

# *Community Clean Water Toolbox*

## *Developing a County-Based Action Plan for Clean Water*

**June 2018**



June 2018



Dear Local Partner:

Thank you for participating in this unique collaborative opportunity to improve local water quality and develop Pennsylvania's next phase of the Chesapeake Bay Watershed Implementation Plan (WIP).

The Secretaries of the Departments of Environmental Protection, Conservation and Natural Resources, and Agriculture have been engaged in a stakeholder initiative that has included government agencies, state legislators, county and local government officials, industry associations, NGOs, and citizens since April 2017 on how to best approach the effort.

The key goal in this process is to engage partners at the county and local level, and give you direct input into the planning and implementation of the practices that achieve local water quality improvements that work best for your local priorities. At the end of the day, no one knows your local community better than you.

There are many choices to make about how each county planning goal will be achieved. More importantly, in addition to achieving the nutrient and sediment reduction planning goals, this is an opportunity for other local goals of importance to be identified as part of this planning partnership. Yes, these goals will include water quality improvements, but they may also include items such as economic development, enhancing habitat for brook trout, increasing public access to your local waters, and more.

The following, "Developing a County-Based Action Plan for Clean Water," provides an overview of Pennsylvania's waterways, previous and current efforts to improve water quality, and a brief overview of Pennsylvania's challenges and opportunities for clean water. Additional resources, including county-specific data will also follow to assist you in reaching your local water quality goals. Please note that the final countywide Action Plan for Clean Water must be submitted to the DEP Chesapeake Bay Office by **October 2018**.

Again, thank you for your time and participating in this tremendous effort.

Sincerely,

A handwritten signature in black ink, appearing to read "Patrick McDonnell".

Patrick McDonnell, Secretary  
PA Department of  
Environmental Protection

A handwritten signature in black ink, appearing to read "Russell C. Redding".

Russell C. Redding, Secretary  
PA Department of Agriculture

A handwritten signature in black ink, appearing to read "Cindy Adams Dunn".

Cindy Adams Dunn, Secretary  
PA Department of  
and Natural Resources

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For more information:

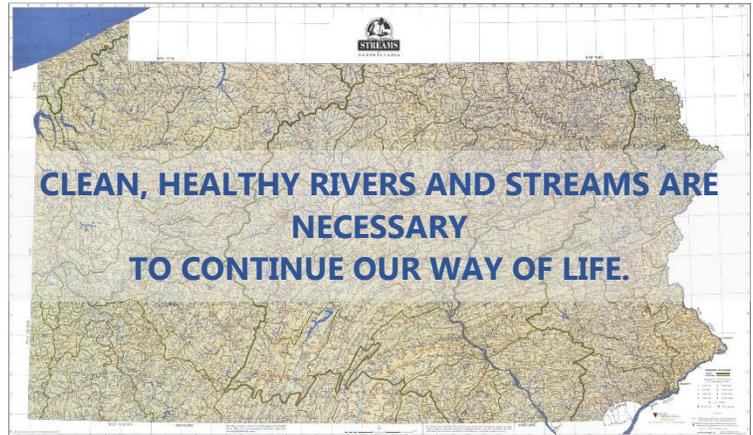
[http://www.dep.pa.gov/Business/Water/Pennsylvania%e2%80%99s%20Chesapeake%20Bay%20Program%20Office/WIP3/Pages/Phase-III-WIP-\(Watershed-Implementation-Plans\).aspx](http://www.dep.pa.gov/Business/Water/Pennsylvania%e2%80%99s%20Chesapeake%20Bay%20Program%20Office/WIP3/Pages/Phase-III-WIP-(Watershed-Implementation-Plans).aspx)

## Introduction: Clean Water Begins Locally

### Pennsylvania – a Water State

Pennsylvania has more miles of waterways than any other state in the contiguous United States. More than 86,000 miles of streams and rivers, run through and over our landscapes and communities.

These waters provide millions with drinking water, support tourism, agriculture and other key industries, support communities through the import and export of goods, entice anglers for recreational, sport, and sustenance fishing, produce electricity, provide us with a variety of recreational opportunities and cool waters on a hot summer day, and they are also places where wildlife can find sustainable habitats.



