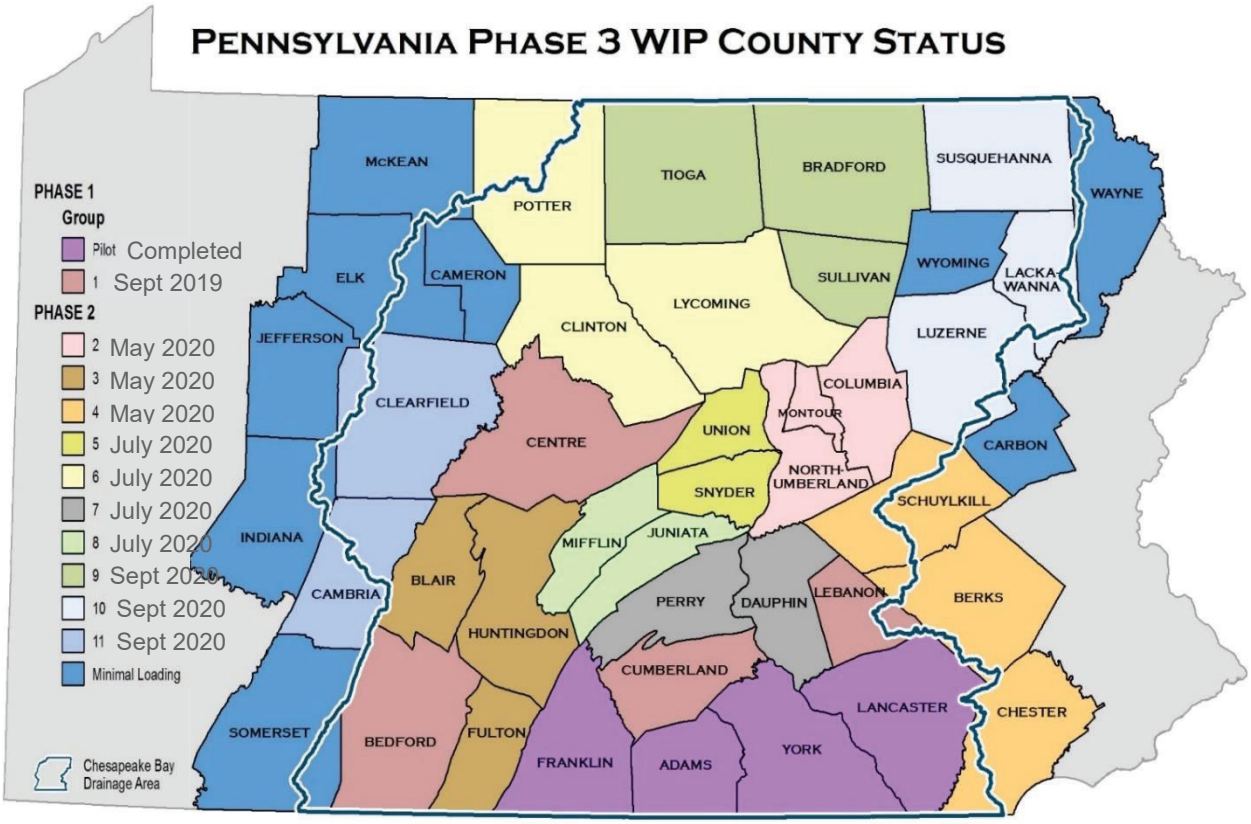
Staged Approach, Phase 2, focuses on planning and long-term implementation of Pennsylvania's WIP for 26 of the remaining 35 Tier 3 and Tier 4 counties, and target the remaining 46% of Pennsylvania's nitrogen and 58% of phosphorus loads.

During Phase 2, the technical support team described above will provide support on a regionalized basis for Tier 3 and 4 counties. The regionalized planning efforts group counties together, leveraging existing regional partnerships where feasible. Each county will still be required to submit an individual CAP but will be encouraged to work together with other counties during planning to share technical resources and information and maximize on existing cooperative efforts.

Phase 2 begins after the completion of the planning process for Phase 1 counties, sometime around May 2020, depending on the availability of resources. All Tier 3 and Tier 4 counties will be given 6 to 8 months for planning and will immediately switch to the implementation phase once planning is complete.

Figure 3.1 is a graphical representation of this staged approach and shows which counties are involved in each phase. These phases are well thought out and planned in detail, but there remains flexibility to adjust if opportunities and/or limitations become apparent over time.

Figure 3.1. CAP Development Staged Approach



3. Counties with Minimal Loadings

There are currently nine counties with less than 200,000 pounds of nitrogen per county: Somerset, Wyoming, Elk, Indiana, Cameron, Wayne, McKean, Jefferson, and Carbon. Progress in these counties based on existing programs will continue to be documented and tracked. No additional staff resources will be devoted to additional planning efforts in these counties.

D. Resource Needs

This initiative is one of the core responsibilities for the DEP Chesapeake Bay Office. As a result, the resource needs for this initiative are incorporated into the overall description for this office in Section 2, State Actions and listed in Table 5.4 in Section 5, Existing and Needed Resources.

IV. Key Actions for Implementation of Countywide Action Plans

A significant part of the pilot countywide planning process was the open exchange of issues and challenges regarding implementation of CAPs. DEP's Chesapeake Bay Office built on previous relationships and established additional partnerships throughout the planning process with the goal of successful implementation of its Phase 3 WIP. Moving forward on this collaborative effort, DEP's Chesapeake Bay Office is working

with two of the pilot counties, Lancaster, and York, to assist with the next steps of moving from planning to action. In July and August 2019, the Chesapeake Bay Office and its facilitation and outreach contractors led a series of meetings with these counties to discuss their needs for resources, tools and training that would support the countywide interests to move from planning to action.

Key takeaways from these meetings included the important roles the proposed internal coordinators and external coordinators will have moving forward. These coordinators are essential to facilitate the necessary coordination, collaboration and data collection needed for successful implementation. Using funding from the EPA Chesapeake Bay Implementation Grant, DEP is moving forward with hiring two internal coordinators and funding eight external coordinators; one for each of the four pilot counties and one for each remaining Tier 2 county.

Beyond these staffing needs, the meetings revealed the value of facilitation support, project management tools, and training that the Chesapeake Bay Office's contractors, Water Words That Work (WWTW) and Jennifer Handke, Consulting with a Purpose (CWP) can provide. A framework was built to provide Lancaster and York with tools and training for them to generate commitment and facilitate the collaboration needed for success. Areas of support include assistance with:

- Structuring an Implementation Team
- Prioritizing and Sequencing Projects/Activities
- Project Management
    - Meeting cycles
    - Facilitation
    - Expectations and Deliverables
- County Implementation Plan Template
- Facilitation Support
- Training Support
    - Leadership and Facilitation
    - Communication Skills
    - Managing Multiple Interests (Collaboration)

As a result, the Chesapeake Bay Office, WWTW and CWP are working with Lancaster and York in their efforts to move from planning to action - facilitating implementation

strategy sessions, providing tools and structure for project planning and management, developing, and delivering training to meet the needs of each counties' partners.

The outreach and support developed for these two counties will be utilized to further develop tools and resources that will be made available to assist other counties as they begin implementation.

V. KEY ACTION STEPS

To track and report progress, key action steps were selected to be reported on a six-month basis for the initiatives described above. These are summarized on Section 7, Milestones and Progress Reporting. The details on the action steps can be found in the Progress and Reporting Template.

SECTION 4. FEDERAL ACTIONS AND COORDINATION

I. FEDERAL FACILITIES

EPA, in partnership with the states, has developed planning goals for all federal facilities in the Chesapeake Bay watershed. Table 4.1 is a summary of the total nitrogen reductions addressed by the different federal facilities in Pennsylvania by county. Table 4.2 is the same table for phosphorus.

Like the local planning goals for counties, the planning goals federal facilities do not specify which sector should achieve the load reductions. In the case of federal facilities, the reductions would come from managing excess nutrients and sediment in the developed sector since stormwater is the primary source.

The Action Plan developed by the Department of Defense was unable to attain the 73.92% controllable load reduction due to the scarcity of higher-loading land uses on which to install control practices based on this methodology.

As shown in Table 4.1, the 97,358 pounds/year nitrogen reduction expected from federal facilities is only 0.3% of Pennsylvania's total required nitrogen load reduction. DEP is working with the Department of Defense and other federal facility partners to further refine local land use and facility loads to establish an equitable methodology for reductions from federal facilities. Federal facilities will be expected to achieve equivalent reductions at their facilities as their surrounding counties based on sector loading rates or an agreed alternative approach that will meet the TMDL objective.

Table 4.1. Nitrogen Reductions for Pennsylvania Federal Facilities by County

County	Department of Defense			National Park Service			US Fish and Wildlife Service			General Services Administration			Total Reduction 2017-2025
	2017 Load	2025 Target	Reduction	2017 Load	2025 Target	Reduction	2017 Load	2025 Target	Reduction	2017 Load	2025 Target	Reduction	
Adams	2,267	1,818	449	26,590	20,406	6,185	-	-	-	-	-	-	6,634
Bedford	3,666	2,976	689	-	-	-	-	-	-	-	-	-	689
Berks	-	-	-	2,296	2,237	59	-	-	-	-	-	-	59
Blair	59	37	22	3,839	3,264	574	-	-	-	-	-	-	597
Bradford	-	-	-	-	-	-	-	-	-	-	-	-	-
Cambria	-	-	-	1,517	1,208	309	-	-	-	-	-	-	309
Cameron	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon	-	-	-	-	-	-	-	-	-	-	-	-	-
Centre	15,883	15,176	707	-	-	-	-	-	-	-	-	-	707
Chester	-	-	-	-	-	-	-	-	-	-	-	-	-
Clearfield	5,711	5,621	89	-	-	-	-	-	-	-	-	-	89
Clinton	1,376	1,196	181	-	-	-	856	640	215	-	-	-	396
Columbia	-	-	-	-	-	-	-	-	-	-	-	-	-
Cumberland	64,483	40,634	23,849	8,734	7,713	1,022	-	-	-	-	-	-	24,871
Dauphin	29,034	23,185	5,850	3,183	3,056	127	-	-	-	-	-	-	5,976
Elk	-	-	-	-	-	-	-	-	-	-	-	-	-
Franklin	81,489	61,344	20,145	859	771	88	-	-	-	0.5	0.3	0.20	20,233
Fulton	-	-	-	-	-	-	-	-	-	-	-	-	-
Huntingdon	119,271	111,169	8,102	-	-	-	-	-	-	-	-	-	8,102
Indiana	-	-	-	-	-	-	-	-	-	-	-	-	-
Jefferson	-	-	-	-	-	-	-	-	-	-	-	-	-
Juniata	-	-	-	-	-	-	-	-	-	-	-	-	-
Lackawanna	308	282	26	-	-	-	-	-	-	-	-	-	26
Lancaster	327	205	121	-	-	-	-	-	-	-	-	-	121
Lebanon	78,147	59,433	18,714	863	836	27	-	-	-	-	-	-	18,741
Luzerne	885	569	316	-	-	-	-	-	-	27	17	9.70	326
Lycoming	-	-	-	-	-	-	-	-	-	9	3	5.30	5
Mckean	-	-	-	-	-	-	-	-	-	-	-	-	-
Mifflin	207	132	75	-	-	-	-	-	-	-	-	-	75
Montour	-	-	-	-	-	-	-	-	-	-	-	-	-
Northumberland	163	119	44	-	-	-	-	-	-	-	-	-	44
Perry	-	-	-	508	426	81	-	-	-	-	-	-	81
Potter	-	-	-	-	-	-	-	-	-	-	-	-	-
Schuylkill	8	5	3	1,550	1,507	42	-	-	-	-	-	-	45
Snyder	-	-	-	-	-	-	-	-	-	-	-	-	-
Somerset	-	-	-	-	-	-	-	-	-	-	-	-	-
Sullivan	-	-	-	-	-	-	-	-	-	-	-	-	-
Susquehanna	177	115	63	-	-	-	-	-	-	-	-	-	63
Tioga	28,513	24,699	3,814	-	-	-	-	-	-	-	-	-	3,814
Union	56	37	19	-	-	-	-	-	-	-	-	-	19
Wayne	-	-	-	-	-	-	-	-	-	-	-	-	-
Wyoming	-	-	-	-	-	-	-	-	-	-	-	-	-
York	17,754	12,419	5,335	-	-	-	-	-	-	-	-	-	5,335
Total	**449,784**	**361,171**	**88,613**	**49,939**	**41,425**	**8,515**	**856**	**640**	**215**	**36**	**21**	**15**	**97,358**

Table 4.2. Phosphorus Reductions for Pennsylvania Federal Facilities by County

	Department of Defense			National Park Service			US Fish and Wildlife Service			General Services Administration			Total Reduction 2017-2025
County	2017 Load	2025 Target	Reduction	2017 Load	2025 Target	Reduction	2017 Load	2025 Target	Reduction	2017 Load	2025 Target	Reduction	
Adams	244	200	44	4,966	4,296	669	-	-	-	-	-	-	713
Bedford	297	250	47	-	-	-	-	-	-	-	-	-	47
Berks	-	-	-	105	102	3	-	-	-	-	-	-	3
Blair	2	1	1	416	314	102	-	-	-	-	-	-	103
Bradford	-	-	-	-	-	-	-	-	-	-	-	-	-
Cambria	-	-	-	81	55	26	-	-	-	-	-	-	26
Cameron	-	-	-	-	-	-	-	-	-	-	-	-	-
Carbon	-	-	-	-	-	-	-	-	-	-	-	-	-
Centre	1,363	1,261	102	-	-	-	-	-	-	-	-	-	102
Chester	-	-	-	-	-	-	-	-	-	-	-	-	-
Clearfield	460	451	9	-	-	-	-	-	-	-	-	-	9
Clinton	101	92	9	-	-	-	65	43	23	-	-	-	32
Columbia	-	-	-	-	-	-	-	-	-	-	-	-	-
Cumberland	3,633	2,157	1,476	591	459	131	-	-	-	-	-	-	1,607
Dauphin	2,125	1,621	503	85	78	7	-	-	-	-	-	-	510
Elk	-	-	-	-	-	-	-	-	-	-	-	-	-
Franklin	7,056	4,696	2,360	50	37	13	-	-	-	0.04	0.02	0.02	2,373
Fulton	-	-	-	-	-	-	-	-	-	-	-	-	-
Huntingdon	10,904	9,605	1,299	-	-	-	-	-	-	-	-	-	1,299
Indiana	-	-	-	-	-	-	-	-	-	-	-	-	-
Jefferson	-	-	-	-	-	-	-	-	-	-	-	-	-
Juniata	-	-	-	-	-	-	-	-	-	-	-	-	-
Lackawanna	31	26	5	-	-	-	-	-	-	-	-	-	5
Lancaster	7	4	3	-	-	-	-	-	-	-	-	-	3
Lebanon	3,855	2,223	1,632	34	15	19	-	-	-	-	-	-	1,651
Luzerne	25	15	10	-	-	-	-	-	-	1.16	0.68	0.49	10.33
Lycoming	-	-	-	-	-	-	-	-	-	0.29	0.09	0.20	0.20
Mckean	-	-	-	-	-	-	-	-	-	-	-	-	-
Mifflin	18	10	8	-	-	-	-	-	-	-	-	-	8
Montour	-	-	-	-	-	-	-	-	-	-	-	-	-
Northumberland	6	4	2	-	-	-	-	-	-	-	-	-	2
Perry	-	-	-	45	39	6	-	-	-	-	-	-	6
Potter	-	-	-	-	-	-	-	-	-	-	-	-	-
Schuylkill	0	0	0	40	39	1	-	-	-	-	-	-	1
Snyder	-	-	-	-	-	-	-	-	-	-	-	-	-
Somerset	-	-	-	-	-	-	-	-	-	-	-	-	-
Sullivan	-	-	-	-	-	-	-	-	-	-	-	-	-
Susquehanna	15	11	4	-	-	-	-	-	-	-	-	-	4
Tioga	3,599	3,030	569	-	-	-	-	-	-	-	-	-	569
Union	3	2	1	-	-	-	-	-	-	-	-	-	1
Wayne	-	-	-	-	-	-	-	-	-	-	-	-	-
Wyoming	-	-	-	-	-	-	-	-	-	-	-	-	-
York	1,299	1,068	231	-	-	-	-	-	-	-	-	-	231
Total	**35,043**	**26,727**	**8,316**	**6,412**	**5,434**	**977**	**65**	**43**	**23**	**1.49**	**0.79**	**0.70**	**9,316**

Each agency is expected to submit a plan to address the nutrient loadings assigned to their respective facilities, as established in the EPA document, "US Environmental Protection Agency's Expectations for Federal Lands and Facilities in Supporting Chesapeake Bay Watershed Jurisdictions' Phase III Watershed Implementation Plans", dated August 16, 2018. See the Department of Defense, US Fish and Wildlife Service's and National Park Service plans.

II. FEDERAL AGENCY SUPPORT AND COORDINATION

A. Coordination Between the Natural Resource Conservation Service and EPA

As part of the Chesapeake Bay Program Partnership, EPA, and the Natural Resource Conservation Service (NRCS) work very closely together. One area in which state partners in the Chesapeake Bay Partnership have identified the need for improved coordination between the two agencies involves the tracking and verification of practices installed by NRCS. Due to provisions in the Federal Farm Bill related to confidentiality of some cost-share data and NRCS program staff interpretation of these restrictions, most states only receive this data in an aggregated format. While this aggregated format allows for progress reporting, it does not allow for ongoing verification of these practices once the credit life of the practice has expired. Without the exact location of these practices, the states cannot find them in order to meet the Chesapeake Bay Program Partnership protocols for verification. As a result, the reductions associated with these practices will be eliminated as part of the progress documentation over time.

EPA, as the lead agency responsible for coordination between all the federal agency partners involved in the Chesapeake Bay Program, should take the lead and resolve this issue with NRCS. This would help Pennsylvania and all the states in the Chesapeake Bay watershed succeed in meeting reduction goals.

B. Coordination with the EPA Chesapeake Bay Program Office Regarding BMP Verification

Pennsylvania has been involved in Chesapeake Bay Program Partnership discussions related to BMP Verification Protocols and, alongside our jurisdictional partners, highlighting the need for reviewing and revising those protocols. The protocols in place now require an inordinate amount of staffing and financial resources to "keep" BMPs in the modeling tools. As a result of the need for these resources, and in response to the EPA evaluation of Pennsylvania's Phase 3 WIP, DEP took another look at these protocols with a focus on the importance of verifying the accelerated implementation of BMPs needed to document successful completion of the Phase 3 WIP in mind. Several barriers were identified. Pennsylvania will continue to work with our partners, including EPA, to find acceptable approaches that do not pull funding and manpower away from implementing additional BMPs on the ground to address these barriers. Specifically:

- The equity of how the protocols are applied to practices across different jurisdictions.

- The need for better representation of practices on the ground over time in that the defined credit life of some practices does not accurately reflect the actual duration of those practices in the field.

- The actual cost of verification in many cases is prohibitive.

- Loss of credit for practices captured through changes in land use and the use of the land cover data set for documenting these changes.

- Currently, there is no transparent documentation available to the public identifying the practices removed from the model due to lack of verification in accordance with the Chesapeake Bay Program Verification Protocols. This makes it difficult for jurisdictions to explain to stakeholders and other local partners why practices they think should be in the model are no longer there.

- A Verification Panel comprised of BMP experts and jurisdiction representatives reviewed the original BMP Verification Plans. These reviews are now completed only by the EPA Chesapeake Bay Program Office. A review of this approval process is needed. A re-convening of a BMP Verification Workgroup reviewed is another option.

C. Coordination with the EPA Chesapeake Bay Program Office and the Chesapeake Bay Program Partnership Wetland Workgroup

The primary goals of the Wetland Workgroup, within the Chesapeake Bay Program Partnership, is to facilitate the implementation of projects that protect, restore, and enhance tidal and non-tidal wetlands across the Chesapeake Bay watershed and to coordinate the collection and organization of wetland restoration data reported by the Chesapeake Bay Program.

A significant gap that is hampering these goals is the inability to report wetland gains achieved through state and federal regulatory actions that are greater than a 1:1 ratio (acreage or function). DEP recommends that the EPA Chesapeake Bay Program Office accept the reporting of wetland gains greater than 1:1 ratio from all regulated activities by state or federal programs.

D. Coordination with the EPA Chesapeake Bay Program Office and the Chesapeake Bay Program Partnership Agriculture Workgroup

Much like the urban stormwater crediting of stormwater BMPs under the Chesapeake Bay Program-approved expert panel report for Performance Standards, which relies on state regulatory requirements and technical guidance for crediting of BMPs, EPA and the Chesapeake Bay Program Partnership should be amenable to agriculture BMPs

implemented following state regulatory requirements and technical guidance recommendations.

Additionally, Pennsylvania has made strides in accounting for BMPs that have been implemented and not reported. Through efforts to survey, inspect and document, there have been several BMPs that are being implemented and, due to modeling protocols, do not meet the Chesapeake Bay Program criteria. The agriculture BMPs identified below have been noted as either being inconsistent with Pennsylvania regulatory requirements or common practice within the agricultural landscape:

- Dairy Precision Feeding – this BMP needs to be reported on an annual basis. However, as documented in more than 114 published research papers, milk urea nitrogen (MUN) is a viable and valid option to use as a metric to correlate the amount of urinary urea nitrogen excreted. Much like recent studies on swine and poultry manure nutrients, the use of MUN should be reviewed by the partnership to build into the modeling tools versus tracking and reporting Dairy Precision Feeding.

- Rotational/Prescribed Grazing – this BMP needs to be reported on an annual basis, following either standards set forth in an NRCS Grazing Plan or as a Resource Improvement (RI) BMP. Per Pennsylvania's Manure Management Technical Guidance standards, all pastures must either be managed based on an NRCS Grazing Plan or to a minimum of three inches of vegetation over the growing season. Meeting the pasture requirement set forth in Pennsylvania's Manure Management technical guidance standards should be acceptable to the Chesapeake Bay Program for reporting of this BMP.

- Cover Crop – there are three categories of cover crop accepted in the Phase 6 Modeling Tools:

    - Traditional Cover Crop – non-harvested
    - Traditional Cover Crop with fall nutrients – non-harvested
    - Commodity Cover Crop without nutrients

    "Commodity Cover Crop with nutrients" does not receive a reduction value within the model beyond that which is applied for the regular crop rotation. In Pennsylvania, commodity cover crop is planted to provide soil cover and, in the act of harvesting, removes nutrients from the system. The cover crop BMPs should be reviewed and incorporate the value of sediment reduction specifically for cover crop implementation.

- Manure Transport – as recommended by the Chesapeake Bay Program Agriculture Modeling Subcommittee and approved by the Chesapeake Bay Program Agriculture Workgroup, there is an assumed "backfill" of commercial fertilizer when manure is removed (exported) from the county. It is based on the idea that the farmer would not change their application rate just because they

changed or lowered the application of the nutrient source. In addition, the loading rate increases when fertilizer is assumed to be applied instead of manure. This assumption does not apply in most instances in Pennsylvania, specifically in the case of poultry. For example, many of the large, concentrated poultry facilities in the southeastern part of Pennsylvania's Bay watershed have broker and/or importer agreements to be exported outside of the county. These operations have limited or no land acreage under their ownership or operational control; the manure would not have been land applied. Having to apply Nutrient Management BMP on top of any Manure Transport or Manure Treatment Technology is onerous and does not avail itself to ease of reporting. The modeling of manure transport needs to be reviewed and revised.

E. Coordination with the EPA Chesapeake Bay Program Office and the Modeling Workgroup

Pennsylvania, through engagement with the Chesapeake Bay Partnership Program and Workgroups, has concerns with crediting practices that have not yet been sufficiently recognized through the modeling framework. In response to the EPA Evaluation of Pennsylvania's Phase 3 WIP, a more detailed review of those concerns was done. As a result of that review, Pennsylvania intends to work with Chesapeake Bay Program Partnership to develop Pennsylvania-specific practice definitions for several BMPs including:

- Legacy Sediment – work has continued with the Chesapeake Bay Program Urban Stormwater Workgroup to bring data related to establishing the credit for this practice. Pennsylvania believes there is enough data and local need to establish Pennsylvania-specific crediting criteria for this practice. While there have been several pilot projects that have developed data, as additional implementation occurs, it is important that these projects are accurately characterized in the model based on Pennsylvania's methodologies. Currently, legacy sediment projects are credited under Individual Stream Restoration Projects methodology in the model.

- Flood Control Measures – Pennsylvania recognizes that there may be opportunities to bridge Federal Emergency Management Agency funded stream projects related to local flood control for crediting in the Chesapeake Bay Watershed Model. Pennsylvania intends to take advantage of any information obtained and developed through these projects that we do not currently report in the model.

- Restored Stream Miles and Acid Mine Drainage (AMD) treatment – Pennsylvania has 15,369 miles of impacted streams which have limited biologic activity and nutrient uptake. Acid Mine Drainage accounts for 1,891 of the impaired stream miles. Through AMD treatment projects, 55 stream miles have been restored to attain designated use criteria with a fully functioning ecosystem. Streams with fully functioning ecosystems effectively process and remove nutrients. While

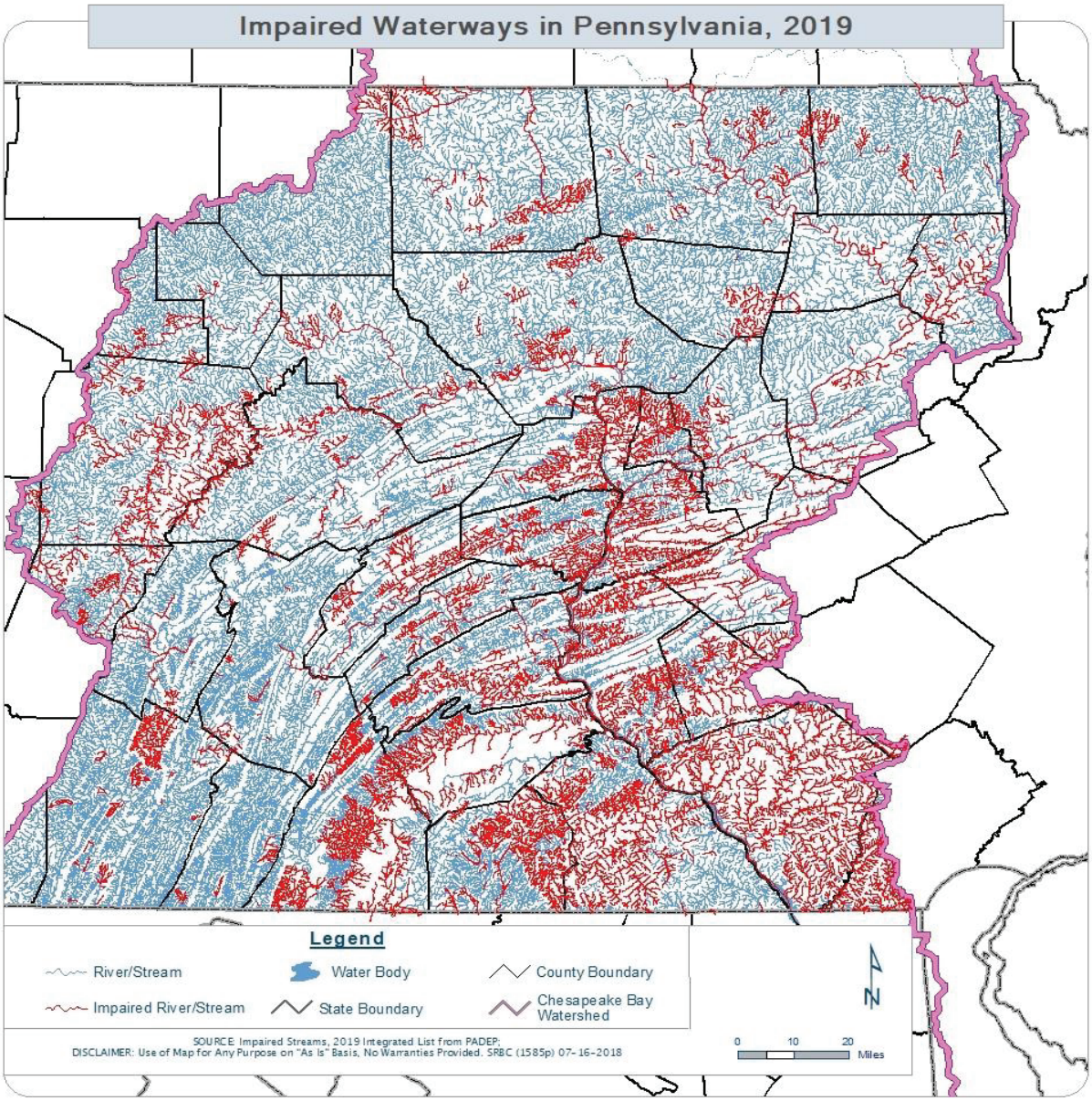
these changes may be captured in longer term monitoring, the improvements evident with restoration are significant.

- Dirt and Gravel Roads – Pennsylvania has a very successful program to address stormwater runoff from dirt and gravel roads. However, this program only receives credit for sediment reductions in the Chesapeake Bay Watershed Model. There are associated nutrient reductions that are achieved from the practices installed as part of this program that should also be credited as part of the implementation of this program.

Table 4.3. Impaired Stream Miles in Pennsylvania's Chesapeake Bay Watershed

Impairment Source	Total Miles
Acid Mine Drainage	1,891.00
Agriculture	3,808.31
Animal Feeding Operations (NPS)	4.04
Atmospheric Deposition	483.88
Channelization	25.95
Combined Sewer Overflows	15.38
Construction	11.95
Crop Production (Crop Land or Dry Land)	359.31
Dam or Impoundment	25.41
Erosion from Derelict Land (Barren Land)	13.18
Golf Courses	11.35
Grazing in Riparian or Shoreline Zones	318.47
Habitat Modification	301.95
Highway/Road/Bridge Runoff (Non-Construction Related)	89.25
Highways, Roads, Bridges, Infrastructure (New Construction)	3.88
Hydromodification	22.25
Impacts from Hydrostructure Flow Regulation/Modification	53.80
Industrial Point Source Discharge	71.15
Landfills	2.57
Municipal Point Source Discharges	43.03
Natural Sources	14.69
On-Site Treatment Systems (Septic Systems and Similar Decentralized Systems)	5.15
Other	6.05
Recreation and Tourism (Non-Boating)	0.54
Removal of Riparian Vegetation	28.09
Rural (Residential Areas)	99.51
Site Clearance (Land Development or Redevelopment)	23.96
Source Unknown	7,240.53
Streambank Modifications/Destabilization	14.09
Surface Mining	32.95
Urban Runoff/Storm Sewers	347.34
Total	**15,369.04**

Figure 4.1. Map of Impaired Stream Miles in Pennsylvania's Chesapeake Bay Watershed



Pennsylvania has over 15,000 miles of impaired streams within the Chesapeake Bay watershed. Of the known sources of pollution, agriculture is the primary reason of impairment for Pennsylvania's local waterways. Agriculture accounts for 47% of the known impaired waterways. The second largest reason for impairment is abandoned mine drainage, which accounts for 23% of the known impaired waterways.

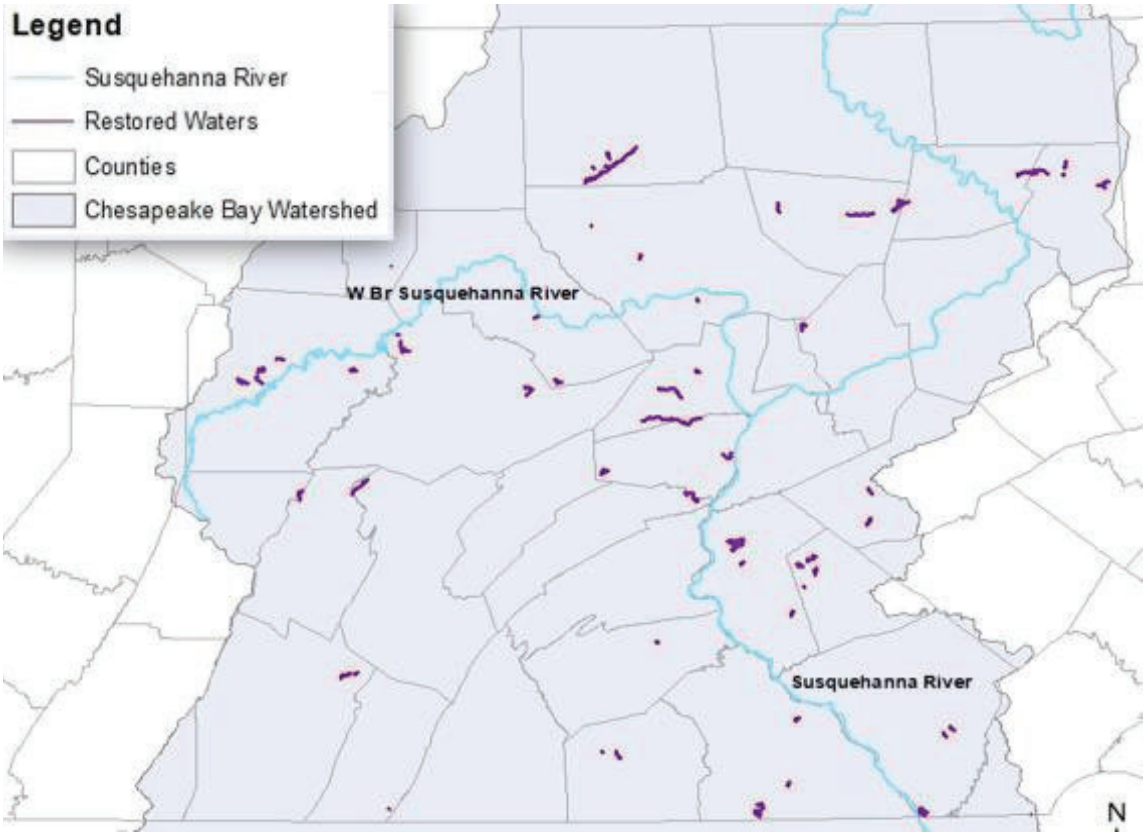
Included in Pennsylvania's many success stories are the restoration of over 171 miles of streams in the Chesapeake Bay watershed alone between 2010 and 2018; a restored stream is one that was once impaired but is now attaining full water quality function. Currently, the Chesapeake Assessment Scenario Tool does not provide nutrient and

sediment reduction credit for water quality restoration despite the growing body of scientific evidence that suggests restored streams function to increase nutrient uptake and retention through various physical, chemical, and biologic processes.

Table 4.4. Restored Stream Miles in Pennsylvania's Chesapeake Bay Watershed

Original Impairment Source	Total Miles
Abandoned Mine Drainage	55.25
Agriculture	35.05
Agriculture, Habitat Modification	1.22
Atmospheric Deposition, Natural Sources	6.74
Channelization, Urban Runoff/Storm Sewers	0.71
Crop Related Agric	0.35
Crop Related Agric, Road Runoff	5.76
Grazing Related Agric	9.26
Grazing Related Agric, Habitat Modification	4.51
Industrial Point Source	0.62
Industrial Point Source, Land Development	1.15
Municipal Point Source	1.13
Other, Urban Runoff/Storm Sewers	0.55
Removal of Vegetation	2.24
Removal of Vegetation, Road Runoff, Urban Runoff/Storm Sewers	1.21
Road Runoff	5.43
Source Unknown	39.59
Total	**170.78**

Figure 4.2. Map of Restored Stream Miles in Pennsylvania's Chesapeake Bay Watershed



The major restored source of impairment in Pennsylvania's streams is abandoned mine drainage, with 55 miles of streams restored between 2010 and 2018. Streams impaired by abandoned mine drainage (AMD) are colloquially described as "dead streams." These are aquatic ecosystems with little to no biological activity. After restoration efforts, these streams can support native plant and animal species, as well as the biological and nutrient removal benefits of an attaining stream. Many of Pennsylvania's AMD-restored streams that are now attaining full ecological benefits, are documented here: www.epa.gov/nps/nonpoint-source-success-stories-pennsylvania.

Pennsylvania recognizes that other future practices may be developed over time. All potential additional BMPs will take continued coordination with other workgroups within the partnership as well as input from outside experts. Pennsylvania would also assist in the developing these additional BMPs.

F. Coordination with the Chesapeake Bay Program Office, EPA Region 3, and DEP's Nonpoint Source Management Program

The Nonpoint Source Management Program is part of DEP's Office of Water Resources Planning and provides grants to assist watershed associations, county conservation districts and other non-profit organizations in addressing nonpoint source pollution. This

grant program manages funds EPA awards to DEP under Section 319(h) of the Clean Water Act. DEP uses awarded funds in part to fund programmatic efforts and in part as sub-grants to local partners to implement water quality improvement projects specified in EPA-approved 319 Watershed Implementation Plans (WIPs). Currently, 319 grant funded projects must be associated with implementation of an EPA-approved 319 WIP. DEP recommends EPA also allow these funds to be used to implement priorities in the WIPs developed to meet the Chesapeake Bay TMDL goals.

G. Coordination with DEP Regulatory Programs and Other State and Federal Agencies

In addition to the above listed Chesapeake Bay specific coordination, DEP's regulatory programs work closely with their state and federal partners to coordinate permitting efforts for applicants. DEP has identified the need for more timely responses when state and federal partners, including Pennsylvania Fish and Boat Commission, Pennsylvania Historical and Museum Commission, United States Fish and Wildlife, and Army Corps of Engineers, have a role in our permit process. While this coordinated review effort allows for a more linear application process for applicants, it sometimes creates backlogs in DEP's permit decision process. DEP recommends permitting through these programs be aligned with priorities in the Phase 3 WIP to meet Chesapeake Bay TMDL. State and federal counterparts should evaluate opportunities to shorten review time for Phase 3 WIP priority projects.

SECTION 5. EXISTING AND NEEDED RESOURCES

I. INTRODUCTION

This section identifies existing financial and staffing resources in Pennsylvania, costs associated with actions identified in the WIP and additional resources that are needed to meet Chesapeake Bay TMDL goals.

II. APPROACH TAKEN

A. Data Collection Efforts

The Phase 3 WIP Funding Workgroup collected data from four sources:

- Reported funding amounts spent through state and federal funding programs.
- The Phase 3 WIP workgroups identified technical and financial resources available and needed.
- The four pilot counties identified resources available and needed during the pilot planning process for their CAPs.
- The EPA Chesapeake Bay Program data system and CAST model for cost information on BMPs.

III. SUMMARY OF RESULTS

A. State and Federal Agency Fiscal Data by County

One of the early WIP Funding Workgroup efforts was to compile the fiscal data from a wide range of state and federal agencies that relate to restoration of local waters and in turn the Chesapeake Bay. Table 5.1 below is a summary of this effort and shows the amount of financial resources provided to all the counties within the Chesapeake Bay watershed from these state and federal funding sources in the past four years. Figure 5.1 is a graphic representation of this data arranged by county. Figure 5.2 is the same data with the counties arranged by the Tiers as described in Section 3, Countywide Actions.

Table 5.1. State and Federal Agency Fiscal Data for Last Five Years

Program	Total FY 14-15	Total FY 15-16	Total FY 16-17	Total FY 17-18	Total FY 18-19
Federal Funding					
Natural Resource Conservation Service	$12,925,363	$17,616,201	$20,441,044	$19,421,415	$15,324,517
EPA Section 319 Program	$358,351	$3,675,619	$3,182,323	$1,137,168	$2,167,001
Subtotal	*$13,282,714*	*$21,291,820*	*$23,623,367*	*$20,558,583*	*$17,491,516*
Combination of Federal and State Funding					
Chesapeake Bay Program	$6,542,018	$7,914,830	$5,076,147	$10,253,893	$4,998,958
PENNVEST NPS Stormwater	$2,382,455	$1,309,168	$77,193,402	$101,759,521	$46,065,086
Subtotal	*$8,924,473*	*$9,223,998*	*$82,269,549*	*$112,013,414*	*$51,064,044*
State Funding					
ACT 13 - Unconventional Gas Well Funding	$33,891,325	$27,713,077	$25,683,372	$4,064,919	$9,374,464
Ch. 102/NPDES and Ch. 105 Program Permit Processing Fees	$4,578,500	$5,256,512	$4,757,457	$5,120,336	$5,062,058
Conservation District Fund Allocation Program	$2,073,288	$2,074,040	$2,104,184	$2,105,195	$2,130,945
Growing Greener	$9,126,533	$12,953,685	$20,743,372	$9,552,272	$10,166,250
Environmental Education Grants	$16,726	$246,256	$267,641	$270,698	-
Department of Community and Economic Development: Watershed Protection Program	$282,985	$1,002,300	$2,240,000	$375,000	$2,442,858
Dirt and Gravel Roads Program	$16,310,567	$16,353,594	$15,976,856	$16,777,700	$17,157,461
Department of Agriculture	$26,129,555	$31,097,484	$34,966,497	$33,994,499	$36,532,581
Department Conservation Natural Resources	$2,282,170	$3,736,666	$8,972,849	$10,714,286	$4,211,800
Subtotal	*$94,691,649*	*$100,433,614*	*$115,712,228*	*$82,974,905*	*$87,078,417*
Total	**$116,899,836**	**$130,949,432**	**$221,605,144**	**$215,546,902**	**$155,633,979**