We demand quite a bit of our waterways, and it shows. **Approximately one-third of Pennsylvania's waterways are out of balance**, and do not meet state water quality standards. The reason for this is simple; what we do to the land, we do to the water. As waterways do, they transport pollutants like excess nutrients, sediment, and fertilizers downstream – altering the balance of waterways in neighboring communities, and those downstream.

### A Bay of Plenty

The Chesapeake Bay is a massive watershed, encompassing 64,000 square miles across six states, New York, Pennsylvania, Maryland, Virginia, West Virginia and Delaware, and the District of Columbia. The Bay, like Pennsylvania's waterways, provides economic, recreational, and aesthetic resources for the 17 million people living in the watershed, region, and beyond.



The Susquehanna River is by far the largest source of fresh water to the Bay. Thus, what happens in Pennsylvania streams and rivers has a direct impact to downstream waters.

**Pennsylvania's waterways and the Chesapeake Bay need our help.**

## Finding a Balance: Local Clean Water Focus with a Bay Benefit

Clean water efforts have been underway in Pennsylvania for decades, and we've made real progress. Some of that progress has been achieved through improved treatment of wastewater, progressive thinking and on-farm actions by Pennsylvania's robust agricultural sector, and through state and local permitting.

Clean water is good for Pennsylvania and the Bay. In order to achieve our local and regional clean water goals, we must continue to expand our efforts.

## Establishing Pollution Limits, Clean Water Goals and Implementation Plans

### The Chesapeake Bay TMDL

Under the jurisdiction of the Federal Clean Water Act, the U.S. Environmental Protection Agency (EPA) can establish a total maximum daily load (TMDL), or pollution limit, in order to restore impaired waters. While it may sound daunting, a TMDL is really a measure of the maximum amount of pollution (in this case nitrogen, phosphorus, and sediment) that a water body can withstand, before reaching a 'tipping point,' whereby the water quality within that system is detrimentally impacted.

**The TMDL specifies pollution reduction goals for each of the jurisdictions in the watershed:**

Pennsylvania  
Maryland  
Virginia  
Delaware  
West Virginia  
New York  
The District of Columbia

In 2010 the Chesapeake Bay TMDL was established, pollution limits and reduction goals assigned, and a deadline of 2025 set. Each of the six Bay states and the District of Columbia (collectively referred to as jurisdictions), are accountable for reducing pollution locally and in the Bay.

Because each state contributes different amounts and types of pollution to the Bay, each jurisdiction received a customized pollution reduction target. Pennsylvania's TMDL focuses on reducing the excess nitrogen (N) and phosphorus (P) from the Susquehanna and Potomac River Basins.

An integral part of the process toward meeting the TMDL and clean water goals is planning. Thus, EPA has instructed jurisdictions to develop a plan, called a Watershed Implementation Plan (WIP). These WIPs outline the strategies, methods, and timeframes for meeting our clean water goals and restoring local waterways. The WIPs are also working documents that plan for clean water progress in three separate phases, starting with 2010 and ending in 2025.



## Pennsylvania is making progress toward our clean water goals

- Twenty-five years before the TMDL, in 1985, the Susquehanna River delivered nearly 125 million pounds of nitrogen and just over six million pounds of phosphorus to the Bay – annually!
- By 2017, seven years into the TMDL commitment, Pennsylvania’s efforts have resulted in the annual reduction of over 16 million pounds of nitrogen and nearly 2.5 million pounds (nearly half) of phosphorus.

The following table summarizes the nitrogen and phosphorus reduction progress and 2025 requirements.

**Figure 1. Pennsylvania Planning Targets**

Year	Nitrogen (M lbs/year)		Phosphorus (M lbs/year)	
	Delivered to the Bay	Delivered to Local PA Waterways	Delivered to the Bay	Delivered to Local PA Waterways
1985(Actual)	122.02	183.88	6.046	14.857
2017 (Actual)	107.31	161.94	3.801	9.640
2025 (Final TMDL Planning Target)	73.18	110.88	3.044	7.619
Remaining Reductions to be Achieved Through Local Planning Goals *	34.31	51.06	0.757	2.021

\*This table does not account for future (beyond 2025) pollution loads and potential impacts such as climate change, development and growth, and potential infrastructure or (cost of doing business) which may alter the amount of sediment reaching the Bay (currently held in place by the Conowingo Dam).