Figure 5.1. Funding by County FY14-FY19

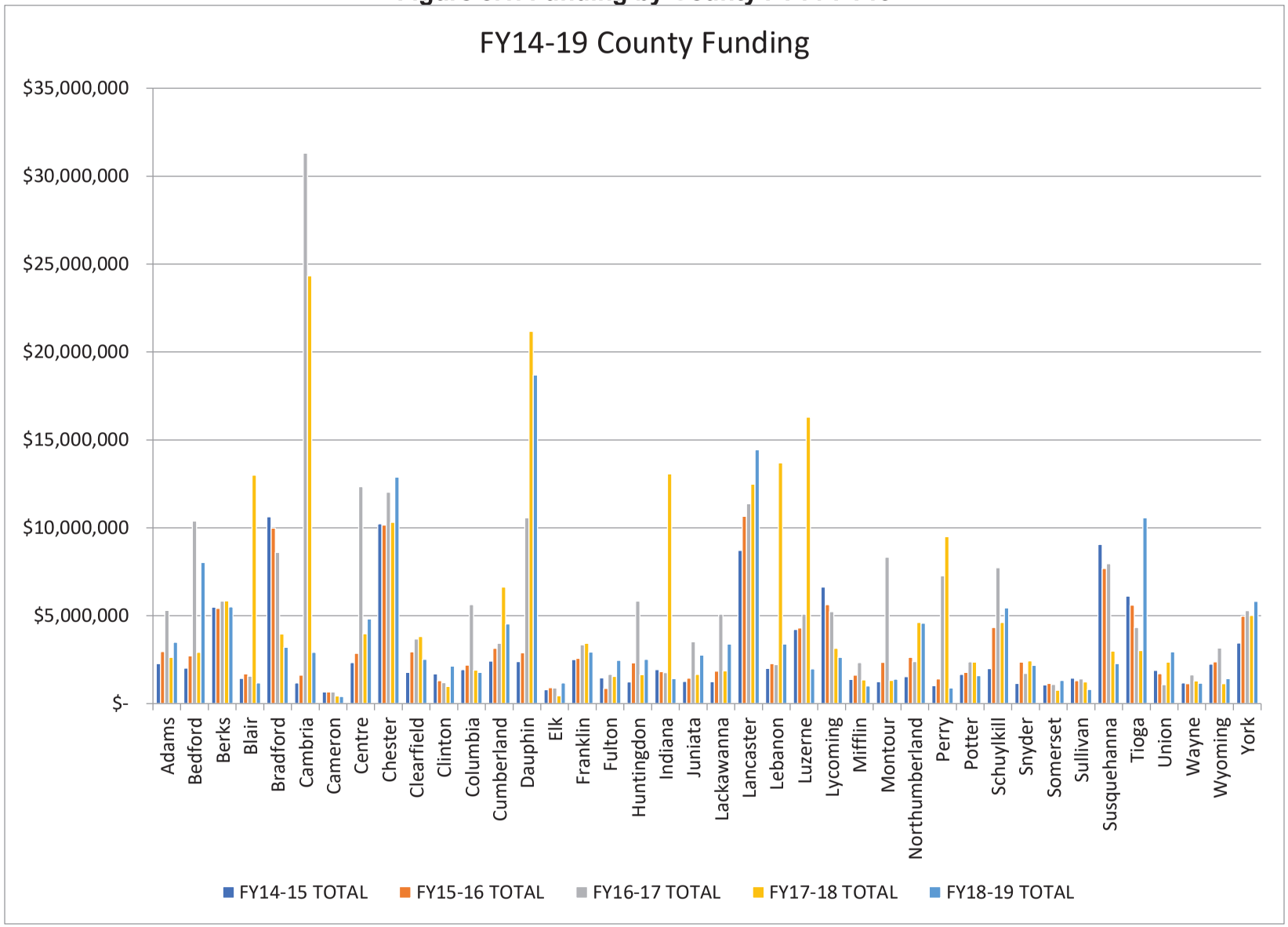
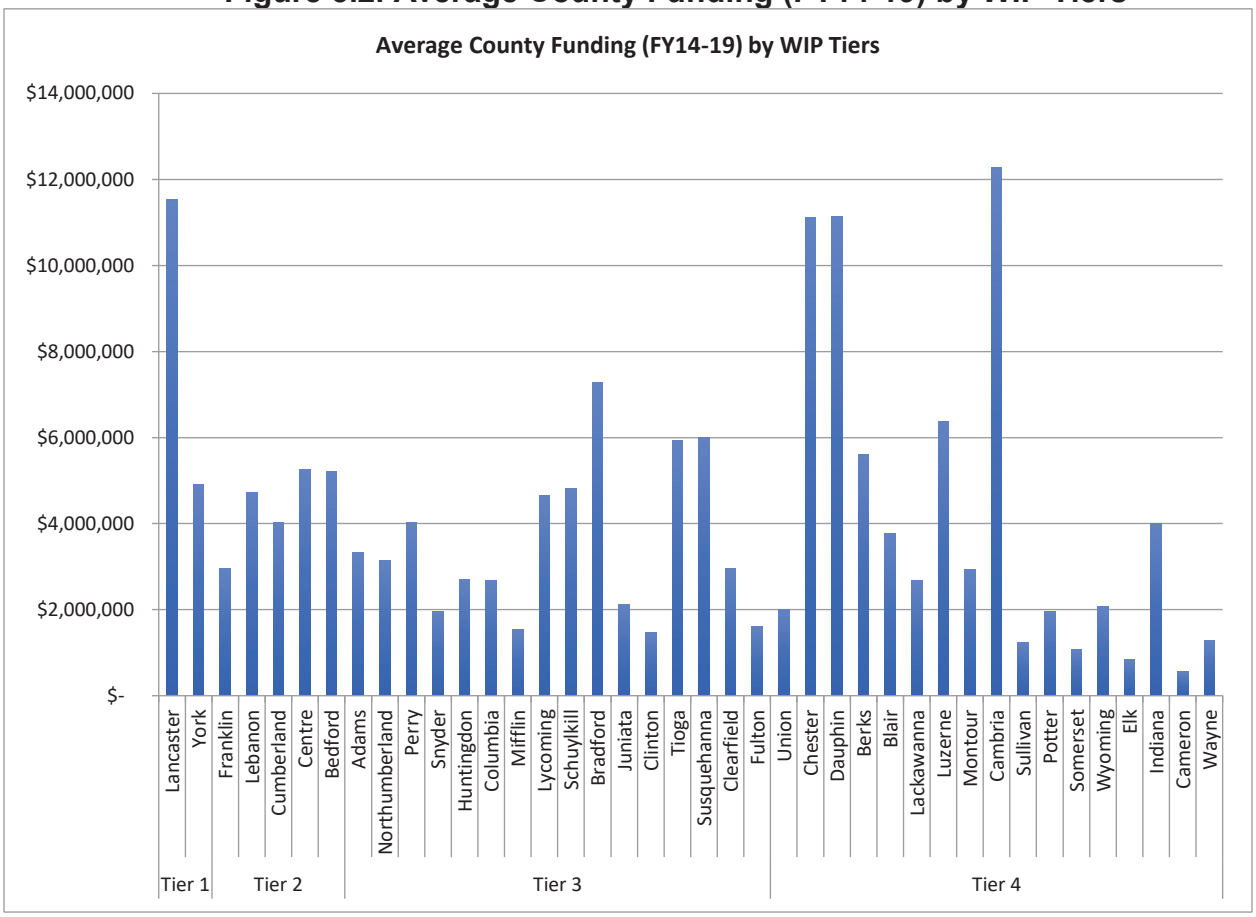


Figure 5.2. Average County Funding (FY14-19) by WIP Tiers



B. Priority Initiative Costs, Numeric Commitments

Table 5.2, Summary of Priority Initiative Costs, is an overview of the annual BMP installation costs needed to implement the numeric commitments identified in Section 2, State Actions. The annualized costs are derived from the Chesapeake Bay Program's Chesapeake Assessment Scenario Tool (CAST). Costs are estimated in 2010 dollars. Capital and opportunity costs are amortized over the BMP lifespan and added to annual operations and maintenance (O&M) costs for a total annualized cost. The interest rate for capital and opportunity costs is 5%. Costs are those incurred by both public and private entities. Costs represent a single year of cost rather than the cost over the entire lifespan of the practice. Default costs were prepared for EPA using existing data. Chesapeake Bay jurisdictions were provided with the opportunity to review and amend the unit costs for BMPs in the Phase 2 WIP. The primary source of costs, specifically in the agriculture sector, are from NRCS payment schedules and cost estimates as well as state sources such as Penn State Extension research. (https://cast.chesapeakebay.net/CostProfile)

These costs do not include associated technical assistance costs provided at the local level to facilitate implementation of these BMPs. Those additional costs are provided in Table 5.3.

Table 5.2. Summary of Priority Initiative Costs for BMP Implementation in Pennsylvania's 39 Counties without Countywide Action Plans

Statewide Workgroup Recommendation	Annual Projected Cost (Final WIP)	Annual Projected Cost (Draft WIP)
Agriculture		
Total	***$206,370,000***	***$187,600,000***
Agriculture Compliance	$24,058,000	$24,058,000
Soil Health	$21,090,000	$21,090,000
Expanded Nutrient Management	$31,735,000	$8,611,000
Manure Storage Facilities	$125,615,000	$125,615,000
Precision Feeding	(-$1,901,000)	(-$894,000)
Integrated Systems for Elimination of Excess Manure	$3,278,000	$2,205,000
Grass Riparian Buffers	$2,495,000	$6,914,000
Stormwater		
Total	***$61,899,000***	***$60,242,000***
Meet Current MS4 Permit Requirements	$57,789,000	$57,789,000
New Riparian Forest Buffers	$48,000	$48,000
Pools and Car Washing	$451,000	$451,000
Industrial Stormwater	$1,953,000	$1,953,000
Fertilizer Legislation	TBD	TBD
Meet Current Erosion and Sediment (E&S) Control and Post Construction Stormwater Management (PCSM) Requirements*	N/A	0
Dirt and Gravel Roads	$1,657,000	0
Forestry		
Total	***$42,950,000***	***$53,522,000***
Forest Riparian Buffers	$20,562,000	$31,012,000
Tree Canopy	$4,000	$4,000
Woods and Pollinator Habitat	$751,000	$8,71,000
Forest, Farm, and Natural Areas Conservation	TBD	TBD
Stream and Wetland Restoration	$23,287,000	$23,287,000
Wastewater		
Onsite Septic Management	$309,000	0
Total Workgroup Implementation Annualized Costs	**$311,779,000**	**$300,810,000**

*These costs are not included as part of the “funding gap,” permit holders incur the cost of these practices.

A word of caution is warranted when using these cost estimates. CAST cost estimates are intended to be a starting point for users to create their own BMP cost projections. Many of the CAST estimates originate from documents and communications that are at

least 10 years old. Regarding the agriculture BMPs, CAST cost estimates originate from sources such as Pennsylvania Natural Resource Conservation Service payment schedules and Penn State Extension research. There was no accounting for inflation, which may have raised these estimates by approximately 15%. In addition, cost estimates will differ from locality to locality for reasons beyond inflation.

CAST BMP costs often reflect a single point estimate derived from multiple cost sources and ranges. While not fully inventoried, data and sources of costs feeding into CAST have inherent variability. Original sources of costs are not consistent in how they account for major components, such as cost of land, intensity of operation and maintenance (O&M), management and coordination (to secure opportunities). Because the CAST estimates are averages, they mask the variability in the underlying data.

Other important sources of cost variability include:

- Changes in technology and inputs to BMPs. The cost structure to inputs for many of these practices has changed in the last 10 years. County estimates reflect each area's understanding of current prices and current technologies.
- Any given BMP is likely to use different ratios of labor and capital/equipment reflecting the entity's ability to leverage its existing resources (equipment, capital, labor). This mix can substantially change a given BMP's cost.
- Design and scale can significantly drive cost estimate variation by several orders of magnitude.
- Local costs differences. In addition to changes through time in input costs, local economic conditions can also account for cost variability, particularly with respect to labor and materials.
- Differences in assumptions about O&M. Different practices and approaches to BMP O&M can explain variation and uncertainty in costs for any given BMP. For example, some organizations assume that tree planting or riparian buffer plantings require a five-year rather than three-year establishment period. Changes in this assumption not only impact the "capital costs," but also have flow-on effects for ongoing maintenance requirements.

Table 5.3 below provides a summary of existing state agency and external staff resources currently supported with either state or federal funding devoted to providing technical and compliance assistance and support to implement the priority initiatives listed in Table 5.2. This table also lists additional resources needed. A complete description of these priority initiatives can be found in Section 2, State Actions.

Table 5.3. Summary of Technical Assistance and Staff Resources, Priority Initiatives, Numeric Commitments

State Actions, On the Ground Implementation						
Activity	**Position**	**Agency**	**Number**		**Cost**	
			Existing	New	Existing	New
Agriculture						
Agriculture Permitting	Permit Engineers and Env. Eng. Manager	DEP – SCRO	2.5	0	$395,552	
Agriculture Compliance	Inspectors	DEP – Regional Offices	5.5	7	$572,357	$728,455
Agriculture Compliance	Compliance Specialists	DEP- Regional Offices	2	2.5	$237,898	$297,373
Agriculture Compliance	Inspector Supervisors	DEP – Regional Offices	1	2	$135,662	$271,324
Agriculture Compliance	Program Specialist	DEP – Central Office	1.5	1	$203,493	$135,662
Nutrient and Odor Management (Act 38)	Conservation Program Specialists	State Conservation Commission	7	0	$728,000	
Nutrient Management Support (Act 38)	Penn State Extension	Penn State University	5	0	$356,000	
Nutrient Management (Act 38)	NM Technicians	Conservation Districts	39	0	$3,510,000	
Technical Assistance, Planning, Inspections	Bay Technicians	Conservation Districts	35	50	$3,150,000	$4,500,500
BMP Design, Engineering Support	Bay Engineers	Conservation Districts	8	10	$720,000	$900,000
Subtotal Agriculture (Agency Resources)			19.5	12.5	$2,272,962	$1,432,814
Subtotal Agriculture (External Resources)			87	60	$7,736,000	$5,400,500

State Actions, On the Ground Implementation						
Activity	**Position**	**Agency**	**Number**		**Cost**	
			Existing	New	Existing	New
Stormwater						
Outreach	Water Quality Specialists	DEP – Bureau of Clean Water	0	3		$328,000
MS4 Annual Report Reviews	Water Quality Specialists	DEP Regional Offices	1	1	$105,000	$105,000
MS4 Permit Reviews	Engineers	DEP Regional Offices	4	2	$250,000	$250,000
MS4 Inspections	Water Quality Specialists	DEP Regional Offices	4	2	$420,000	$210,000
MS4 Compliance and Enforcement	Compliance Specialists	DEP Regional Offices	0.25	1	$29,737	$118,949
Water Quality Monitoring	Aquatic Biologist	DEP – Bureau of Clean Water	7	1	$735,000	$105,000
Chapter 102 Construction Permit Reviews and Inspections - Increased Inspection Frequency	E&S Technicians	CCDs	82.5	19	$5,940,000	$1,368,000
Chapter 102 Permit Reviews – PCSM Delegation	Engineers	CCDs	3	34	$270,000	$2,448,000
Chapter 102 Construction Permit Reviews	Engineers	DEP Regional Offices	15	7	$2,034,930	$1,899,268
Chapter 102 Construction Permit Compliance	Compliance Specialists	DEP Regional Offices	2	5	$237,898	$594,745
Chapter 102 Permitting and Compliance Management	Management (EPM, EGM, WPS)	DEP Regional and Central Office	17.25	2	$3,404,182	$271,324
		Total (Agency)	50.5	24	$7,216,747	$3,882,286
		Total (External – CCD)	85.5	53	$6,210,000	$3,816,000

State Actions, On the Ground Implementation						
Activity	**Position**	**Agency**	**Number**		**Cost**	
			Existing	New	Existing	New
Forestry						
Watershed-wide Forestry BMP Leadership and Management	Program Manager	DCNR	0	1	0	$116,250
Watershed-wide Forestry BMP coordination, communication, interagency cooperation, guidance	Program specialists	DCNR	3	4	$305,226	$406,968
Grants administration	Recreation and Conservation Advisor 2	DCNR	.25	4	$21,787	$348,588
Riparian Forest Buffer outreach and technical assistance (including identifying funding for landowners)	Foresters	DCNR	5	15	$390,600	$1,171,800
Riparian Forest Buffer outreach and technical assistance (including identifying funding for landowners)	Resource conservation technician	Conservation Districts	5	20	$390,600	$1,562,400
Stream Restoration		Fish and Boat Commission	0	8		$ 430,906
Subtotal Forestry (Agency Resources)			8.25	32	$717,613	$2,474,512
Subtotal Forestry (External Resources)			5	20	$390,000	$1,562,400
Wastewater						
Web-based Septic System management and permitting system			0	1		$160,000
Sewage Management Program Administration	Water Program Specialist			1		$140,000
Optimization Program	Water Program Specialists	DEP – Bureau of Clean Water	1.5	4.0	$250,000	$1,260,000
Subtotal Wastewater (Agency Resources)			1.5	5.0	$250,000	$1,560,000
Total Numeric Commitments (Agency Resources)			**79.75**	**74.5**	**$10,457,322**	**$9,349,612**
Total Numeric Commitments (External Resources)			**177.5**	**133**	**$14,336,600**	**$10,778,900**

Agriculture

There is a significant need for more “boots on the ground” to assist farmers and help ensure compliance with the regulatory requirements. Agency staff resources, along with conservation district and Penn State Extension, are identified above. However, private industry, non-governmental entities and federal agency staff are needed to fill gaps in planning and technical assistance across the Chesapeake Bay watershed. The existing scope and breadth of coverage is unknown. The workload analysis showed a need for at least 87 private, non-governmental, and federal staff providing direct technical assistance for Agricultural BMP implementation. This number does not include supervisors, administrative support or contractors providing construction services, so the total number could be greater.

In calculating the resource needs for Agriculture implementation, the following factors were considered:

- Permitting - Average number of NPDES CAFO and Water Quality Management (WQM) Permits reviewed and approved for agricultural facilities per year. Time spent includes permit review and approval, staff meetings, client communications, responding to Right to Know Law requests, responding to DEP central office information requests, site visits and field work.

- Compliance - Average number of DEP and Conservation District inspections and site visits per year for CAFOs and non-CAFOs (this includes the Chesapeake Bay Agriculture Inspection Program); average number of hours per inspection including preparation time, travel time, data management activities, and planning assistance; time spent on continued non-compliance, preparing documentation and follow-up inspections; complaint investigation and documentation; time spent on data management (administrative) for mailings and reporting purposes.

- Technical Assistance –

    - Engineering/Structural Practices (Manure Storage/Barnyards) - Includes an estimated time for design and construction checks; pre-construction meetings, meetings with private consultants, engineers, farmers, and contractors. (17% of livestock and poultry operations annually)

    - Engineering/Structural Practices (Grassed Waterways, Diversions, Terraces, Stream Crossings, etc.) – Includes estimated time for design and construction checks; pre-construction meetings, meetings with private consultants, engineers, farmers, contractors. (5% of all agricultural operations annually)

    - Non-structural practices (Contour lines/strips, Fence, Prescribed Grazing Plans, No-Till/Cover Crop Assistance, Workshops/Field Days, etc.) – Includes estimated time for travel, survey, tracking payments; workshop

events, field days, meetings with farmers. (5% of all agricultural operations annually)

- Enforcement – Average number of enforcement actions performed by DEP Central and Regional Offices per year and average amount of time spent per action.

Specific to County Conservation District staff costs, current funding is provided at $65,500 per Full Time Equivalent (FTE). In order to keep qualified and certified staff engaged and employed at the conservation districts, it has been noted that this amount of funding does not provide comparable salary and benefits over time, which results in significant staff turnover and many certified and qualified staff leaving the field all together. One of the commitments noted in the Chesapeake Executive Council's *Directive in Support of Agricultural Technical Assistance and Conservation Practice Implementation* is the following:

- Provide stable and sufficient technical assistance to help farmers implement the conservation practices necessary to meet the Bay TMDL goals.

To accomplish this commitment, a close look at conservation district agriculture staffing costs needs to be made, with an adjustment of federal and state funding provided for staff. Therefore, a funding estimate of $90,000 per FTE has been made for existing and future conservation district staff needs.

Stormwater

In calculating the resource needs for Stormwater implementation, the following factors were considered:

- Chapter 102 Increased Inspection Frequency – Double the amount of inspections performed by conservation districts annually. Inspections provide assurance that the erosion and sediment control measures are being implemented and maintained throughout the life of the permit. Conservation district staff that perform permit reviews also complete inspections.

- Chapter 102 PCSM Delegation - The PCSM delegation provides authority to conservation districts to perform engineering (technical) reviews of PCSM Plans, thereby streamlining the permit review process. If all County Conservation Districts had PCSM delegation, each county would need a licensed Professional Engineer on staff to perform the job duties.

- Chapter 102 Permitting - Increase the total FTE for DEP Permitting Staff by one per four counties for additional County Conservation District support, training, and permit review functions to ensure program consistency.

- Chapter 102 Compliance and Enforcement - Increase the total FTE for DEP Compliance Staff for additional County Conservation District support, compliance assistance and enforcement functions.

The basis for the Chapter 102 construction stormwater existing and additional staff is the conservation district quarterly reports, which include delegated duties such as education, outreach, and awareness of Chapter 102 requirements; general and individual permit applications received, permit reviews and approvals; inspections performed; complaint investigations; and referrals to DEP for non-compliance.

Forestry

Implementing Forestry-related BMPs will also require a significant need for more "boots on the ground" to assist farmers and other landowners. Agency staff and conservation district resource needs are identified in Table 5.3 above. However, efforts from federal agency staff, non-governmental entities including non-profit organizations and private businesses have a great impact and will also be needed to fill the gaps in planning and technical assistance for forestry practices across the Chesapeake Bay watershed. Additional support for these groups providing "boots on the ground" technical assistance is needed to meet the Phase 3 WIP goals. This additional support should come from grants, Memorandums of Understanding and other funding mechanisms, as well as coordination with resource needs identified in the Countywide Action Plans (CAPs).

Further, Table 5.3 assumes Pennsylvania realizes dramatic efficiencies and increases in both funding and communications based around forestry BMPs through the Phase 3 WIP implementation process. Realizing these efficiencies and increases will help lead to more streamlined implementation by a smaller number of new, dedicated staff. Without a change to funding or communication strategies in Pennsylvania through Phase 3 WIP implementation, and if the Commonwealth continues with current rates of funding and current communication avenues surrounding BMP implementation, Pennsylvania would need a total of 230 additional technical assistance providers, or FTEs. These 230 new FTEs would be spread across state agencies, Conservation Districts, and non-governmental/private/federal partner agencies, businesses, and organizations.

With partial streamlining, a partial increase in funding, and limited investments in new communication efforts that would essentially double current efficiency, 140 new FTEs would be required for implementation of forestry BMPs alone by 2025.

To make the dramatic increases in efficiency necessary to make substantial progress toward Phase 3 WIP forestry BMP implementation goals with only 44 new FTEs (plus an increase in resources directed to partner agencies, organizations, and businesses to employ more "boots on the ground", as outlined above), dramatic increases in implementation funding and communications must accompany this increase in positions.

In calculating the resource needs for Forestry Implementation, the following factors were considered:

1. Primary Forestry BMPs include urban and agriculture riparian forest buffers, turf to trees and meadows, and tree canopy.
2. Existing resources are calculated as FTEs, not necessarily dedicated staff.
3. DCNR program specialists would be placed in Bureau of Forestry and Bureau of Recreation and Conservation.
4. Resource conservation technicians in Conservation Districts would focus primarily on agricultural riparian forest buffers.
5. Foresters in DCNR would focus on agricultural riparian forest buffers, urban riparian forest buffers, turf to trees and meadows, and tree canopy.

C. Priority Initiatives, Programmatic and Narrative Commitments

Section 2, State Actions identifies several priority initiatives that have existing staff resources devoted to them, or will require additional staff resources, to implement the proposed programmatic enhancements. These additional resources are also connected to initiatives in Section 3, Countywide Actions and Section 10, Communication and Engagement Strategy.

A complete description of these priority initiatives can be found in the respective sections, to include:

1. Implementation of the BMP Verification Program Plan
2. Administrative activities of the DEP Chesapeake Bay Office
3. Implementation of legislative initiatives such as the proposed Fertilizer Bill
4. Expansion of existing technical assistance, compliance and enforcement, and funding programs
5. Development and implementation of the CAPs
6. Implementation of the Communication and Engagement Strategy

Table 5.4, Summary of Resources, Priority Initiatives, Programmatic and Narrative Commitments provides the existing state agency and external staff resources that are currently supported with either state or federal funding devoted to this effort. This table also summarizes the additional resources needed to support the implementation these priority initiatives.

Table 5.4. Summary of Staff Resources, Priority Initiatives, Programmatic and Narrative Commitments

State Actions						
Activity	Position	Agency	Number		Cost	
			Existing	New	Existing	New
BMP Verification Tracking and Reporting Milestone Tracking	Water Program Specialist, Licensed Geologist	DEP – Chesapeake Bay Office	2		$200,000	
BMP Verification Tracking and Reporting	Contractor Support	Multiple public and private agencies			$540,000	
EPA Grant Development, Management	Administrative Officer or Water Program Specialist	DEP -- Chesapeake Bay Office		1		$100,000
Project Management, Program Evaluation	Water Program Specialist	DEP— Chesapeake Bay Office	1		$100,000	
Supervisor, Coordination with Bay Program Partnership	Administrative Officer or Environmental Group Manager	DEP -- Chesapeake Bay Office	1		$105,000	
Contract Management, Invoicing, Personnel Support	Administrative Officer 1	DEP – Chesapeake Bay Office	1		$87,032	
Office Manager	Program Manager	DEP— Chesapeake Bay Office	1		$110,000	
Act 167 Outreach, Compliance and Enforcement	Water Program Specialists	DEP – Bureau of Clean Water		2		$200,000
Real-Time Water Quality Monitoring		DEP – Bureau of Clean Water		1		$600,000
Support for REAP and Pennsylvania Farm Bill	Administrative Officer 1	State Conservation Commission		1		$87,032
Additional Support for REAP ($10-$20 million increase)	Administrative Officer 1	State Conservation Commission		2		$174,064
Technical Assistance to counties	Program Specialist	State Conservation Commission		3		$295,530
Farmland Preservation Conservation Coordinator and Compliance	Administrative Officer 2	Department of Agriculture, Bureau of Farmland Preservation		2		$98,152
Policy and District Operations and Outreach	Executive Policy Specialist	State Conservation Commission		1		$61,203
Deputy Secretary for Water Quality, Conservation and Farmland Preservation	Deputy Secretary	Department of Agriculture		1		$115,000

State Actions						
Activity	**Position**	**Agency**	**Number**		**Cost**	
			Existing	New	Existing	New
Fertilizer Bill Compliance	Inspectors	Department of Agriculture, Bureau of Plant Industry		3		$147,228
Fertilizer Bill Administration	Program Specialist	Department of Agriculture, Bureau of Plant Industry		1		$56,059
Subtotal (Agency Resources)			6	18	$602,032	$1,934,268
Subtotal (External Resources)			**0**	**0**	$540,000	**$-**
Countywide Actions						
Activity	**Position**	**Agency**	**Number**		**Cost**	
			Existing	New	Existing	New
Supervisor	Administrative Officer 4 or Environmental Group Manager	DEP – Chesapeake Bay Office		1		$120,000
Support to counties in plan development and implementation	Water Program Specialists	DEP – Chesapeake Bay Office	2	6	$200,000	$600,000
Contract Management, Invoicing	Management Technician	DEP – Chesapeake Bay Office		1		$80,000
County External Coordinators		Counties	8	10	$800,000	$1,000,000
Technical Support	Contractors	SRBC, EPA, Others		9	$900,000	
Facilitation	Contractor	Consulting with a Purpose		1	$200,000	
Subtotal (Agency Resources)			2	8	$200,000	$800,000
Subtotal (External Resources)			8	20	$1,900,000	$1,000,000
Communication and Engagement Strategy						
Activity	**Position**	**Agency**	**Number**		**Cost**	
			Existing	New	Existing	New
Development of outreach materials for two years	Contractor	Water Words That Works	1		$200,000	
Development of videos		Commonwealth Media Services		1	$50,000	
Subtotal (External Resources)			1	1	$250,000	
Total Programmatic and Narrative Commitments (Agency Resources)			**8**	**26**	**$802,032**	**$2,734,268**
Total Programmatic and Narrative Commitments (External Resources)			**9**	**21**	**$2,690,000**	**$1,000,000**

D. Countywide Action Plans

The four pilot counties (Adams, Franklin, Lancaster, and York) worked to identify priorities, practices and resources needed to improve their local waters. The Funding Workgroup decided to use a two-prong approach to estimate the cost associated with implementing the priorities and practices identified by each county. Both methods were based on Pennsylvania specific default costs in the CAST model.

1. *Cost Estimate from County Templates for BMP Input into CAST*

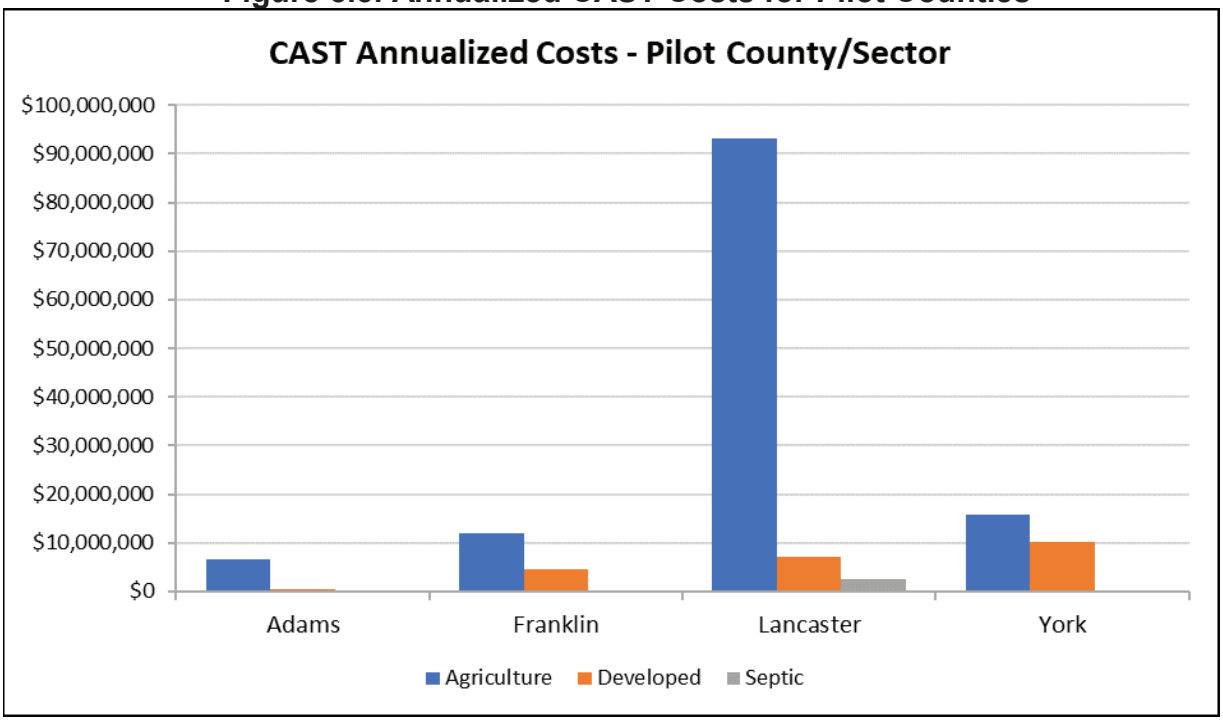
The first method to estimate the costs for implementation of BMPs used the default annualized CAST costs to be consistent with the above estimates used for the WIP workgroup recommendations. Described below is a brief description of how the WIP Funding Workgroup used data submitted by the four pilot counties to calculate these annualized costs using CAST.

Costs are estimated in 2010 dollars. Capital and opportunity costs are amortized over the BMP lifespan and added to annual O&M costs for a total annualized cost. The interest rate used for capital and opportunity costs is 5%. Costs are those incurred by both public and private entities. Costs represent a single year of cost rather than the cost over the entire lifespan of the practice. Default costs were prepared using existing data. The Chesapeake Bay Program states are able to review and amend the unit costs for BMPs in the Phase 3 WIP if they have a source of more accurate data.

Table 5.5. Annualized CAST Costs for Pilot Counties

	Adams	Franklin	Lancaster	York	Total
Agriculture	$6,557,000	$11,911,000	$93,114,000	$15,915,000	$126,752,000
Developed	$559,000	$4,623,000	$7,202,000	$10,269,000	$27,958,000
Septic	$-	$-	$2,461,000	$-	$2,461,000
Total	**$7,115,000**	**$16,534,000**	**$107,337,000**	**$26,184,000**	**$157,170,000**

Figure 5.3. Annualized CAST Costs for Pilot Counties



To better characterize the start-up and ongoing cost, the same CAST estimates were used to calculate the start-up costs by including the Capital and Opportunity costs as well as first year of O&M. Annual recurring costs were calculated by adding the ongoing O&M and Opportunity costs to the BMP practices that are annual (Conservation Tillage, Cover Crops, Manure Transport etc.) These costs are summarized in Table 5.6.

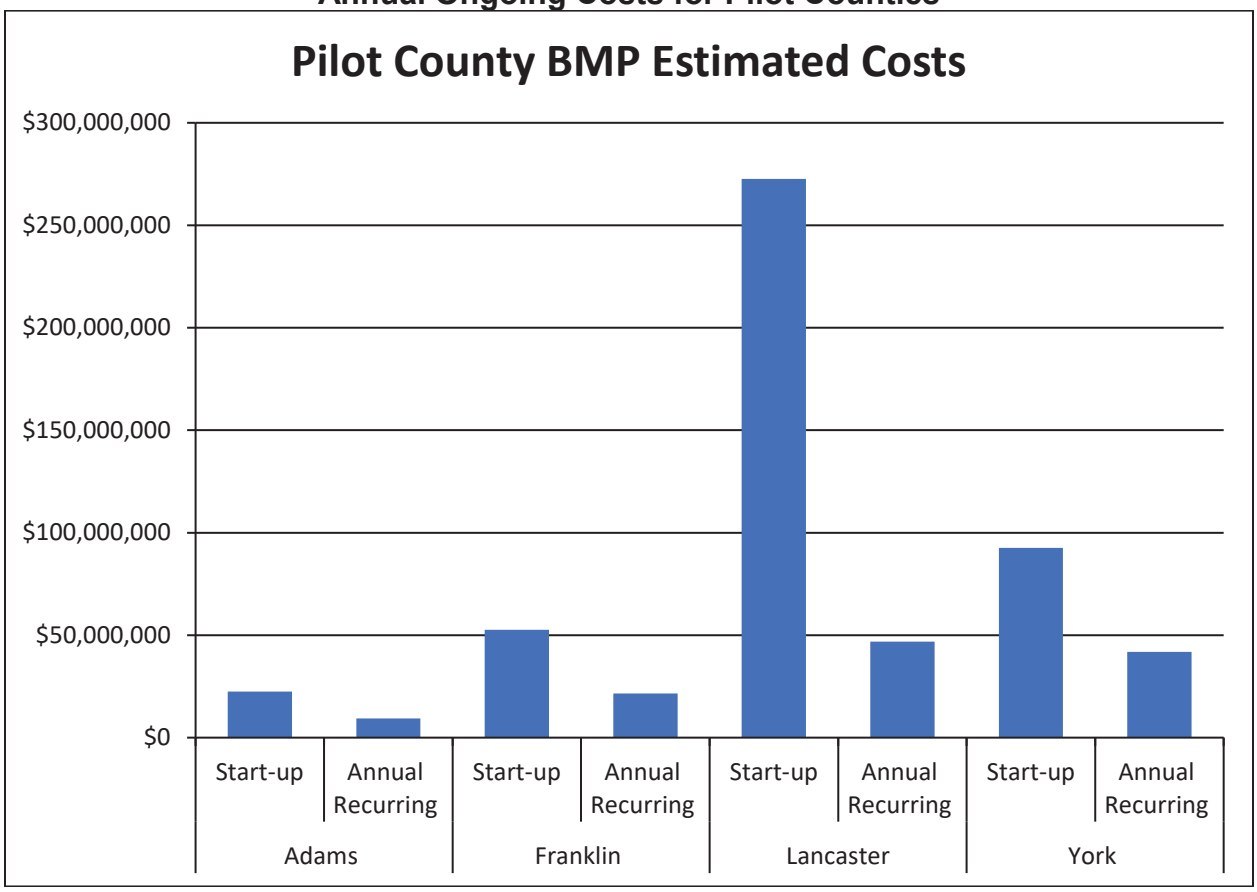
Table 5.6. CAST Costs: Initial Upfront Costs and Annual Ongoing Costs for Pilot Counties

	Adams		Franklin	
	Start-up	Annual Recurring	Start-up	Annual Recurring
Agriculture	$15,400,000	$9,100,000	$30,200,000	$19,900,000
Developed	$7,100,000	$300,000	$22,400,000	$1,700,000
Septic	$---	$---	$---	$---
Total	**$22,500,000**	**$9,400,000**	**$52,600,000**	**$21,600,000**

	Lancaster		York	
	Start-up	Annual Recurring	Start-up	Annual Recurring
Agriculture	$226,700,000	$42,900,000	$45,400,000	$26,400,000
Developed	$14,500,000	$3,600,000	$47,200,000	$15,400,000
Septic	$31,400,000	$300,000	$---	$---
Total	**$272,600,000**	**$46,800,000**	**$92,600,000**	**$41,800,000**

	TOTAL	
	Start-up	Annual Recurring
Agriculture	$317,700,000	$98,300,000
Developed	$91,200,000	$21,000,000
Septic	$31,400,000	$300,000
Total	**$440,300,000**	**$119,600,000**

Figure 5.4. CAST Costs: Initial Upfront Costs and Annual Ongoing Costs for Pilot Counties



2. *Pilot Counties - Additional Resources Needed*

The four pilot counties identified other resources outside of the cost for BMP implementation listed above. These costs most often included staffing needs to draft, coordinate, implement, and report BMPs. However, counties also identified other interests such as technology to report BMPs and enhancements to existing water quality monitoring to track progress of local waters. Table 5.7 is a summary of identified additional resources by each pilot county.

Table 5.7. Additional Resources by County

Adams County	**Annual Costs**
7- FTE (Ag Technicians for plan writing/permitting)	$350,000
Enhance Water Quality Monitoring within the county	$20,000
Total	**$370,000**
Franklin County	**Annual Costs**
1- County FTE (Integrate Planning Efforts)	$80,000
Establish a centralized data collection and reporting system	TBD
3- County FTE Agriculture Coordinators	$240,000
1- County FTE Stormwater Coordinator	$80,000
Enhance WQ Monitoring Network	TBD
2- County FTE Outreach Coordinators	$160,000
Total	**$560,000**
Lancaster County	**Annual Costs**
Data Management	$710,000
Agriculture	$4,400,000
Stormwater	$1,980,000
Buffers	$1,147,000
Stream Restoration	$2,200,000
Land Use and Preservation	$5,500,000
Total	**$15,937,000**
York County	**Annual Costs**
1- County staff to coordinate WIP Implementation	$80,000
2- Act 167 Enforcement Staff	$150,000
12- Staff (Ag Implementation)	$1,200,000
WQ Monitoring Network	$300,000
Total	**$1,730,000**

E. The Annual Funding Gap

From Table 5.1, the average resources dedicated to efforts relating to improving Pennsylvania waters over the last five fiscal years is approximately $196 million, with the most recent FY2019 at $156 million. Additionally, combining Tables 5.3 and 5.4, Table 5.8 is a summation of staffing resources that are already existing that are dedicated to this effort which is approximately $28.3 million annually.

The statewide workgroups estimated the total annual resources needed at approximately $312 million, plus an additional $23.9 million needed for additional staffing resources, also totaled in Table 5.8. Agency resources are state agency staff involved in the Chesapeake Bay cleanup effort. External agency staff are staff supported with state or federal agency resources, such as county conservation district staff, contributing to this effort. Using the most recent existing funding, the funding gap for the WIP Workgroup scenarios is approximately $324 million annually, as itemized in Table 5.9, Funding Gap Scenario.

Table 5.8. Total of Existing and New Resource Needs

	Number		Cost	
	Existing	New	Existing	New
Total (Agency Resources)	87.75	100.5	$11,259,354	$12,083,880
Total (External Resources)	186.5	154	$17,026,600	$11,778,900
TOTAL	**274.25**	**254.5**	**$28,285,954**	**$23,862,780**
GRAND TOTAL		**528.75**		**$52,148,734**

Table 5.9. Funding Scenario Gap

Existing	Existing Resources 2018	$168,522,608
	Existing Staff Resources	$28,285,954
	Total	$196,808,562
Total Needed Resources	Statewide Practice Implementation	$311,779,000
	Pilot County Practice Implementation[1]	$157,170,000
	Staffing Resources	$52,148,734
	Total	$521,097,905
Annual Funding Gap		**$324,289,173**

[1]These costs are for practice implementation identified in Countywide Action Plans

The four pilot counties' estimates highlight the substantial differences in costs based on BMP selection. The costs from the four pilot counties total $157 million annually for practices implemented with an additional $18.6 million needed for additional resources (staffing, monitoring etc.). These figures should not be extrapolated to the rest of the 39 counties in the Chesapeake Bay watershed, as each county will have different local planning goals and local priorities. The WIP Funding Workgroup hopes there will be opportunities to reduce the implementation costs through learning and economies of scale as the CAPs are developed and implemented.

While the funding gap is approximately $324 million annually in terms of federal and state funding, the Phase 3 WIP does not have to be completed strictly from the above-mentioned funding sources and recently proposed legislation such as Restore Pennsylvania would substantially help to fill this gap. Table 5.1, above, captures many funding sources and catalogs available dollars. However, for many of the devoted resources there is often a match required from either a private landowner or other stakeholder that is implementing the practices on the ground. Also, recent surveys show a large amount of water quality improvements come from private dollars either directly or indirectly that have not been captured in Table 5.1. It would be valuable to capture not only all practices going on the landscape, but also all resources being expended through this effort.

As mentioned in Section 2, State Actions, another approach would be to look at a phased approach to filling this funding gap. With this approach, at a minimum, at least $100 million annually for BMP implementation is recommended as a first phase for implementation. This is based on the summary results in Table 2.3, Summary of Reductions from Priority Initiatives in Section 2, State Actions.

In Table 5.10 below, the four more effective priority initiatives are identified. These four initiatives alone will help to achieve half of the nitrogen reduction goal and 86% of the phosphorus reduction goal. Some amount of the $52 million identified for existing and new agency and external staff resources for technical support would also be needed to implement this effort. A minimum of five percent of the cost of implementation is recommended.

Table 5.10. Implementation Costs for Top Priority Initiatives

Priority Initiative	Cost (in millions)	Nitrogen Reduction	Phosphorus Reduction
Agricultural Compliance	$33.1	14%	12%
Soil Health	$32.9	14%	14%
Forest Buffers	$28.1	16%	41%
Grass Buffers	$3.4	8%	37%
TOTAL	**$97.7**	**50%**	**86%**

F. The Cost of Not Filling This Gap

Failure to meet the federal Chesapeake Bay TMDL could have significant and wide-ranging consequences for the Commonwealth.