## The Next Phase: Pennsylvania's Opportunity

As Pennsylvania enters the third phase of the Watershed Implementation Plan, it is important to note that every opportunity, action, and success for the next seven years will determine whether we succeed. Thus, critical thinking, strategic planning, and partnerships are key in this final phase.

Since April 2017, a large stakeholder initiative that has included government agencies, state legislators, county and local government officials, industry associations, NGOs, and citizens has been working on how to best approach a collaborative effort to develop county-based Action Plans for Clean Water that are realistic, and implementable to local communities.

**The Next Phase: Pennsylvania has many opportunities to meet our local clean water goals by 2025**

Current (2017) Pollution Loads:  
Nitrogen = 109 million pounds  
Phosphorus = 3.9 million pounds

Required Annual Pollution Limits:  
Nitrogen = 73 million pounds  
Phosphorus = 3 million pounds

## County-Based Planning to Achieve Clean Water Goals

In an effort to more fully account for all local water quality activities, benefits, improvements and planned activities, EPA and its state partners, added a new component to the Phase 3 WIP process, that being a local, bottom-up approach. This new approach, focusing on local partnerships is a critical component of a successful Phase 3 WIP.

EPA recognizes that there is no one-size-fits-all approach, and has provided jurisdictions with the flexibility to determine how to initiate a local approach to developing the WIP. Pennsylvania established a Local Area Goals Work group to make recommendations on what local planning could look like in the Commonwealth.

The Work group examined several geographies for local goals, from land-river segments (505) to sub-basins (6), and ultimately recommended county-based goals as the most feasible in terms of size, number, existing data levels and ability to organize resources.

County-based goals  
**DO NOT** establish  
any new  
requirement or  
regulatory  
obligation

Pennsylvania's nitrogen and phosphorus reduction targets are broken down into local planning goals for each countywide area. Added together (reductions from all 43 counties), these local pollution reductions will help Pennsylvania reach its Chesapeake Bay clean water targets.

**Please note that the pollution reduction goals for your county are included in your county-focused toolbox.**

These targets can help local partners better understand their role in helping to meet TMDL requirements, assist with advancing other local restoration priorities, enhance local citizen engagement, and help stakeholders focus limited resources and targeted programs on defined local areas.

Achieving our local clean water goals will require new partnerships, new ideas, and local leadership, to get the job done. County-based, collaborative efforts with representatives from a variety of stakeholder groups at the local, state, and federal level will play a necessary and key role in the development of the Phase 3 WIP.

It is important to note that these countywide goals do NOT establish any new requirement or regulatory obligation on counties. These goals are simply a way to assist Pennsylvania in engaging local partners and focusing resources so that efforts can be effectively aggregated in achieving the state’s Chesapeake Bay goals.

**Figure 2. Depiction of a Countywide Goal**

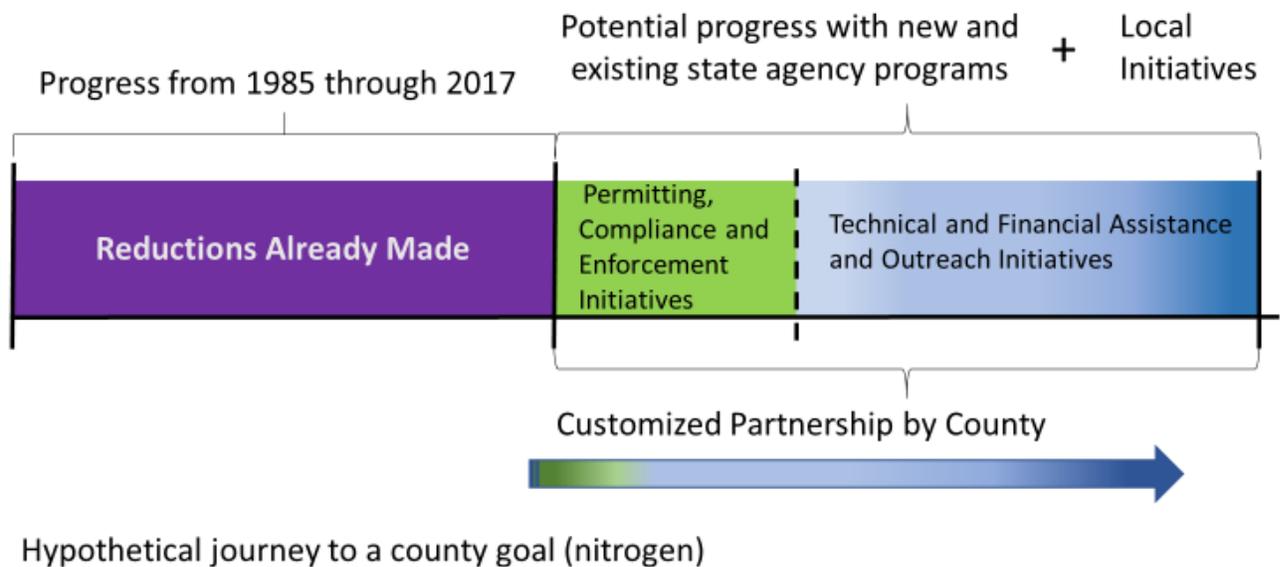


Figure 2 depicts the hypothetical journey to countywide goals and overall Pennsylvania water quality targets. Moreover, the figure above represents Pennsylvania’s journey to clean water.

The nitrogen and phosphorus planning targets for Pennsylvania are broken down into local planning goals for each county (See Figure 2 above). Added together, these goals will help Pennsylvania reach its assigned planning targets.

- The purple section represents the progress Pennsylvania has made from 1985 through 2017.

- The green section depicts the estimated reductions that can be achieved between now and 2025 if all existing state agency permitting, compliance and enforcement initiatives are accomplished across the watershed. This will require ongoing effort to achieve these reductions through compliance. To be truly successful, these initiatives will also be more effective through additional assistance and collaboration at the local level.
- The blue section and the arrow across the bottom of the journey bar represent a series of technical, financial assistance and outreach initiatives that are now under development by the sector specific workgroups under the Phase 3 WIP Steering Committee. However, to be truly successful, these initiatives will need to be customized to each county's unique situation.
- Reductions from these initiatives will be estimated across the watershed, then customized as part of the individual countywide planning efforts to capture additional local resources and initiatives that can be added; as well as tailoring the watershed-wide initiatives to more effectively maximize these resources.
- The end result will be a countywide action plan for each county that identifies the customized partnership of local and watershed-wide initiatives that can be accomplished at the county level to reach the county planning target in the most effective manner.

## **Overview of a Few Key Steps to Consider in Developing a County-Based Action Plan for Clean Water**

Over the next few months, you will have the opportunity to engage in a unique collaborative effort to develop Pennsylvania's Phase 3 WIP. The key goal in this process is to engage partners at the county and local level to give you direct input into the planning and implementation of the practices that achieve local water quality improvements that work best for your local priorities. At the end of the day, no one knows your local community better than you.

The county-based planning process provides an opportunity to increase the knowledge, awareness, and contributions to water quality improvements of residents in your county.

Each of the counties in Pennsylvania's portion of the Chesapeake Bay watershed will receive a county-specific pollution reduction goal and a customized toolbox. County-based stakeholders will work with DEP and other partners to develop and submit county-based action plans to the DEP Chesapeake Bay Office by **October 2018**.

One of the main functions of this document and the accompanying toolbox is to assist local leaders in capturing existing or proposed local clean water initiatives. DEP is also asking local partners to provide input about the effectiveness of existing programs, in order to gain a better understanding of what is working locally, and what things you might recommend to increase pollution reductions on a broader scale.