First and foremost, a lack of substantial progress in restoring Pennsylvania's impaired waters will mean continued negative impacts to drinking water resources, outdoor recreation, wildlife, and public health, and safety. Local communities will continue to suffer from pollution-related problems such as stormwater and flood damage, nitrogen and bacterial contamination in drinking water sources, degradation of aquatic resources, loss of fisheries, and many more issues (each of which create their own societal costs and economic losses) that could be addressed through a robust and timely implementation of the Phase 3 WIP.

Beyond the consequences to local communities that would be felt by failing to implement the Phase 3 WIP, an array of backstop measures and consequences have been outlined in the Chesapeake Bay TMDL (Chesapeake Bay TMDL Section 7: Reasonable Assurance and Accountability Framework) and correspondence from U.S. EPA to the Principals' Staff Committee in December 2009.

Most specifically, EPA outlined the following potential consequences in the EPA Expectations for the Phase 3 WIP, dated July 19, 2018:

- EPA may continue to target federal enforcement and compliance assurance in the watershed which could include both air and water sources of nitrogen, phosphorus, and sediment.
- EPA may expand NPDES permit coverage to additional animal feeding operations, other industrial and municipal stormwater sources, and/or urbanized areas.
- EPA may redirect Chesapeake Bay or other EPA grant funding to other third-party entities to implement practices in priority areas or direct Chesapeake Bay funding to identified priorities in the EPA evaluations if Pennsylvania does not adequately target workplans and funding toward priority actions.
- EPA may establish finer scale nutrient or sediment reductions for municipal and industrial wastewater facilities, concentrated animal feeding operations, and municipal separate storm sewer systems as well as require additional load reductions from the wastewater sector above and beyond what has already been accomplished.
- EPA may initiate a process to propose promulgating nitrogen and phosphorus numeric water quality standards for appropriate streams in Pennsylvania that are within the Chesapeake Bay watershed.

SECTION 6. DOCUMENTING, TRACKING AND VERIFYING

Pennsylvania has existing tracking, reporting and verification protocols in place that are accepted by the Chesapeake Bay Program Partnership. DEP has also taken steps since 2016 to enhance the capabilities of several programs to capture and document practices that have been put on the ground including creating the following:

- A central BMP Warehouse to house all the implemented practices reported to DEP.

- Software tools to facilitate reporting practices by those responsible for their implementation, including the geo-database PracticeKeeper for use by DEP and conservation district staff involved in agriculture and construction stormwater compliance inspections, and an interactive website for use by Municipal Separate Storm Sewer Systems (MS4s) for the submitting annual reports.

In addition, DEP worked with the Phase 3 WIP partners to revise the existing BMP Verification Program Plan, engaging over 60 people who have different roles in BMP tracking and reporting. This revised BMP Verification Program Plan focuses on verifying the Phase 3 WIP priority BMPs for nitrogen, phosphorus, and sediment control in the Agriculture, Urban Stormwater, and Forestry sectors.

Pennsylvania is committed to working with the Chesapeake Bay Program Partnership in an open dialogue and evaluating the existing CBP BMP Verification protocols. Pennsylvania has already engaged with jurisdictional partners in an effort to collaborate and review the protocols. Many lessons have been learned since the partnership approved the BMP Verification protocols in 2014; the inordinate amount of financial and staffing needed to “keep” BMPs in the modeling tools, while putting more BMPs on the ground, is insurmountable, and continued engagement with our partners, including EPA, is necessary. See Section 4, Federal Agency Support and Coordination, subsection 4.II for further details.

I. DATA MANAGEMENT SYSTEM

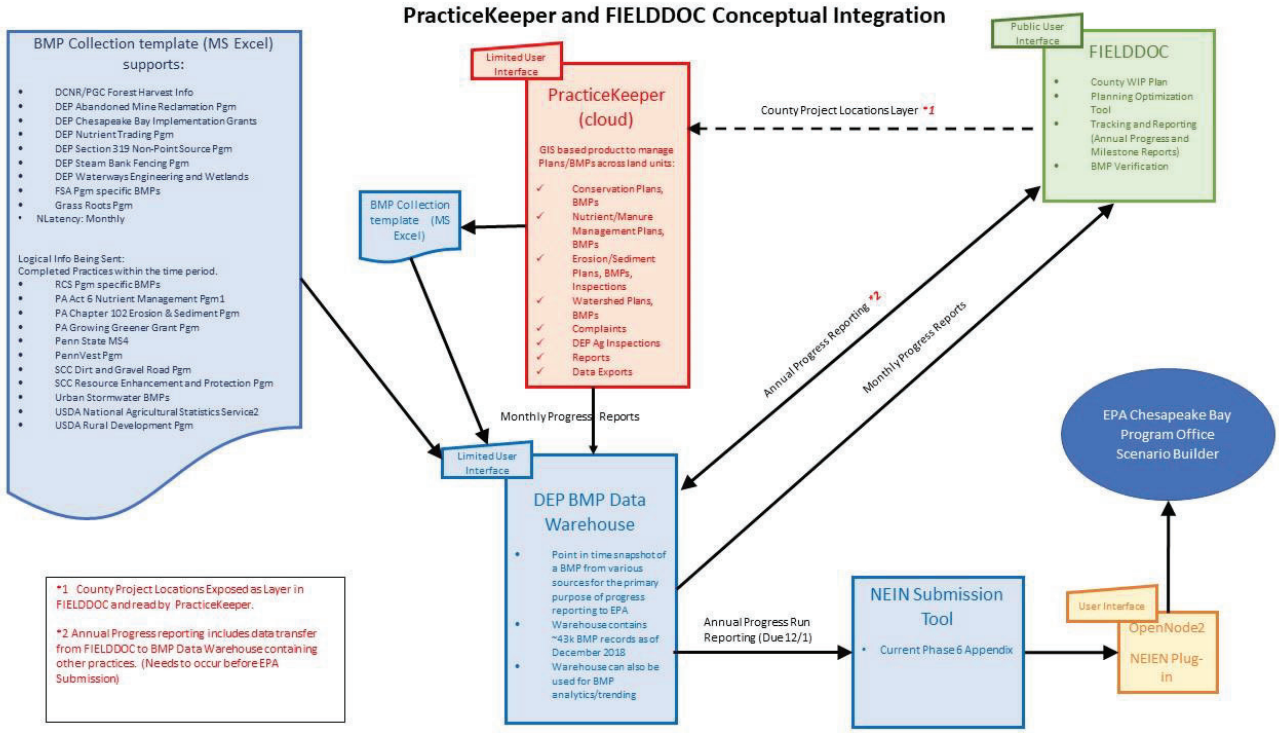
Figure 6.1 below illustrates the flow of BMP data from the DEP BMP Warehouse through the National Environmental Information Exchange Network (NEIEN), and finally reporting to the EPA Chesapeake Bay Program Office. The DEP BMP Warehouse is the central collection application that serves as a pipeline to transfer this data.

For the 2018 Progress Run, data was collected from the program sources in the blue box on the left side of the figure (when available) or from PracticeKeeper (red box) and imported into the BMP Warehouse using formatted Excel templates. This data reporting process is documented in Pennsylvania’s Quality Assurance Project Plan (QAPP). Annual report records are available as backup from each reporting source or program.

The green box (top-right) contains the anticipated Chesapeake Conservancy project that will include optimization, goal tracking, and milestone reporting to support the Countywide Action Plans (CAPs). The Chesapeake Conservancy project will incorporate the recently developed *Watershed Data Dashboard* from the EPA Chesapeake Bay Office and the *FieldDocs* application from Chesapeake Commons.

While not finalized, it is planned that some form of public access to report BMPs will be included within this application. The details of the data flow and communications between these applications are not final and planning meetings with the Chesapeake Conservancy are ongoing. The Conservancy project will give local Phase 3 WIP planners the ability to locate and track their implementation progress, generate local BMP reports, and provide a platform for local BMP verification and is anticipated to be complete by late 2020.

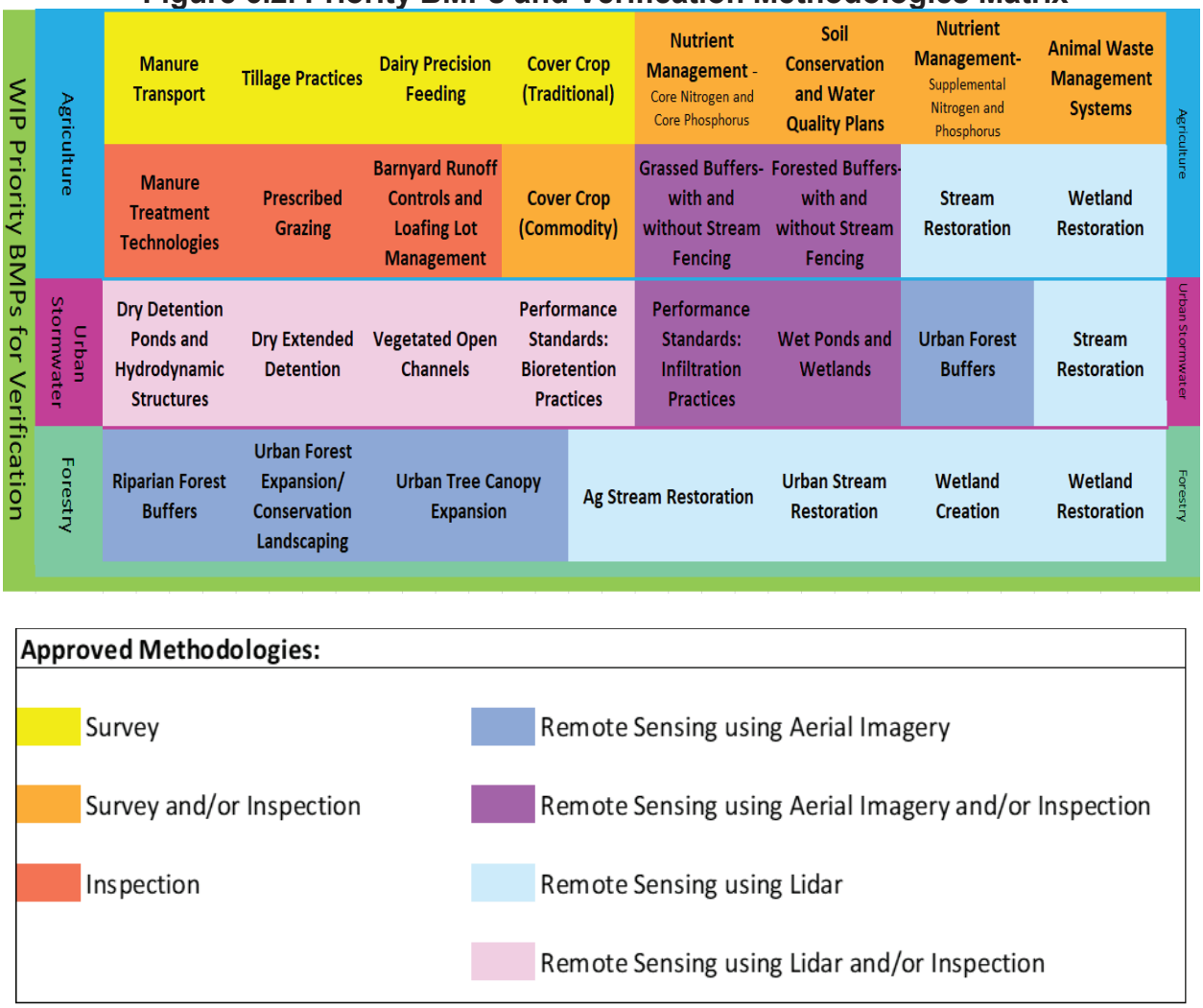
Figure 6.1. Schematic for Data and Tracking System



II. TRACKING, REPORTING AND VERIFICATION PROTOCOLS

Figure 6.2 shows the priority BMPs by sector and color-coded verification methodologies approved by the Chesapeake Bay Program Partnership and selected for the verification of these priority practices. Some BMPs have more than one verification methodology.

Figure 6.2. Priority BMPs and Verification Methodologies Matrix



The BMP Verification Program Plan focuses on the plan for verifying the priority BMPs in sectors with non-point source pollution concerns.

The plan outlines:

1) Four sections: Agriculture, Urban Stormwater, Forestry and Plan Implementation;

2) The WIP priority initiatives in each sector;

3) The sector-specific inspector/verifier qualifications listing the requirements for verifying that the priority BMPs are installed and functioning as designed;

4) Each WIP priority initiative and the associated priority BMPs for implementation and verification as part of that initiative; and

5) An outline of existing programs and new verification projects that Pennsylvania will use to verify the priority BMPs.

Pennsylvania's BMP Verification Program Plan's goal is to build a comprehensive, implementable program which verifies that priority practices identified in the Phase 3 WIP are installed, operational and continue to provide pollution reductions. This verification plan not only functions as a part of the data quality assurance, but also as an integral part of the Phase 3 WIP so that, as the CAPs are implemented, and as needs and resource allocations change, this plan may be updated to include other projects and proposals.

A. Tracking, Reporting and Verification Improvement Initiatives

More work is needed for Pennsylvania to capture all undocumented practices that have either already been installed or will be installed in the future without public assistance or with funding sources not tracked by the current program.

Specifically, DEP is taking the following immediate action steps:

1. *CAP Refinement Planning and Prioritization Tool*

Using funding from Pennsylvania's Chesapeake Bay Regulatory and Accountability Program Grant, the Chesapeake Conservancy, and EPA Chesapeake Bay Program Office are working on software for a planning and prioritization tool for use in the development and future refinement of the CAPs. This software should be ready for use when the next two-year cycle begins where milestones from the CAPs need to be revised. A more detailed description of this tool and how it fits into the existing data management system is described above.

2. LIDAR Pilot Project

Solicit requests for proposal for a pilot project to use LIDAR and remote sensing technology to identify BMPs installed for stormwater control as part of development activities described in the revised Pennsylvania BMP Verification Program Plan. This proposal will also include the utilization of third-party individuals to do onsite verification of the results of this analysis.

3. PracticeKeeper Enhancements

Continue enhancements to PracticeKeeper to allow the capture of additional practices by other partners beyond conservation districts and DEP program staff. Qualifications required under the Chesapeake Bay Program Verification protocols for external parties to provide quality assurance, document and report must be reviewed and revised accordingly.

B. Verification Goals

In addition to the existing verification protocols and improvement initiatives listed above, Pennsylvania will explore an adjustment to the overall verification concept to be less of a routine practice and more of an audit process. If this shift can be made, more resources can be utilized to implement BMPs and install monitoring devices. Verification data will continue to be available and could be extrapolated for broader use.

SECTION 7. MILESTONES AND PROGRESS REPORTING

I. COORDINATION AND TRACKING OF PROGRESS

DEP's Chesapeake Bay Office coordinates development and implementation of the Phase 3 WIP. This includes updating milestones and action steps on a two-year basis and progress reporting on a six-month basis. The milestones will be updated using the same template used by the workgroups and counties to develop their respective action plans. Progress reporting will be done using Figure 7.1, Progress Reporting Template.

The action steps that will be tracked on a six-month basis using this template are identified below. A complete list of all action steps using the Progress Reporting Template is below.

Figure 7.1. Progress Reporting Template[1]

	Phase 3 Watershed Implementation Plan (WIP) Progress and Milestones Template											
	Green - action has been completed or is moving forward as planned Yellow - action has encountered minor obstacles Red - action has not been taken or has encountered a serious barrier											
Action #	Description	Performance Target(s)	Responsible Party(ies) and Partnerships	Geographic Location	Expected Timeline	Potential Implementation Challenges or Recommendations	Resources Available		Resources Needed		Progress to Date	Justification for Change to Action Item
							Technical	Financial	Technical	Financial		
Priority Initiative 1:												
1.1												
1.2												
Priority Initiative 2:												
2.1												
2.2												

[1]Responsible Party as used in this template is defined as the lead individuals or organizations involved in the implementation of the action step.

II. KEY ACTION STEPS

Key action steps are identified to implement elements of the Phase 3 WIP. Progress on these action steps will be reported on a six-month basis. These action steps are grouped around five priority initiatives and numbered using the same numbering protocol of:

- Phase 3 WIP Section Number First
- Priority Initiative Number Second (See below for the initiatives and their respective numbers)
- Action Step Number within the priority initiative

For example, Action Step 4.2.1 is the first action step to further the Funding and Resources Priority Initiative in Section 4 of the Phase 3 WIP.

The five priority initiatives are:

1. Communications and Outreach
2. Funding and Resources
3. Expanding Capacity for Technical Assistance
4. Reporting and Tracking
5. Compliance

The action steps are summarized below. While multiple parties may be involved in implementing many of these action steps, a lead agency responsible for tracking progress has been listed, along with a proposed timeline for completion.

A. Communications and Outreach

1. *Section 2, State Actions*

a. Agriculture

Lead Agency Responsible for Tracking Progress: DEP
Timeline for Completion: December 2025
Action Steps:

2.1.1A – Continue communication, outreach, and stewardship programs to increase the use of conservation tillage and no-till practices.

2.1.2A – Continue communication, outreach, and stewardship programs to increase implementation of cover crops.

21.3A – Continue communication, outreach, and stewardship programs to increase implementation of pasture management.

b. Forestry

Lead Agency Responsible for Tracking Progress: DCNR
Timeline for Completion: December 2023
Action Steps:

2.1.1F – Implement a comprehensive communication/outreach strategy to engage farmers/landowners in planting and maintaining riparian forest buffers.

2.1.2F – Implement a communication/outreach program to engage a variety of turf owners to plant trees and meadows on their properties.

2.1.3F – Communicate the importance and values of forests to facilitate and encourage state and local land conservation programs.

2.1.4F – Emphasize the full range of benefits and co-benefits of stream and wetland restoration to facilitate additional implementation.

2. *Section 3, Countywide Actions*

Lead Agency Responsible for Tracking Progress: DEP Chesapeake Bay Office
Timeline for Completion: Fall 2019
Action Steps:

3.1.1 – Develop communications and outreach strategy for staged approach to WIP planning and implementation in all counties.

3.1.2 – Conduct outreach via webinars and one-on-one meetings to provide overview of WIP, define the expectations and discuss next steps to prepare counties for the WIP planning process.

3.1.3 – Begin implementation of WIP plans completed by four pilot counties.

3.1.4 – Seek staffing to support this large-scale coordination and support effort.

3. *Section 10, Communication and Engagement Strategy*

Lead Agency Responsible for Tracking Progress: DEP Communications and Chesapeake Bay Offices
Timeline for Completion: Fall 2019 Through 2025
Action Steps:

10.1.1 – Complete the public comment period and provide a response to comments received.

10.1.2 – Develop the outreach materials, webinars, templates for letters and mailings and success stories identified by the Communications and Engagement Workgroup for their use in message delivery and outreach.

10.1.3 – Finalize the DEP Web-based StoryMap.

10.1.4 – Schedule and participate in focus groups, forums, and workshops, as appropriate.

10.1.5 – Communications and Engagement Workgroup members will use the delivery tools developed to reach their respective constituents through mailings, newsletters, their respective websites, conferences, workshops, etc. about the importance of clean water and the goals of the Phase 3 WIP.

B. Funding and Resources

1. Section 2, State Actions

a. Programmatic and Narrative Commitments

Lead Agency Responsible for Tracking Progress: State Legislature, DEP Legislative Office
Timeline for Completion: 2019-2020 Legislative Session
Action Steps:

2.2.1 – Pass legislation providing a funding source or combination of funding sources for the implementation of the Phase 3 WIP.

Lead Agency Responsible for Tracking Progress: DEP Chesapeake Bay Office
Timeline for Completion: Fall 2019
Action Steps:

2.2.2 – Identify the process and develop specific procedures for the award of “block grants” to the lead planning teams for the implementation of the CAPs.

b. Numeric Commitments

i. Agriculture

Lead Agency Responsible for Tracking Progress: DEP
Timeline for Completion: December 2025
Action Steps:

2.2.1A – Investigate the incorporation of alternative manure treatment technologies and other potential strategies to address areas of excess manure nutrient

generation and capital investment required for implementation of manure treatment systems.

ii. Forestry

Lead Agency Responsible for Tracking Progress: DCNR
Timeline for Completion: December 2025
Action Steps:

2.2.1F – Maximize existing funding sources for riparian forest buffer implementation in Pennsylvania.

2.2.2F – Expand TreeVitalize and utilize other programs to facilitate community tree planting and maintenance.

2.2.3F – Create additional flexible funding options for riparian forest buffers.

2.2.4F – Ensure that riparian forest buffers are adequately maintained to ensure survival by developing a Maintenance funding source for NGOs to develop their own maintenance programs.

2.2.5F – Continue and increase urban tree canopy grants to communities and non-governmental organization partners.

2.2.6F – Leverage existing funding sources for stream and wetland restoration.

2.2.7F – Develop funding opportunities for turf conversion programs.

2.2.8F – Continue to implement stream restoration, emphasizing creditable, load-reducing projects. Pair stream restoration projects with tree planting BMPs whenever possible. Identify areas that may have a high cost-to-benefit ratio for load reductions for legacy sediment removal and associated ecosystem restoration.

2. Section 3, Countywide Actions

Lead Agency Responsible for Tracking Progress: DEP Chesapeake Bay Office
Timeline for Completion: Summer 2021
Action Steps:

3.2.1 - 3.2.5 – Seek staff resources: utilize staged approach as an incremental approach to scaling of resources and coordination of planning efforts. The staged approach rolls out in two phases over 18 months. Phase 1 uses the additional time to focus efforts on the eight higher loading Tier 1 & 2 counties (54% of PA's nitrogen and 42% of PA's phosphorus loads). This

approach allows for additional outreach to Tier 3 and 4 counties before their planning starts.

C. Expanding Capacity and Technical Assistance

1. *Section 2, State Actions*

a. Programmatic and Narrative Commitments

Lead Agency Responsible for Tracking Progress: PENNVEST, DEP Chesapeake Bay Office
Timeline for Completion: Summer 2021
Action Steps:

2.3.1 – Implement a pilot of the "Center for Water Quality Excellence" concept in the four pilot counties. The pilot would be done through a Request for Proposals process where applicants would describe how these services would be effectively provided to serve the needs of both the agriculture and urban communities.

b. Numeric Commitments

Lead Agency Responsible for Tracking Progress: PDA and DEP
Timeline for Completion: December 2025
Action Steps:

i. Agriculture

2.3.1A – Initiate implementation of Pennsylvania's Agriculture Conservation Stewardship Program.

2.3.2A – Work with third parties, integrators, and co-ops to identify alternative methods to support and assess compliance with regulations without use of regulatory entities.

2.3.3A – Implementation of Animal Waste Management Systems.

2.3.4A – Develop web-based and in-person training for Manure Management and Agriculture Erosion and Sediment planning.

ii. Forestry

Lead Agency Responsible for Tracking Progress: DCNR
Timeline for Completion: December 2025
Action Steps:

2.3.1F – Increase technical assistance available to landowners interested in implementing riparian forest buffers.

2.3.2F – Increase Urban Forestry technical assistance available to communities and citizens.

2.3.3F – Create a turf conversion technical assistance program.

2.3.4F – Provide informed technical assistance for stream and wetland restoration projects to ensure they are completed in an adequate, reportable manner.

Lead Agency Responsible for Tracking Progress: PFBC, DEP Chesapeake Bay Office
Timeline for Completion: January 2020
Action Steps:

2.3.5F -- Look into feasibility of expanding the PFBC Stream Restoration Initiative, implementing stream restoration projects resulting in load reductions with habitat co-benefits, to counties in the southcentral region of the state, starting with one or more of the four pilot counties to include Adams, Franklin, Lancaster, and York.

iii. Stormwater

Lead Agency Responsible for Tracking Progress: DEP Bureau of Clean Water
Timeline for Completion: December 2021
Action Steps:

2.3.1S – Complete revisions to the Pennsylvania Stormwater BMP Manual.

2. Section 9, Climate Change

Lead Agency Responsible for Tracking Progress: DEP Energy and Chesapeake Bay Offices
Timeline for Completion: December 2019
Action Steps:

9.3.1 – Complete the Penn State Study, *Climate Change Impacts on Pennsylvania's Watershed Management Strategies and Water Quality Goals.*

D. Reporting and Tracking Progress

1. *Section 2, State Actions*

a. *Programmatic and Narrative Commitments*

Lead Agency Responsible for Tracking Progress: PDA, State Legislature
Timeline for Completion: 2019-2020 Legislative Session
Action Steps:

2.4.1 – Pass legislation to revise Pennsylvania's Right to Know Law to allow for additional confidentiality of landowner records.

Lead Agency Responsible for Tracking Progress: DEP Chesapeake Bay Office
Timeline for Completion: January 2021
Action Steps:

2.4.2 – Develop a planning and prioritization tool for use in the development and refinement of the CAPs.

2.4.3 – Release a request for proposals for a contractor to begin the pilot project for the use of Lidar and remote sensing technology to identify BMPs installed for the control of stormwater as part of development activities.

2.4.4 – Continue enhancements to PracticeKeeper.

2.4.5 – Finalize the revised draft Pennsylvania BMP Verification Program Plan and receive EPA's approval of the plan.

2.4.6 -- Work with the EPA Bay Program Partnership to enhance the existing crediting protocols for programs and practices that improve water quality in Pennsylvania not currently getting full credit in the Chesapeake Bay Watershed Model.

Lead Agency Responsible for Tracking Progress: DEP Bureau of Clean Water
Timeline for Completion: January 2021
Action Step:

2.4.7 -- Install additional monitoring stations and begin to collect "real-time" water quality data on the Susquehanna River to further document the story of progress made by Pennsylvania's efforts to restore local streams and the Chesapeake Bay as part of implementation of the Phase 3 WIP.

b. *Numeric Commitments*

i. Agriculture

Lead Agency Responsible for Tracking Progress: SCC and DEP
Timeline for Completion: December 2025
Action Steps:

2.4.1A -- Work with the Chesapeake Bay Program Partnership to establish a creditable practice or combination of practices for implementation of advanced soil health strategies or plans on farms in the Chesapeake Bay Watershed Model for future crediting of these initiatives. Once established as a practice or set of practices that can be credited for progress in the model, commit additional funding or the technical and financial assistance necessary to implement these practices.

2.4.2A – Expand reporting of Dairy Precision Feeding.

2.4.3A – Expand reporting of Enhanced Nutrient Management,

2.4.4.A – Expand reporting of Grass Buffers.

ii. Forestry

Lead Agency Responsible for Tracking Progress: DCNR
Timeline for Completion: December 2025
Action Steps:

2.4.1F – Ensure adequate tracking of partner-implemented forestry BMPs including forest buffers, tree canopy, conservation landscaping, urban forest expansion, stream wetland restoration.

2.4.2F – Celebrate successful implementation and maintenance of forestry BMPs through reporting successful efforts.

iii. *Stormwater*

Lead Agency Responsible for Tracking Progress: DEP, Bureau of Clean Water
Timeline for Completion:
Action Steps:

2.4.1S – Collect MS4 BMP data using the new reporting system for electronic submission for annual reports.

2.4.2S – Initiate and collect stormwater BMP data from other DEP programs implementing provisions of the Chapter 102 regulations.

iv. *Wastewater*

Lead Agency Responsible for Tracking Progress: DEP
Timeline for Completion: December 2025
Action Steps:

2.4.1W – Develop a GIS based online monitoring and reporting program that municipalities can use to report on-lot system operation and maintenance and permitting information.

2. Section 3, Countywide Actions

Lead Agency Responsible for Tracking Progress: DEP Chesapeake Bay Office
Timeline for Completion: 2025
Action Steps:

3.4.1 -- Track and report progress in Phase 3 WIP planning and implementation in all counties.

3.4.2 -- Update reductions in the County Planning Progress template upon completion of each county plan.

3.4.3 -- Track and report progress to continue implementation of the Phase 3 WIP State Numeric Commitments described in Section 2, State Actions in the counties with minimal reductions.

E. Compliance

1. Section 2, State Actions

a. Programmatic and Narrative Commitments

Lead Agency Responsible for Tracking Progress: State Legislature, DEP and PDA Legislative Offices
Timeline for Completion: 2019-2020 Legislative Session
Action Steps:

2.5.1 – Pass the Fertilizer Bill to achieve the identified nutrient reductions on urban and agriculture lands.

Lead Agency Responsible for Tracking Progress: DEP
Timeline for Completion: July 2020
Action Steps:

2.5.2 -- Review, consider, and potentially incorporate revised Phosphorus Index into planning requirements for land application of biosolids

Lead Agency Responsible for Tracking Progress: DEP
Timeline for Completion: January 2021
Action Steps:

2.5.3 – Develop State Agency nutrient reduction planning goals and the associated Action Plans for meeting those planning goals for the installation of practices on lands owned and maintained by state agencies.

b. Numeric Commitments

i. Agriculture

Lead Agency Responsible for Tracking Progress: DEP
Timeline for Completion: Ongoing
Action Steps:

2.5.1A – Implement NPDES Concentrated Animal Feeding Operation Program Delegation.

2.5.2A – Complete complaint follow up for CAFO and non-CAFO facilities.

2.5.3A – Implement Chesapeake Bay Agriculture Inspection Program, Phase 1, with an emphasis on meeting state planning requirement on non-CAFO operations.

2.5.4A – Implement Chesapeake Bay Agriculture Inspection Program, Phase 2, with an emphasis on meeting both state planning and implementation requirements on non-CAFO operations.

ii. Stormwater

Lead Agency Responsible for Tracking Progress: DEP Bureau of Clean Water
Timeline for Completion: December 2022
Action Steps:

2.5.1S – Complete the Pollutant Reduction or Total Maximum Daily Load Plan Reviews for the 2018 MS4 permits.

2.5.2S – Develop the 2023-2028 MS4 Permit. In the development of this permit, provide opportunities for input from stakeholders, including but not limited to the Phase 3 WIP Stormwater Workgroup, as part of the normal public participation process

2.5.3S – Develop the Industrial Stormwater Permit.

Lead Agency Responsible for Tracking Progress: DEP Bureau of Clean Water
Timeline for Completion: December 2019
Action Steps:

2.5.4S – Develop the 2019-2024 Construction Stormwater Permit.

The Progress and Reporting Template includes the above action steps and further details such as responsible parties, performance targets, completion dates and resources.

III. SCHEDULE FOR REPORTING AND DATA MANAGEMENT

Pennsylvania will be using the following reporting schedule to adequately manage the influx of annual and six-month progress reports and the two-year milestone updates. Using this schedule, each county will report progress on an annual basis, starting one year after completion of the first Countywide Action Plan (CAP), with milestone updates on a two-year schedule. The programmatic and numeric commitments progress reports will be on a calendar schedule, in accordance with the current established Chesapeake Bay Program Partnership protocols. Milestone updates for these commitments are also on the same schedule. See Figures 7.2 through 7.5 below.

Figure 7.2. Calendar Year 2019 and 2020

2019				
	Q1	Q2	Q3	Q4
EPA Reporting			Finalize WIP, Update Program Milestones (Replace EPA)	Progress on State Programmatic Milestones (Dec.)
Progress Reporting				Progress on State Numeric Commitments (Dec.)
County Reporting		Finished Lancaster, York, Adams and Franklin County CAPs	Start Tier 2 Counties (Bedford, Cumberland, Centre and Lebanon	
2020				
	Q1	Q2	Q3	Q4
EPA Reporting		Progress on State Programmatic Milestones		Progress on State Programmatic Milestones (Dec.)
Progress Reporting				Progress on State Numeric Commitments (Dec.)
County Reporting	Pilot Counties Annual Reporting Tier 2 Counties Finalize CAPs Start Tier 3 & 4 Regional Planning Process			

Figure 7.3. Calendar Year 2021 and 2022

2021				
	Q1	Q2	Q3	Q4
EPA Reporting	Update State Programmatic Milestones		Finalize WIP, Update Program Milestones (Replace EPA)	Progress on State Programmatic Milestones (Dec.)
Progress Reporting				Progress on State Numeric Commitments (Dec.)
County Reporting		Pilot Counties Revise 2-year Milestones Tier 2 Counties Annual Report	Finalize First Half of Tier 3 & 4 Regional Plans	Finalize Second Half of Tier 3 & 4 Regional Plans
2022				
	Q1	Q2	Q3	Q4
EPA Reporting		Progress on State Programmatic Milestones		Progress on State Programmatic Milestones (Dec.)
Progress Reporting				Progress on State Numeric Commitments (Dec.)
County Reporting	Pilot Counties Annual Reporting Tier 2 Counties Revise 2-year Milestones			Tier 3 & 4 Annual Reporting

Figure 7.4. Calendar Year 2023 and 2024

2023				
	Q1	Q2	Q3	Q4
EPA Reporting	Update State Programmatic Milestones		Finalize WIP, Update Program Milestones (Replace EPA)	Progress on State Programmatic Milestones (Dec.)
Progress Reporting				Progress on State Numeric Commitments (Dec.)
County Reporting		Pilot Counties Revise 2-year Milestones Tier 2 Counties Annual Report		Tier 3 & 4 Regional Plans Revise 2-year Milestones
2024				
	Q1	Q2	Q3	Q4
EPA Reporting		Progress on State Programmatic Milestones		Progress on State Programmatic Milestones (Dec.)
Progress Reporting				Progress on State Numeric Commitments (Dec.)
County Reporting	Pilot Counties Annual Reporting Tier 2 Counties Revise 2-year Milestones			Tier 3 & 4 Annual Reporting

Figure 7.5. Calendar Year 2025

2025				
	Q1	Q2	Q3	Q4
EPA Reporting	Update State Programmatic Milestones		Finalize WIP, Update Program Milestones (Replace EPA)	Progress on State Programmatic Milestones (Dec.)
Progress Reporting				Progress on State Numeric Commitments (Dec.)
County Reporting		Pilot Counties Revise 2-year Milestones Tier 2 Counties Annual Report		Tier 3 & 4 Regional Plans Revise 2-year Milestones

SECTION 8. ACCOUNTING FOR GROWTH

I. IMPACT OF SECTOR GROWTH IN PENNSYLVANIA

Pennsylvania's Phase 3 WIP relies on the sector growth projections provided by the Chesapeake Bay Program's Chesapeake Assessment Scenario Tool (CAST). CAST has built-in sector growth projections based on a land use model that uses a combination of USDA Census of Agriculture data, land use analysis using one meter by one-meter high resolution land use GIS, county level construction data, and other attributing data to best predict the land use change by sector. The projected changes to land use accounted for in CAST are only projections. These numbers will change when new data, like the 2017 USDA Census of Agriculture, is released to the public. As new information becomes available, it will better inform the current growth projection that is accounted for in the model.

Figure 8.1 below shows the projected change in sector growth between 2017 and 2025. Pennsylvania's agriculture sector is projected to lose 33,429 acres in total. The natural sector is projected to lose 443 acres. The developed sector is projected to increase by 33,872 acres, due to loses in natural and agricultural lands.

Figure 8.1. Pennsylvania's Projected Growth to 2025

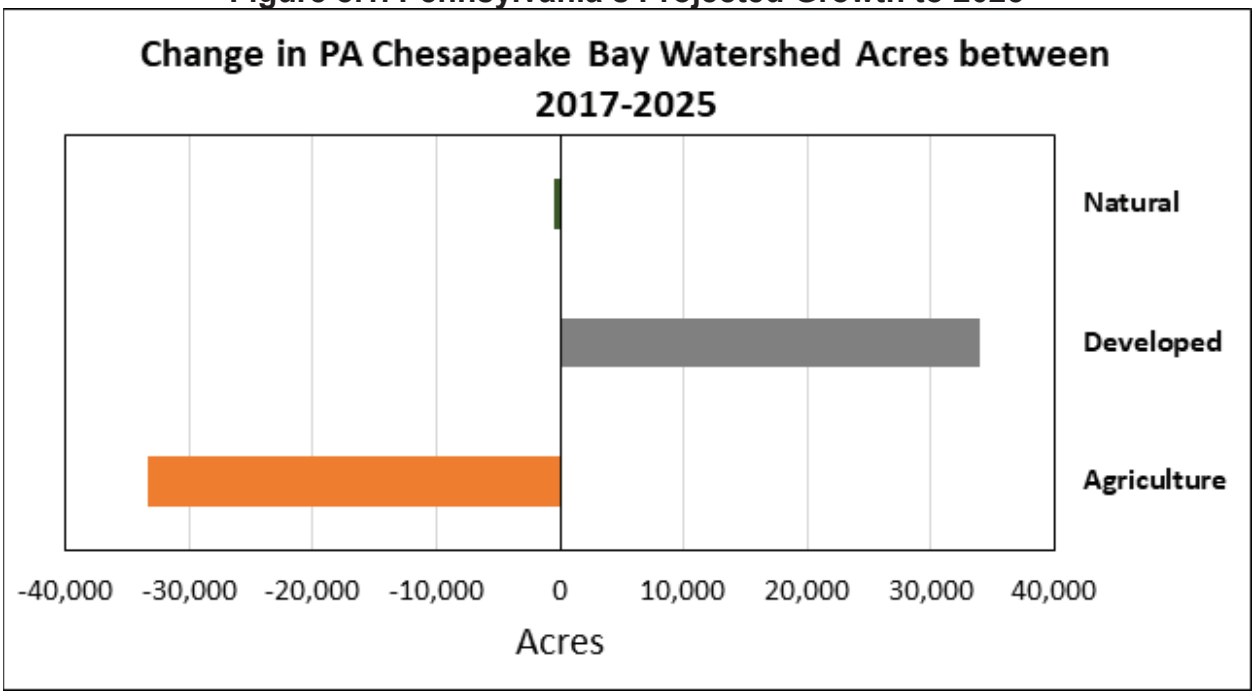


Figure 8.1 above represents the broad sector land use change and does not account for important land use change within each sector. While the total sector land use change is important in understanding sector growth, it only represents a small portion of the growth outlook. Figure 8.2 is a more specific sector breakdown.

Figure 8.2. Specific Sector Land Use Change Breakdown

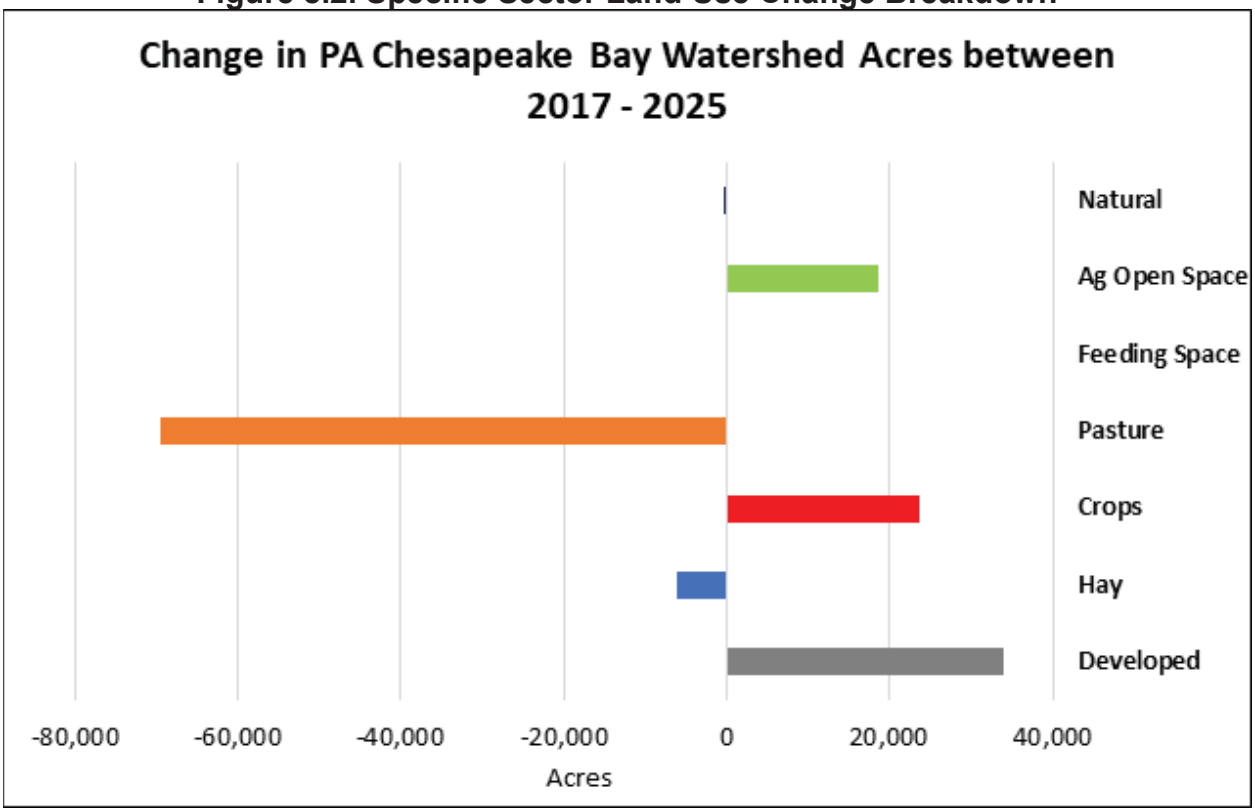


Figure 8.2 above shows the projected change in load source growth and change between 2017 and 2025. Pennsylvania is projected to experience a large shift in load sources within the agriculture sector between 2017 and 2025. Pasture land is projected to decrease by 69,562 acres. Hay land is also projected to decrease by 6,187 acres. Agriculture open space, which includes meadows is projected to increase by 18,621 acres. Feeding space is projected to increase by 155 acres. Cropland is projected to increase by 23,851 acres. Natural land is projected to decrease by 443 acres. Developed land is projected to increase by 33,871 acres.

The projected load source differences between 2017 and 2025, do not account for the differences in loading rates. Each of these variations in load sources attribute various loading rates for nitrogen and phosphorus. To see how the nitrogen load is affected based on sector growth, please see Figure 8.3.