## What is the Toolbox?

The toolbox has been developed as a starting point for each county to use to improve local water quality. It contains useful data relevant to your county to assist you with reaching local water quality goals. There is no requirement to use every tool in the toolbox! You are encouraged to add other tools as fits your local situation. The toolbox serves as a guide to assist with collaborative efforts, not as a regulatory tool. You also will find a variety of resources that may be helpful in the toolbox's appendices.

## The Basic Planning Steps for Developing Your Action Plan for Clean Water

### Include:

- Convene a countywide planning team with diverse representation;
- Define goals you wish to accomplish alongside water quality goals;
- Identify existing and needed local resources to help you meet those goals and supplement the support provided by the state and other entities;
- In partnership with the state support team, select the actions appropriate for your county to meet the identified goals and plan how they will be implemented;
- Report those actions using the templates in your county's toolbox; and
- Implement and continue to report results of your plan.

## Getting Started – Convening a Group Meeting

A first step might be to schedule a partner or stakeholder group meeting, with diverse representation, to review and consider options and opportunities. You may already have a group focused on water quality that could undertake this task. If not, you may want to work with Pennsylvania's DEP and other agencies to help you convene a representative local planning group.

Some useful criteria for selecting members in such a group include individuals with relevant specialized knowledge, who may be impacted, who will be implementing identified actions, with connections to relevant groups, and who are willing to come to the table and contribute to consensus. The following list represents groups and individuals you may want to invite to your meeting. Please note, these are merely suggestions, and do not imply a requirement.

Agriculture industry representatives	Historic preservation groups
Business Associations	Hunting, fishing and sportsmen's groups
College/University personnel	Land trusts and conservancies
Communications personnel	Local/community leaders and champions
Cooperative Extension	Local environmental consulting groups
County conservation districts	Nursery and tree-growing industry
County or municipal officials	Private funders/foundations
County or municipal planners	Rural & economic development groups
Farming associations and unions	USDA
Forest products industry representatives	Water authorities/companies
Funding institutions, co-ops, banks	Watershed groups

## Questions to Consider

The following list provides questions you and your stakeholder or partner group may want to consider in preparation for your first group discussion. There is no requirement to provide answers to these questions as part of your report on how you plan to achieve your countywide goal, as they are included as a resource to help spark conversation.

### What are our local goals and vision?

- Which local goals align with the goals of the Phase 3 WIP, and can be achieved through this process?
- How can this dovetail into local municipal separate storm sewer systems (MS4) goals? The county comprehensive plan? Capital improvement projects?
- What is our vision for our community and how can we use this process to achieve that vision?

### Can we build upon existing resources?

- How can we build upon existing projects or sites?
- Which areas of our county have the most obvious challenges?
- What initiatives or related activities are already underway? What has been accomplished?
- What types of personnel, financial, policy or other paid or volunteer resources already exist? Can they be incorporated into this process?
- What are the existing local environmental ordinances?
- How can we engage new partners?
- What is our readiness for change?

### What do we need to achieve our goals?

- What additional resources do we need? What data or other information do we need?
- What can be done?
- Where can we get the biggest bang for the buck?
- What are the easiest fixes? Low hanging fruit?
- How can local communities work together to pool funding and resources and avoid duplicating efforts?
- Who will be involved in putting new initiatives on the ground?
- How will progress and projects be tracked and reported?