Figure 8.3. Changes in Nitrogen Load Due to Sector Growth

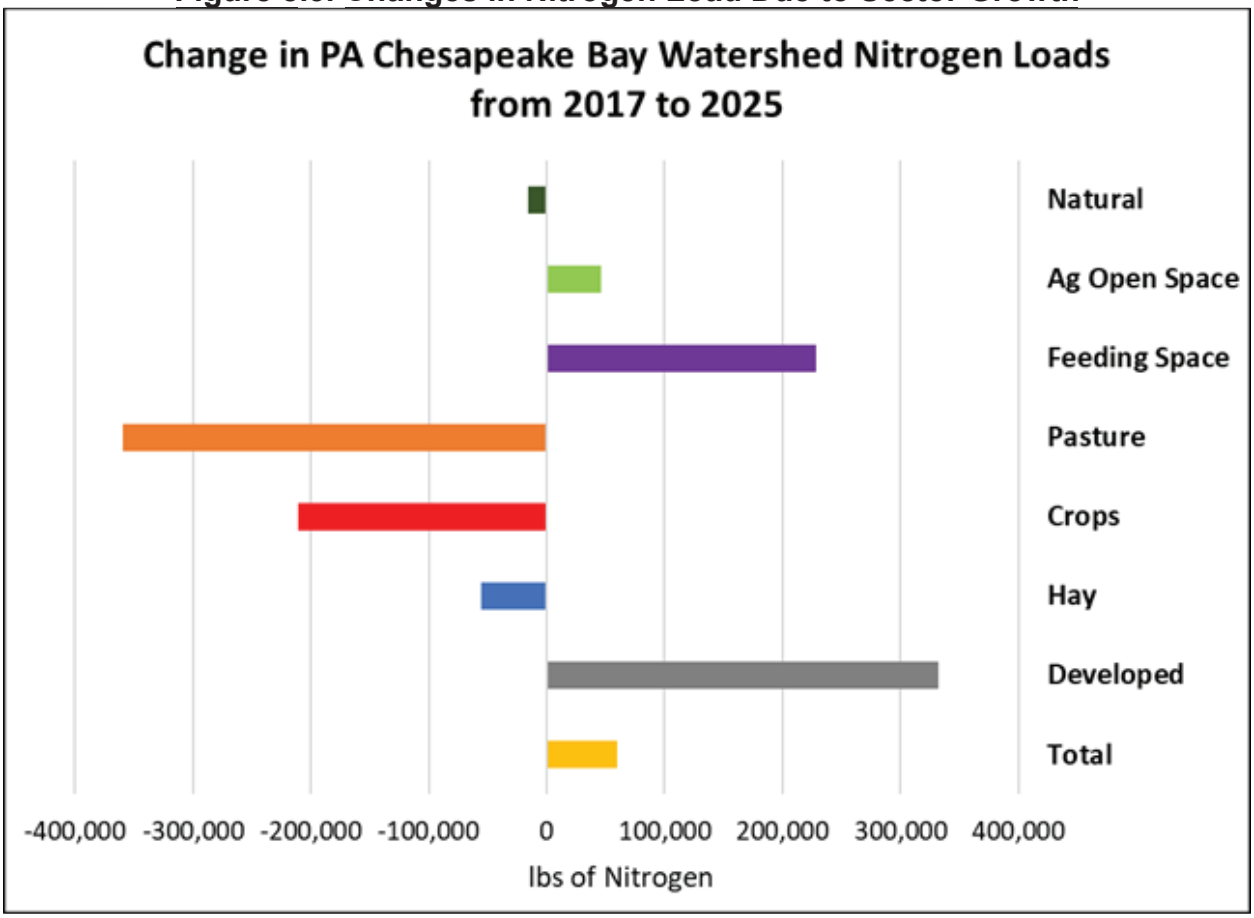


Figure 8.3 displays the projected difference in nitrogen loading rates from Pennsylvania to the Chesapeake between 2017 and 2025. In total Pennsylvania is projected to gain 59,891 pounds of nitrogen loading and gain 21,838 pounds of phosphorus loading, due to sector growth. The agriculture sector is projected to lose 376,225 pounds of nitrogen and gain 8,228 pounds of phosphorus between 2017 and 2025. The developed sector is projected to gain 332,114 pounds of nitrogen and gain 9,938 pounds of phosphorus between 2017 and 2025. The natural sector is projected to lose 15,961 pounds of nitrogen and gain 3,672 pounds of phosphorus between 2017 and 2025.

In the agricultural sector, the largest differences in loading rates occur due to the switch of load sources between 2017 and 2025. Agriculture open space, which includes meadows, gained 46,147 pounds of nitrogen. Feeding space increased its nitrogen load by 228,165 pounds. Pasture land decreased its nitrogen loading rates by 360,062 pounds. Cropland also decreases it nitrogen loading 210,430 pounds. Hay decreased its nitrogen loading by 55,241 pounds.

II. PENNSYLVANIA'S STRATEGY TO ADDRESS SECTOR GROWTH

A. Introduction

Forests, wetlands, and other natural areas significantly improve and protect water quality by absorbing rainfall, reducing storm water runoff, and helping to recharge groundwater aquifers. Conserving working lands provides significant values well beyond protecting and improving water quality. Working lands, like farms and forests, are deeply rooted in Pennsylvania's cultural heritage, contribute significantly to the Commonwealths' rural economy, and provide valuable products to society. Forests provide clean water, wood products, tourism and recreation opportunities, habitat, climate mitigation, and provide the backdrop to our aesthetic landscape.

B. Planning for Growth

After several years of dialogue, the Chesapeake Bay Program agreed to a framework for "crediting" land conservation actions, programs, and policies as part of the Phase 3 WIP. Opportunities to receive "credit" for land conservation include land acquisition by agencies and municipalities, conservation easements, and planning and zoning to limit conversion of forests to commercial and residential development. A recent publication titled *"Sustaining and Improving Forest Land through Comprehensive Plans"* provides advice to local governments to fully consider the conservation of forests in comprehensive planning.

Pollution reduction "credits" will be calculated based on the change in magnitude and patterns of future land use and development resulting from implementing conservation programs and policies. For example, if future growth is managed in a way that conserves forests in a county, the resulting pollutant loading will be less than if the forest had been developed for commercial or residential uses.

The Chesapeake Bay Program's framework for land conservation includes:

- Conserving and protecting wetlands
- Conserving and limiting development in riparian areas
- Modernizing local planning and zoning to conserve critical forests and habitats
- Preserving farmland as part of a holistic approach to conserving working lands

1. *Pennsylvania's Land Conservation Scenario*

Pennsylvania's approach to land conservation consists of four main components, Forest Conservation, Private Forest, Wetlands and Farmland. Most land use planning and decisions are made locally within the context of the Pennsylvania Municipalities Planning Code, which enables local planning, zoning, ordinances, and other measures that affect growth and development. Planning for growth also needs to consider impacts to future business activity and economic development opportunities, historical land uses and the many benefits of conserving natural resources. Pennsylvania chose to follow

the Chesapeake Bay Program's framework for sector growth. Goals were established for forest and natural area conservation, as well as farmland preservation based on the highly popular and nation-leading Farmland Preservation Program.

The Pennsylvania state-specific scenario for Sector Growth had not been completed when the four pilot counties developed their CAPs. The Community Clean Water Planning Guide and text for the County Clean Water Technical Toolbox have been enhanced with additional information relating to Sector Growth and this scenario. By revising these two documents, the intent is to facilitate more-purposeful conversations with the remaining counties and revisit the concept with the four pilot counties, with the goal of producing locally-driven plans for conservation and managing growth.

a. *Forest Conservation*

Forest conservation of working lands, park lands and other natural areas by agencies and land trusts: the Commonwealth and its conservation partners have a tremendous history of conserving important forests and natural areas, resulting in over four million acres of State Forests, State Parks, State Game Lands, the Allegheny National Forest, and many local parks open for public use. Local land trusts have helped conserve thousands more acres by facilitating conservation easements with private landowners. Additionally, state and private agencies hold conservation easements which help keep working lands in private ownership. Pennsylvania's goal is to continue this current approach while increasing efforts to conserve land, resulting in an additional 20,000 acres of forest conservation annually for the years 2019 through 2025. This is a statewide goal that will be prorated to counties in the Chesapeake Bay watershed.

Pennsylvania regulations for erosion and sediment control, specifically found in Section 102.14 (Riparian Buffer Requirements), require protection of existing riparian buffers. Where existing riparian buffers cannot be protected, this section requires conversion of existing riparian buffer to riparian forested buffer or the establishment of a new riparian forest buffer.

b. *Private Forests*

Acknowledging private working forests with forest management plans. Private forest landowners across the Commonwealth have worked with natural resource professionals to develop management plans covering approximately 33,000 acres of private forests. Understanding that these landowners have a basic intent to keep these lands forested, this amount of forest will be excluded from development in Pennsylvania's land conservation scenario. This exclusion is for planning purposes only. Information on these owners' and their properties is not available and these lands are not subject to any development restrictions. Additionally, for the scenario, trends for future management plan adoption will be assumed to follow recent trends on a county basis and will form the basis for future estimates of forest management plan development. As such, Pennsylvania's land conservation scenario will acknowledge the small portion of forest properties managed under guidance of a forest management plan.

c. *Wetlands*

Jurisdictional wetlands are excluded from development in the scenario.

d. *Farmland*

Pennsylvania is preserving farmland according to Pennsylvania's nation-leading Farmland Preservation Program. Historical rates have averaged approximately 12,000 acres preserved annually. This annual rate will be assumed for the 2019-2025 WIP horizon. These acres will be excluded from development, in perpetuity.

Pennsylvania's approach to land conservation has resulted in nutrient and sediment reductions. Table 8.1 represent the total reductions from land conservation activities described above by 2025.

Table 8.1. Summary of Reductions from Pennsylvania Land Conservation Scenario

Priority Initiative	Nitrogen Reduction (EOS)	Phosphorus Reduction (EOS)	Estimated Annualized Cost for Practice Implementation[1]
Pennsylvania Land Conservation	**32,000**	**1,000**	**N/A**

2. *Future Considerations*

In addition to the four components described above, the Commonwealth, its partners and local governments have other tools available to promote long-term land conservation, such as engaging in county-level land conservation efforts as part of continued Phase 3 WIP development and implementation. Since this portion of the Phase 3 WIP was finalized toward the end of the planning process, there will be future efforts to engage counties and local governments on land conservation efforts as part of the milestone review process for the Phase 3 WIP and future implementation. While not currently included in Pennsylvania's watershed-wide land conservation scenario, additional tools for use during the CAP development process include:

a. Riparian Areas

Conserving and limiting development in riparian areas. These areas along streams are sensitive and critical to habitat and protecting local water quality. Pennsylvania regulations for erosion and sediment control, specifically found in Section 102.14 (Riparian Buffer Requirements), require protection of existing riparian buffers. Where existing riparian buffers cannot be protected, this section requires conversion of existing riparian buffer to riparian forested buffer or the establishment of a new riparian forest buffer.

b. Local Planning and Zoning

Modernizing local planning and zoning to conserve critical forests and habitats. Examples include increasing urban densities and growth in urban areas versus rural

areas, managing sewer service area expansions, avoiding growth on soils unsuitable for septic systems and increasing infill and redevelopment. A model available for localities includes the Chapter 102 permit, when triggered, the permittee must manage 20% of the existing impervious area as if it were a “meadow in good condition,” which decreases the post construction stormwater runoff generated from the project site when compared with the existing developed condition. The intent of this provision is to provide some stormwater controls on property that was previously developed with few or no stormwater BMPs. This “retrofit” stormwater runoff requirement can result in a net reduction of pollutants to the Chesapeake Bay. Additionally, street tree ordinances and shade tree commissions help to retain critical tree canopy in communities. A recent publication titled *“Sustaining and Improving Forest Land through Comprehensive Plans”* provides advice to local governments in fully considering forests in comprehensive planning.

c. County Roles in Land Conservation

Pennsylvania’s Land Conservation Scenario can be broken down to individual goals for each county in Pennsylvania’s Bay watershed. Each county can incorporate its own local zoning ordinances and policies to prioritize land conservation. The following are examples of local zoning ordinances that can be incorporated into CAPs.

i. Zoning Ordinances

The Pennsylvania Legislature, through the Municipalities Planning Code (MPC, Act 247 of 1968), grants certain zoning powers to municipalities. Within these powers, a municipality could choose to include measures for land conservation in its local zoning ordinance. Such a choice would also have an impact on sector growth management and would be particularly pertinent during efforts to modernize local planning and zoning. Local governments can go above and beyond current state recommendations for land conservation and sector growth management by implementing more stringent policies, so long as they stay within the powers and purposes granted by the MPC.

“Use zoning” is one measure which could be used for land conservation. Through use zoning, a municipality can assign forests, farms, and wetlands to zones that restrict commercial and residential development. Use zoning may be constitutionally sensitive and should be approached judiciously.

Another measure would be using “density zoning” to manage growth by delineating density restrictions. For example, a zoning ordinance may establish a maximum number of units per acre or a minimum lot size in acres. Density zoning could also be implemented on a sliding scale. For example, a zone could have a permitted and preferred use for agriculture but also allow for limited residential development on a sliding scale – such as up to two units allowed on the first 50 acres and then gradually increasing the number of allowed units on additional acres. This variation on density zoning is known as “sliding-scale zoning.”

ii. Subdivision Ordinances

A local “subdivision ordinance” manages the development and division of property parcels. Municipalities may use a subdivision ordinance to permit agricultural and residential development on rural land while controlling for density.

iii. Conservation Easements

Pennsylvania has enacted enabling legislation which authorizes municipalities to adopt a local ordinance and thereby establish a program for purchasing “conservation easements.” These easements are voluntary agreements which restrict uses or development on a property to protect natural resources and manage growth. Any restrictions assigned to an easement will remain with the title of the land for the duration of the easement term, sometimes guaranteeing conservation in perpetuity. A municipality could also partner with other government entities or land trusts as a strategy for leveraging resources for easement purchases.

iv. Transfer of Development Rights

Pennsylvania has enacted enabling legislation which authorizes local governments to create “Transfer of Development Rights” (TDR) programs. Under a TDR program, a landowner may voluntarily sell development rights to a buyer, such as a municipality, for use on the landowner’s property while still retaining ownership. Any existing agricultural or forestry uses may continue but the landowner may not develop the property after selling his or her development rights. By purchasing development rights on private property, a municipality can protect private land and natural resources from the environmental implications of growth and development.

v. Multi-Municipal Planning

A regional approach to land conservation policies may be optimal for managing growth and designating rural resource areas where there is additional strength of law to promote such conservation. Multi-municipal planning may offer local governments increased agility in zoning and planning efforts as well as mutually beneficial environmental outcomes.

SECTION 9. CLIMATE CHANGE AND CLIMATE RESILIENCY

I. BACKGROUND

A. Estimated Impact Due to Climate Change

The Chesapeake Bay Program Partnership (Partnership) relayed preliminary modeling results of climate change in 2025 in the form of nutrient load projections as part of the Midpoint Assessment completed in July 2018. These preliminary results are summarized below in Table 9.1 for nitrogen and Table 9.2 for phosphorus.

Table 9.1. Climate Change Impacts by State (in millions of pounds) for Nitrogen

Jurisdiction	1985 Baseline	2013 Progress	Climate Change	Phase 3 Planning Target
NY	18.71	15.44	0.400 (3.8%)	11.59
PA	122.41	99.28	4.135 (5.7%)	73.18
MD	83.56	55.89	2.194 (4.8%)	45.30
WV	8.73	8.06	0.236 (3.7%)	8.35
DC	6.48	1.75	0.006 (0.3%)	2.43
DE	6.97	6.59	0.397 (8.5%)	4.59
VA	84.29	61.53	1.722 (3.1%)	55.82
Basinwide	**331.15**	**248.54**	**9.09 (4.6%)**	**201.25**

Table 9.2. Climate Change Impacts by State (in millions of pounds) for Phosphorus

Jurisdiction	1985 Baseline	2013 Progress	Climate Change	Phase 3 Planning Target
NY	1.198	0.710	0.014(2.9%)	0.606
PA	6.282	3.749	0.141 (4.7%)	3.073
MD	7.495	3.942	0.114 (3.2%)	3.604
WV	0.902	0.617	0.019 (3.9%)	0.456
DC	0.090	0.062	0.001 (0.8%)	0.130
DE	0.225	0.116	0.006 (5.1%)	0.120
VA	14.244	6.751	0.193 (3.0%)	6.186
Basinwide	**30.44**	**15.95**	**0.489 (3.4%)**	**14.173**

The existing Planning Targets are in the last column. The estimated additional reductions to mitigate the additional impact due to climate change are shown in Column 4. For example, Pennsylvania's estimated additional reduction is 4.135 million pounds of nitrogen and 0.141 million pounds of phosphorus.

The Partnership also committed to the following strategy to address climate change between now and 2025:

- By refining the climate modeling and assessment framework, continue to sharpen the understanding of the science, the impacts of climate change and any research gaps and needs.

- Develop an estimate of pollutant load changes (nitrogen, phosphorus, and sediment) due to 2025 climate change conditions.
- Develop a better understanding of BMP responses; including new, enhanced and climate-resilient BMPs.
- In March 2021, the Partnership will consider results of updated methods, techniques, and studies and refine estimated loads due to climate change for each jurisdiction.
- The Principals Staff Committee agreed that in September 2021, jurisdictions will account for additional nutrient and sediment pollutant loads due to 2025 climate change conditions in a Phase 3 WIP addendum and/or two-year milestones beginning in 2022.
- Finally, in developing the narrative strategy, the Partnership approved guiding principles that will be considered, described below.

A. Partnership Guiding Principles

The following are guiding principles, approved by the Partnership, for consideration by the jurisdictions in developing Climate Resiliency Strategies:

1. *Capitalize on Co-Benefits*

Maximize BMP selection to increase climate or coastal resiliency, soil health, flood attenuation, habitat restoration, carbon sequestration, or socio-economic and quality of life benefits.

2. *Account for and Integrate Planning and Consideration of Existing Stressors*

Consider existing stressors such as future increase in the amount of paved or impervious area, future population growth, and land-use change in establishing reduction targets or selection/prioritizing BMPs.

3. *Align with Existing Climate Resiliency Plans and Strategies Where Feasible*

Align with implementation of existing greenhouse gas reduction strategies; coastal/climate adaptation strategies; hazard mitigation plans; floodplain management programs; DoD Installation Natural Resource Management Plans (INRMPs); fisheries/habitat restoration programs, etc.

4. *Manage for Risk and Plan for Uncertainty*

Employ iterative risk management and develop robust and flexible implementation plans to achieve and maintain the established water quality standards in changing, often difficult-to-predict conditions.

5. *Engage Federal and Local Agencies and Leaders*

Work cooperatively with agencies, elected officials and staff at the local level to provide the best available data on local impacts from climate change and facilitate the modification of existing WIPs to account for these impacts.

II. PROGRAMMATIC COMMITMENTS

Like every state in the country, Pennsylvania has already begun to experience adverse impacts from climate change, such as flooding, heat waves, and drought. Based on the overwhelming scientific evidence, those harms are likely to increase in number and severity unless aggressive steps are taken to reduce carbon dioxide (CO_2) and other greenhouse gas (GHG) emissions.

Pennsylvania's 2015 Climate Change Impacts Assessment and the United Nation's Intergovernmental Panel on Climate Change recognize that, based on decades of research and evidence, GHGs from human activities are causing long-term changes in climate, as well as increasing the likelihood and intensity of significant weather events. In fact, Pennsylvania is expected to continue to experience higher temperatures, changes in precipitation, sea level rise, and more frequent extreme events and flooding over the next century due to climate change.

Since the early 20th century, temperatures have already increased by more than 1.8 °F. If GHG emissions are not curtailed significantly, Pennsylvania is projected to be approximately 5.4 °F warmer by 2050 than it was at the end of the 20th century. Similarly, average annual precipitation has increased by approximately 10 percent over the past 100 years and, by 2050, it is expected to increase by an additional 8 percent, with a 14 percent increase during the winter season.

These impacts could alter many fundamental assumptions about climate intrinsic to the Commonwealth's infrastructure, governments, and businesses. For example, bridges are designed for certain flooding return intervals, energy systems are designed for certain temperature ranges, farmers plant crops suited to historical climate conditions, and communities are planned around historical floodplains. If not properly accounted for, changes in climate could result in more frequent road washouts, higher likelihood of power outages, shifts in economic activity, among other impacts. It is estimated that events such as these have cost governments, citizens, and businesses in the United States more than $1.1 trillion in the last 30 years.

Climate change can also affect vital determinants of health such as clean air, safe drinking water, sufficient food as well as secure shelter. This can include impacts from increased extreme weather events such as heat, droughts, and floods, wildfire, decreased air quality, and illnesses transmitted by food, water, and disease carriers such as mosquitoes. The World Health Organization expects climate change to cause around 250,000 additional deaths globally per year between 2030 and 2050, with additional direct damage costs to health to be estimated around $2 to $4 billion per year by 2030. GHGs must be reduced very quickly if these impacts are to be avoided.

In 2015, DEP estimated GHG emissions from all sources in Pennsylvania to be 256.05 million metric tons of CO2 equivalent (MMTCO2e), after including forestry and land use sinks. Industrial sources (31%), transportation (21%) and in-state energy production (32%) accounted for 84% of CO_2 emissions. The remaining sources include residential (7.2%), commercial (3.9%), agriculture (2.7%), and waste management (4.2%) sectors. Including consideration of land use sinks, GHG emissions in 2000 totaled 299.19 MMTCO2e, so emissions have been reduced by 14.4%.