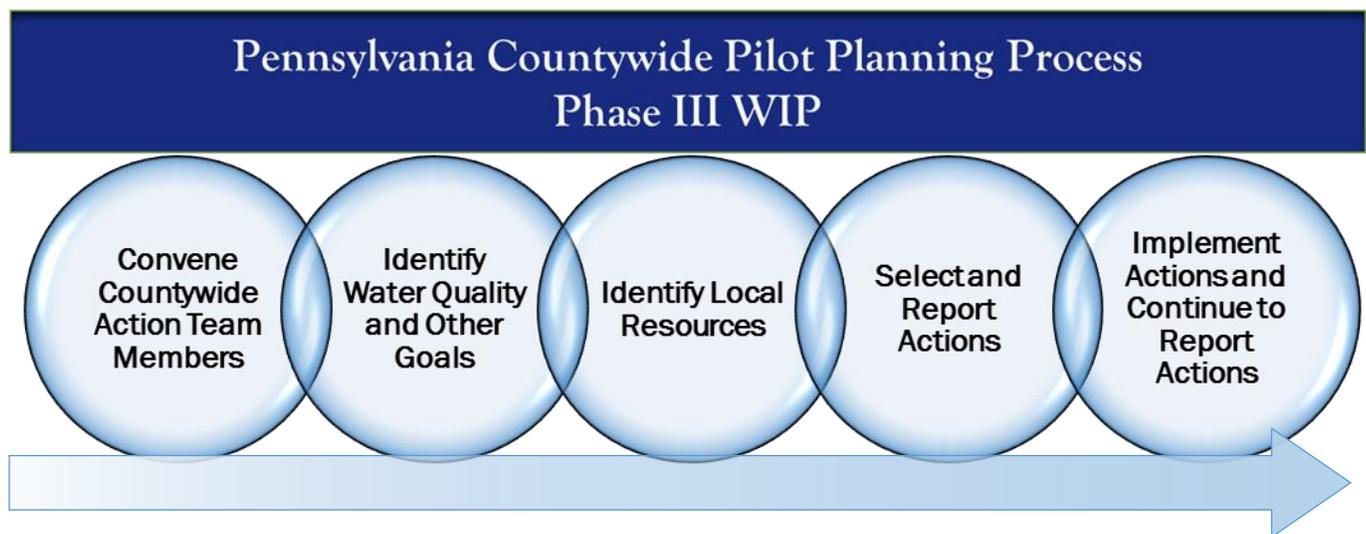
### How will we coordinate and communicate?

- How will local partners coordinate the efforts in their area?
- How will local partners communicate this effort and to whom?
- How can local partners engage and inspire resource managers and local leaders to act voluntarily?

- What does data tell us about our local area? What stories can we share with our local citizens about this?
- How will we communicate with the public?

### Sample Timeline for Planning Process

The following diagram offers a high level scenario for how the countywide process might unfold. More detailed instructions for accomplishing this process are included in your county-specific toolbox. Your countywide planning team can adjust the proposed process and timeline to ensure the final countywide action plan is submitted to the DEP Chesapeake Bay Office by **October 2018**.



### How you do this is up to the local leaders in each county!

Each countywide planning team will have many options to decide for themselves:

- Who should serve on the countywide planning team;
- Who will lead the countywide planning team;
- Which co-benefit goals they wish to work on in addition to the local water quality goals;
- Which resources will be most helpful in meeting those goals; and
- Which steps will be taken to meet those goals, and by whom.

### Reporting Local Plans – Establishing a Countywide Implementation Team

Throughout the planning process, countywide planning team members will need to discuss how, when, and who will be needed to move into an implementation and reporting phase. Rather than starting all over again, it is recommended that the countywide planning team identify several members to serve as the implementation team. The tasks for each implementation team to accomplish may vary by county depending on local goals.

## Reporting Progress

The implementation team may oversee the annual reporting of these elements, identifying and addressing problems as they arise. They may also serve as a conduit for information and resources provided by the DEP Chesapeake Bay Office and county Support Team on an ongoing basis.

Each county-based implementation team will need to identify:

- Inputs – available and needed resources, both public and private.
- Process – what is each partner able to contribute? Where and by when?
- Outputs and outcomes – both short and long-term. These are the goals and objectives that need to be achieved, and the intermediate indicators that will measure progress.
- Implementation challenges – identify any potential issues or roadblocks to implementation that could impede outputs and outcomes.