A. Current Action Strategies

Pennsylvania has continued to bear the impacts of climate change caused by manmade emissions of GHGs, while developing several initiatives to reduce emissions. These initiatives include:

1. *Executive Order 2019-01*

In January 2019, Governor Wolf signed Executive Order 2019-01 which stated that Pennsylvania shall strive to reduce net GHGs 26 percent from 2005 levels by 2025, and 80 percent by 2050 from 2005 levels, among other initiatives and goals including:

a. Collectively reduce overall energy consumption by 3 percent per year, and 21 percent from 2017 levels by 2025.
b. Procure renewable energy to offset at least 40 percent of the Commonwealth's annual electricity use.
c. Implement a state-wide benchmarking strategy and platform for energy and water consumption.
d. Establish a state-wide Governor's Sustainability Council and/or interagency workgroup dedicated to the implementation of leadership actions listed in the Climate Action Plan, as well as actions in department-level plans.
e. Incorporate climate change considerations into decision making processes and criteria. For example, add climate change resilience as a prioritization factor for new capital projects.
f. Consider ENERGY STAR certification for existing buildings, and Architecture 2030, LEED, net-zero designs, and climate resilience design guidelines to drive

higher performance in new construction and major renovation projects in public buildings.

g. Implement emissions reduction and climate resilience activities in public facilities, including distributed generation, backup power generation, water efficiency, climate resilient vegetation, and proper tree maintenance.

h. Replace 25 percent of the state passenger car fleet with battery electric and plug-in electric hybrid cars by 2025.

i. Conduct more training, education, and outreach on energy efficiency, clean energy, climate resilience, and related skills for facility managers and the facility management workforce.

2. Climate Change Act of 2008

DEP is working under Pennsylvania's Climate Change Act of 2008 to develop strategies to reduce and offset GHG emissions and adapt to the impacts of climate change. An updated Climate Action Plan was released in early 2019.

The updated Plan includes nearly 100 actions that government, businesses, and citizens can take to both mitigate and adapt to climate change. The analysis team modeled 15 of those actions, including actions such as increasing the alternative energy portfolio standards (AEPS), investing in renewable energy generation, increasing energy conservation and energy efficiency, and more.

Using all 15 actions, the analysis team aimed at reducing GHG emissions 26 percent from 2005 levels by 2025 and 80 percent by 2050. DEP found that even if the 15 key actions were implemented, GHG emissions in Pennsylvania would only be projected to decrease 21 percent from 2005 levels by 2025 and 36 percent by 2050.

This finding further emphasizes the need for more ambitious and quicker climate action from all Pennsylvanians, including government, businesses, and citizens. It is clear that actions expected to significantly reduce GHG emissions need to be enhanced in order to ensure human activities do not cause irrevocable climate change.

3. Pennsylvania's Alternative Energy Portfolio Standard (AEPS)

Pennsylvania's alternative energy portfolio standard (AEPS) enacted in 2004, administered by the Public Utility Commission (PUC) in cooperation with DEP, requires that 18% of electric power come from alternative and renewable sources; including 8% from renewable resources like solar and wind, by 2021. The standard has helped to grow the clean energy industry, while providing clean energy options to Pennsylvania businesses and homeowners.

4. Finding Pennsylvania's Solar Future

"Finding Pennsylvania's Solar Future" is a 2017-2019 statewide planning project led by DEP's Energy Programs Office with a goal of increasing solar generation to 10% of Pennsylvania's energy portfolio by 2030. The stakeholder effort modeled and developed 15 strategies to achieve that goal, and the final Pennsylvania's Solar Future Plan concludes that the goal is technically and economically achievable. The modeling used in the plan also predicts that GHG emissions from the electricity sector will decrease by nearly 10 percent by 2030, if the goal is achieved.

5. Methane Emission Controls

DEP is implementing methane emission controls on natural gas production, compression, processing, and transmission facilities through the Governor's Methane Reduction Strategy. The comparative impact of methane on climate change is more than 72 times greater than CO2 emissions on a 20-year timeframe.

6. Emissions Reduction Initiatives

DEP is working to reduce emissions from vehicles and other mobile air pollution sources through several initiatives, including the Driving PA Forward suite of grants and rebates and the Alternative Fuels Incentive Grant (AFIG) program. In addition, DEP formed the Drive Electric PA Coalition, which developed an Electric Vehicle Roadmap for Pennsylvania.

7. Energy Efficiency

Pennsylvania's 2008 energy efficiency law requires the state's major electricity distributing companies to meet savings targets established by the PUC. Since 2009, the Commonwealth has saved over 8.8 million megawatt hours of electricity usage resulting in $6.4 billion in savings.

8. Climate Change Adaptation and Mitigation

DCNR's Climate Change Adaptation and Mitigation Plan outlines 123 actions to make the Commonwealth more resilient to climate change. Staff members from across DCNR's bureaus participated in a rigorous process to determine and prioritize DCNR's greatest climate change vulnerabilities and identify strategies to address them. The plan includes recommendations for dealing with higher temperatures, flooding, more extreme weather events, changes in outdoor recreation, range shifts for wildlife and plant species, and an increase in invasive species. DCNR is beginning to implement the adaptation strategies in state parks and forests, including a pilot project that includes Caledonia, Pine Grove Furnace, and Kings Gap state parks, and the 85,000-acre Michaux State Forest. Activities there are focused on addressing flooding issues, planting trees adapted to future climatic conditions, eliminating unnecessary dirt roads,

control of invasive species, relocating and hardening trails damaged by flooding, fuel mitigation to reduce the likelihood of catastrophic wildfire and more.

III. PHASE 3 WIP IMPLEMENTATION: BEST MANAGEMENT PRACTICE (BMP) EVALUATION

A. Evaluation and Implementation of BMPs

As mandated by Pennsylvania's Climate Change Act of 2008, DEP plans to conduct a study of the potential impacts of global climate change on Pennsylvania over the next century. Previous studies were conducted by the Pennsylvania State University (Penn State) and presented to DEP in 2009, 2013 and 2015.

In 2019, the Penn State team will update the prior reports through three in-depth studies of climate change impacts and adaptations in high priority areas for the Commonwealth; agriculture, infrastructure, and water quality.

The following three topics will be studied:

- Implications of climate change for planning, policies, and practices to achieve Pennsylvania's obligations under the 2011 Chesapeake Bay TMDL
- Climate change impacts on Pennsylvania livestock production and livestock production impacts on water quality
- Resilience of Pennsylvania's critical infrastructure to extreme weather and climate events

The first, designed specifically to help with further enhancement of the Phase 3 WIP, is described below.

1. Climate Change Impacts on Pennsylvania's Watershed Management Strategies and Water Quality Goals

Many BMPs, such as cover crops and forest riparian buffers, have been designed and managed using climate data from the 20th century. Thus, as climate continues to change, one expects the suitability and effectiveness of existing BMPs to change throughout the state. For example, as intense precipitation becomes more frequent, cover crops are likely to be less effective at reducing soil erosion and forest riparian buffers are likely to experience short-circuiting through the development of gullies and ditches. Furthermore, forest riparian buffer systems are likely to see increased invasive vegetation coverage and decreased sapling success with greater annual fluctuations in groundwater levels.

In addition, because climate change impacts drivers of water quality throughout the Chesapeake Bay watershed, local and countywide planning associated with the Phase 3 WIP should also account for changing conditions due to climate.

This study aims to answer the following questions:

- What impact will a changing climate have on the proposed tiered approach in Pennsylvania's Phase 3 WIP for local and countywide planning goals?
- What potential impact will projected 21st century climate change have on the suitability and effectiveness of water quality driven BMPs (e.g., forest riparian buffers and cover crops) across the different landscapes and ecoregions of Pennsylvania?
- What changes in policies, new recommendations, or changes to current management practices (e.g., buffer site selection, frequency of invasive vegetation control efforts, etc.) might Pennsylvania adopt increase the effectiveness of BMPs in Pennsylvania as the climate continues to change? This work will draw on existing climate projections for Pennsylvania and recent scientific research and literature on the potential impacts of climate change on the effectiveness of current BMPs specific to the landscapes and land use patterns of Pennsylvania.

The study will also provide recommendations for management actions and research needs to better inform Pennsylvania on future decisions related to meeting water quality goals impacted by changing climate.

SECTION 10. COMMUNICATION AND ENGAGEMENT STRATEGY

I. BACKGROUND

Local engagement, communication and outreach will continue to occur at multiple levels and in multiple ways as the Phase 3 WIP actions are implemented. This intentional, strategic engagement is key to the successful implementation of the Phase 3 WIP and improvement of local waters. Critical to this strategy is overcoming the three primary hurdles: (1) ideologic – developing an understanding of the value of the practices; (2) technical – ensuring that once interested in implementation, tools are available to aid in selection, design, and installation; and (3) funding – providing resources to those that are willing and able to implement the selected practices. The Communications Offices of DEP, DCNR and PDA, in partnership with the Phase 3 WIP Communications and Engagement Workgroup, have the lead in focusing on the ideologic hurdle to ensure the Phase 3 WIP is implemented.

Building on the "Healthy Waters, Healthy Communities" Communications Strategy described in Section 1, Introduction, engagement, communication and outreach will continue as the Phase 3 WIP is implemented. The Communication and Engagement workgroup has identified strategies and actions described below. Their work is intended not only to facilitate such engagement but also to inspire people to want to become involved and take actions through implementing practices.

II. ENGAGEMENT, COMMUNICATION AND OUTREACH DURING REVIEW OF THE DRAFT PLAN

The draft Phase 3 WIP was submitted to EPA and the Chesapeake Bay Program Partnership on April 12, 2019. This started a formal public comment period that ended June 7, 2019. In response to recommendations from the Communication and Engagement Workgroup, DEP and its sister agencies focused on developmental tactics to encourage public review of the draft Phase 3 WIP, while the Communications and Engagement Workgroup led delivery-related tactics. Forty commentators submitted comments on the draft Phase 3 WIP. Appendix 4 is the Comment Response document to these comments.

A. Developmental Tactics

The cornerstone of the communications strategy relies on DEP's digital media assets, such as social media, blogs, and the DEP website. DEP developed an actively maintained, accessible subsite to the DEP main website aimed at both the general public and participants active in the development and implementation of the Phase 3 WIP. These pages can be found at www.dep.pa.gov/chesapeakebay/phase3.

These assets also include a "resource email account" (RA-EPChesBay@pa.gov) for interested parties to submit questions, comments, and concerns about the Phase 3 WIP and the Chesapeake Bay Program. This resource account is also be available for those

wanting to express interest in participating in future Countywide Action Plan development and implementation. Success stories, written by stakeholders, were featured on the DEP blog “Our Common Wealth” (www.dep.pa.gov/OurCommonWealth/Pages/Blog.aspx) and were promoted through social media platforms Facebook, Twitter and LinkedIn.

Other resources identified by the Communications and Engagement Workgroup developed by DEP include:

- A series of informational sheets outlining the details in the Phase 3 WIP to use at events and in public forum discussions

In addition, the communication offices of DEP, DCNR and PDA promoted the opportunity to comment on the draft Phase 3 WIP by:

- Providing links through all three agencies websites to the DEP webpage for the draft Phase 3 WIP
- Highlighting the opportunity in departmental newsletters
- During PDA’s focused three weeks of intentional conservation outreach and messaging, highlight the comment opportunity
- The Secretaries of the three agencies will use speaking events to encourage input on the draft WIP when appropriate

DEP also met with the following advisory groups to solicit input during the public comment period:

- Joint meeting of the Pennsylvania delegates to the Chesapeake Bay Program Partnership Local Government and Citizen Advisory Committees – April 18, Susquehanna River Basin Commission, Harrisburg
- Nutrient Management Advisory Board to the State Conservation Commission – April 18, Room 309, Department of Agriculture, Harrisburg
- Agriculture Advisory Board – April 25, DEP Southcentral Regional Office, Harrisburg
- Citizen Advisory Committee – May 22, Room 105, Rachel Carson State Office Building, Harrisburg
- Water Resources Advisory Committee -- May 23, Room 105, Rachel Carson State Office Building, Harrisburg
- DCNR Advisory Council – May 29, Room 105, Rachel Carson State Office Building, Harrisburg

DEP conducted a webinar on April 23 to describe the phased approach for the development of the Countywide Action Plans (CAPs) described in Section 3,

Countywide Actions and the proposed schedule so that those impacted will know what to expect and can plan accordingly.

1. *Delivery Tactics*

Members of the Communications and Engagement Workgroup scheduled industry and public events to present information about the Phase 3 WIP and encourage input through the public comment period. These events included:

- Industry Conferences as agendas allow including:
  - The Pennsylvania State Association of Township Supervisors Annual Conference – April 14 -17
  - Pennsylvania Water Environment Association – June 2-4
- Focused sessions for specific purposes including:
  - The Pennsylvania Organization of Watersheds and Rivers (POWR) -- Webinar on May 28 on the draft Phase 3 WIP with a focus on the CAP planning process.
  - POWR, The Linn Conservancy/Conservation Union – May 31 Workshop on the Phase 3 WIP, Union County Government Center
  - Chesapeake Conservancy – June 4 Workshop on Precision Conservation and the Phase 3 WIP, Lockhaven University

In addition, where appropriate, focus groups were organized to target sectors, such as farmers. For example, the Phase 3 WIP Agriculture Workgroup hosted four small focus group forums with farmers in April to solicit input on the agriculture components of the Phase 3 WIP and the Phase 3 WIP Forest Workgroup solicited comment through the 60+ member Riparian Forest Buffer Advisory Committee.

More broadly, all workgroup members, co-chairs and Steering Committee members were asked to send the DEP website link for the Phase 3 WIP to members, list serves and other communication vehicles.

III. ENGAGEMENT, COMMUNICATION AND OUTREACH DURING PHASE 3 WIP IMPLEMENTATION

Much of what was used for engaging the public during the comment phase will be used for engagement around implementation.

A. Messages

Local messaging will emphasize the importance for all the partners involved in the CAP, both at the state and local level, to be committed to the completion of action items and the actual implementation of the plan.

Again, building on the communications strategy already established and described above, key messages to be used in the development of additional outreach materials to motivate people to put practices on ground include the following:

- The economic benefit of cleaner water, such as lower tillage and equipment costs, and improved crop, herd, and soil health
- The health and environmental benefits of cleaner water, such as herd and soil health improvements, more productive fisheries, and recreation opportunities
- Voluntary actions can reduce the need for government intervention.

B. Message Delivery

These messages will be delivered through the following mechanisms:

- DEP Healthy Waters, Healthy Communities: Pennsylvania in the Chesapeake Bay Watershed StoryMap – This is a web-based outreach tool that is being created:
  - To increase Pennsylvanians' awareness and knowledge of the value of healthy local waters to their lives; nonpoint source water pollution in our part of the Chesapeake Bay watershed; efforts underway by many people and organizations to reduce it, including DEP's and other state agencies' work; and what they can do to help.
  - To be the big-picture digital home for the story of all the DEP-led and -partnered work happening in Pennsylvania's part of the Chesapeake Bay watershed and a jumping-off point to other storymaps and websites for more specific facets.
  - Note - The StoryMap will have links to other information shared by partners, other agencies, and groups of interest.
- Milestones and Progress Reporting –
  - Milestones and action steps for the Phase 3 WIP must be updated every two years. Updating will allow for adjustments to be made and for those who are actively implementing elements of the Phase 3 WIP and the CAPs to adaptively manage the progress they are making based on lessons learned.
  - Programmatic milestones and action steps will be reported every six months using the Progress and Reporting Template to the EPA Chesapeake Bay Program Office. In addition, progress on BMP implementation will be reported on an annual basis to the EPA Chesapeake Bay Program Office.
- The potential development of recorded webinars and videos for use on the website, YouTube, Facebook, or as Public Service Announcements (PSA's) to include:
  - The State Priority Initiatives and action plans for each sector

    - Webinars relating to priority BMPs, their implementation, and potential funding sources
    - The economics and benefits of specific practices, including stakeholder testimonials
    - Short messages from the agency Secretaries
    - How to leverage partnerships and sources of funding for technical and financial assistance
- Whenever possible, the use of outreach means such as:
    - Regular meetings with key stakeholder communicators (agency and partners) to keep the messaging about implementation going
    - Existing social media platforms of agencies and partners
    - Agency Education Centers
    - Fact sheets on the CAPs, elements of the Phase 3 WIP
    - Short messages on company bills to customers, such as utility bills
- Development and implementation of outreach campaigns focused on:
    - The Countywide Action Plan planning effort to include:
        - Letters/Fact Sheet to remaining counties
        - Opportunities for counties to share what's been done
        - Opportunities for stakeholders to share and be proud of accomplished practices
        - Case studies to showcase cost savings

IV. RESOURCES

In addition to existing program staff in DEP, DCNR and PDA's communications offices, support will be needed for the immediate future for the development of outreach materials as described above. This effort will be funded through the EPA Chesapeake Bay Regulatory and Accountability Program Grant. Table 5.4 in Section 5, Existing and Needed Resources has a summary of the resource needs for the next two years needed to complete this communications and engagement strategy.

V. KEY ACTION STEPS

To track and report progress, key action steps were selected to be reported on a six-month basis for the initiatives described above. These are summarized on Section 7, Milestones and Progress Reporting. The details on the action steps can be found in the Progress and Reporting Template.

SECTION 11. CONCLUSION

The Pennsylvania Phase 3 WIP demonstrates reasonable assurance through a comprehensive, integrated framework of federal, state, and local collaboration in a variety of regulatory programs and voluntary initiatives. The Phase 3 WIP is founded on the intensive collaborative local engagement process undertaken since the 2017 milestones, through which reasonable assurance is demonstrated.

Pennsylvania is very fortunate to have many partners and stakeholders that have made significant commitments to the Phase 3 WIP process and to the Chesapeake Bay and local water restoration efforts.

Development of the Phase 3 WIP is just the first step in this final phase of TMDL implementation, to be followed by a series of further planning and implementation activities necessary to restore and maintain the health of the Chesapeake Bay and restore local waters. Future activities will include practice implementation, six-month implementation tracking and reporting to evaluate milestone progress, and practice verification. Federal, state, and local coordination and partnership in these activities is vital.

To ensure sufficient progress to achieve the 2025 targets and avoid possible consequences of insufficient progress, Pennsylvania will continuously evaluate technical issues regarding pace of implementation. Pennsylvania will also evaluate feasible implementation rates and share this information with the Pennsylvania partnership and stakeholders in advance of developing milestones.

Pennsylvania has heard many concerns about the total cost. The way to begin to address those concerns is to demonstrate progress. If immediate implementation is not possible, partners are urged to make progress on programmatic milestones such as securing new revenue sources. For example, consider establishing authorization for a stormwater utility fee, even if the fee is not implemented immediately. Establish voluntary programs for reforestation, signup commitments to use less lawn fertilizer, subsidize rain barrels and rain gardens, and provide incentives for re-development.

At the same time, DEP recognizes the need to track and report progress, and to be prepared for the possibility that progress will be delayed in some areas. If reporting indicates that milestones are not being met, DEP will work with the identified responsible parties to overcome obstacles and get back on schedule.

Throughout this document, concerns about data collection and input into the Chesapeake Bay Watershed Model are raised. These concerns include information about voluntarily implemented BMPs and regulatory programs that were not captured in the model input. It will be up to the Pennsylvania Partners and stakeholders to work between now and 2025 to assure that all implementation, both urban and agricultural, is accurately inventoried and reported so it can be properly credited and so that new

practices and programs can be approved for input into the Chesapeake Bay Watershed Model for proper crediting.

During the Phase 3 WIP planning process, as the Chesapeake Bay Program presented data and information to the Phase 3 WIP Steering Committee, the seven workgroups, and county pilot partners, Pennsylvania became more aware of discrepancies between what is on the ground and what is being reported to the EPA Chesapeake Bay Program office for input into the Chesapeake Bay Watershed Model for progress. Pennsylvania recognizes that this is due to challenges it has historically had with collecting and reporting data, as well as challenges with Pennsylvania's data fitting properly into the Chesapeake Bay Watershed Model. Going forward, Pennsylvania welcomes continued discussions with the Bay Program Partnership on these reporting challenges as we continue to adaptively manage the program together to accurately reflect real world circumstances beyond the model, so that resources and efforts are tailored most effectively to achieve local and Chesapeake Bay cleanup goals.

With the establishment of the TMDL, the need for consistent and broad-ranging BMP data became critically important to attain adequate yearly progress. These data sources and systems include permit programs, grant and cost-share awards, and special efforts to collect and report BMPs that have not been previously accounted for or are implemented outside of government oversight. December 1st of each year, Pennsylvania reports these BMPs to the EPA Chesapeake Bay Program Office. There have been growing pains in developing this capacity while also working with limited funding. Since 2010, improvements in data collection through programs and new data sources has been steady. Improving data management protocols and capability to document progress was one of six priorities identified as part of the 2016 Pennsylvania Restoration Strategy announced by Governor Wolf to accelerate progress. The results have shown that with each refinement of data submitted to the Chesapeake Bay Watershed Model, Pennsylvania is able to demonstrate increased reductions.

Improvements in data collection around practices and programs not currently documented in the Chesapeake Bay Watershed Model are being addressed in this Phase 3 WIP at both the state and local level. Additionally, DEP is evaluating its permitting requirements to facilitate a smooth process for those that seek to implement practices. As part of that effort, DEP has identified the need for more timely responses when state and federal partners have a role in the permit process and recommend that shorter review times should be evaluated by state and federal counterparts.

Pennsylvania commits to have practices and controls in place by 2025 necessary to achieve the final Phase 3 WIP phosphorus and nitrogen reductions. Pennsylvania, in conjunction with the Partnership, will utilize an adaptive management approach to achieve our collective desired outcome. The two-year milestones and six month progress reporting will allow for implementation progress assessment and targeted adjustments to programs and priorities to ensure the practices and controls called for in the Phase 3 WIP are achieved by 2025.