**Please note that the following is an example of the form to be used by county-based implementation teams. The actual form and detailed instructions for completing it are included in your county-specific toolbox.**

Phase 3 Watershed Implementation Plan (WIP) Planning and Progress Template								
DRAFT / Examples in Italics								
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	Resources Available: Technical & Funding	Resources Needed: Technical & Funding	Potential Implementation Challenges/Issues
<b>Priority Initiative 1: Improve Trout Habitat of xxx Creek</b>								
1.1	Dam removal and stream restoration	Remove dam and restore 1,000 feet of impaired stream channel	PA Fish and Boat Commission, Trout Unlimited, and YYY Twp.	xxx Creek at SR?? Bridge, YYY Twp.	March through Sept. 2019	Project Planning Completed. \$xx from ?? agency allocated	XX staff resources for future Verification Inspection	Adjacent property access required
1.2	Install Stream Exclusion Fence w/ Forest Buffer	Buffer an additional 15 acres of stream corridor through YYY Twp.	County Cons. Dist., NRCS	YYY Twp.	June through Sept. 2019	Xx resources for project coordination \$xx from ?? agency	XX staff Buffer Maintenance/ Inspections	
<b>Priority Initiative 2: Address Flooding of ZZZ Creek in QQQ Boro</b>								
2.1	Improve SW management and infiltration	Reduce impervious surfaces, retrofit aging SW basins to meet current standards	Shopping Center Development Corp., County Planning Office, QQQ Boro	QQQ Boro	To begin July 2019 and extend through 2024	Boro Engineer support, Partial DCED Funding	Boro Oversight and Inspections	To be applied as building permits issued

**Each county-based local area will use the *Phase 3 WIP Planning and Progress Template* to identify:**

1. Inputs – These are both existing and needed resources, public and private, to implement the identified priority initiative. These include both technical and financial resources, such as personnel, supplies, equipment and funding.
2. Process – what is each partner able to do, where and by when. These are the action items listed under each priority initiative.
3. Outputs and outcomes – both short and long-term. These are the priority initiatives identified by each county. The performance targets are the intermediate indicators that will measure progress.
4. Implementation challenges – any potential issues or roadblocks to implementation that could impede outputs and outcomes.

**For each Priority Initiative or Program Element listed in the template:** Use the fields, defined below, to identify the inputs and the process that will be followed to achieve each priority initiative. This is the “who, what, where, when and how” of the plan:

**Description** = What. This may include programs that address prevention, education, or as specific as planned BMP installations that will address the Priority Initiative. A programmatic or policy effort will require some ability to quantify the anticipated benefits which will allow calculation of the associated nutrient reductions.

**Performance Target** = How. This is an extension of the Description above. The Performance Target details the unique BMPs that will result from implementation of the Priority Initiative and serves as a benchmark to track progress in addressing the Priority Initiative. Performance Targets may be spread across multiple Responsible Parties, Geographies, and Timelines based on the specifics of the Initiative.

**Responsible Party(ies)** = Who. The key partner(s) who will implement the action items through outreach, assistance or funding, and who will be responsible for delivering the identified programs or practices.

**Geographic Location** = Where. This field identifies the geographic range of the planned implementation. This could extend to the entire county or down to a small watershed, based on the scale of the Priority Initiative, range of the Responsible Party, or planned funding/resources. *NOTE: Resource limitations alone should not limit potential implementation, as additional funding may become available in the future.*

**Expected Timeline** = When. Provide the expected completion date for the planned activity. This should be a reasonable expectation, based on knowledge and experience, that will aid in tracking progress toward addressing the Priority Initiative.

**Resources Available: Technical & Funding** = This field will note technical and financial resources secured/available to implement the program (Description).

**Resources Needed: Technical & Funding** = This field will note technical and financial resources needed/outstanding to implement the program (Description).

**Potential Implementation Challenges/Issues** = This field will note challenges and issues that may delay program implementation (Description).

The Priority Initiatives that you outline in the **Phase 3 WIP Planning and Progress Template** will be used by the DEP technical group to create a scenario in the Chesapeake Assessment Scenario Tool (CAST) application (<http://cast.chesapeakebay.net/>). This application is used to calculate the nutrient reductions associated with the planned activities that you provide.

<b>Detailed BMP Entry Form Template</b> (with example from Priority Initiative 1 in the Phase 3 WIP Planning and Progress Template above)							
Objective ID/Project Description/Opt. Text Field	<b>BMP Name</b>	<b>Measurement Name</b>	<b>Measurement Unit</b>	<b>BMP Extent</b>	<b>County</b>	<b>Priority Watershed (Optional)</b>	<b>Land Use Selection</b>
1.1	Stream Restoration Ag	Length Restored	FEET	1000			Agricultural
1.2	Exclusion Fence with Narrow Forest Buffer	Acres	ACRE	15			Pasture

The **Detailed BMP Entry Form Template** above offers a streamlined approach to develop scoping scenarios that will be used by the Commonwealth’s technical workgroup to calculate the nutrient reductions associated with your plan. In addition to the template above, more specific details of BMP implementation at the component level need to be developed to allow for CAST model processing and future tracking and reporting.

**Bolded** column headings in the Detailed BMP Entry Form Template are mandatory, and BMPs can be added using the dropdown menus which will associate the correct measurement name and measurement unit options with the selected practice. This Excel template is available for download and use here:

[http://www.dep.pa.gov/Business/Water/Pennsylvania%e2%80%99s%20Chesapeake%20Bay%20Program%20Office/WIP3/Pages/Phase-III-WIP-\(Watershed-Implementation-Plans\).aspx](http://www.dep.pa.gov/Business/Water/Pennsylvania%e2%80%99s%20Chesapeake%20Bay%20Program%20Office/WIP3/Pages/Phase-III-WIP-(Watershed-Implementation-Plans).aspx)

**Following is a description of the fields found in the *Detailed BMP Entry Form Template*:**

**Objective ID/Practice Description/Optional Text Field** = This field is a text field that can be used to link the practice to the Priority Initiative or other descriptive text from the Priority Initiative/Programmatic BMP template.

**BMP Name** = The Chesapeake Bay Program BMP name for the practice, which can be selected from the dropdown menu of available BMPs in the Excel template located at:

[http://www.dep.pa.gov/Business/Water/Pennsylvania%e2%80%99s%20Chesapeake%20Bay%20Program%20Office/WIP3/Pages/Phase-III-WIP-\(Watershed-Implementation-Plans\).aspx](http://www.dep.pa.gov/Business/Water/Pennsylvania%e2%80%99s%20Chesapeake%20Bay%20Program%20Office/WIP3/Pages/Phase-III-WIP-(Watershed-Implementation-Plans).aspx)

**Measurement Name** = This is the measurement method associated with the BMP and will auto-populate in the Excel spreadsheet, or offer a dropdown of available options for reporting, based on the BMP Name selected.

**Measurement Unit** = The text name of the units of measure for the designated practice. This will auto-populate in the Excel spreadsheet with selection of BMP Name, or offer a dropdown of available options for reporting.

**BMP Extent** = The actual quantity of additional units of BMP to be implemented, reported in the Measurement Unit designated.

**County** = County to which these BMPs should be credited.

**Priority Watershed** (optional) = If planning is specific to a priority watershed within the county, this watershed can be identified here.

**Land Use Selection** (optional) = Locating BMPs to designated Chesapeake Bay Model Land Uses increases the accuracy of modeling output. If no value is given, the BMP will be applied to the sector generally and spread across available Land Uses within that sector. "Regulated" land uses refer to the Urbanized Area (MS4) on Developed land and permitted Concentrated Animal Feeding Operations on Agricultural land. Combined Sewer System (CSS) or Combined Sewer Outfall (CSO) lands are associated with urban lands located within the catchment of the combined sewer system.

In addition to these templates, you will find a ***County Resources Inventory Template*** in your county toolbox that is intended to inventory all resources that may assist you with efforts to improve local water quality. These resources can include, but are not limited to dollars, land, staff time or match. Programs that have already been identified and entered at the federal and state level will be provided, while the remaining space is to be filled in locally with both past and potential future resources.

## Help is Available

It is important to remember that you are not alone in this effort!

Pennsylvania DEP and partners have developed a county-specific toolbox, which details your county's water quality challenges, pollution reduction goals, and numerous other resources to help ensure your success.

Additionally, a support team comprised of PA DEP Chesapeake Bay Office and technical staff, representatives from the EPA Chesapeake Bay Program Office, the Susquehanna River Basin Commission, the Interstate Commission of the Potomac River Basin, and members from the different sector workgroups that have helped Pennsylvania develop its Phase 3 WIP planning effort, will be available as needed.

This Support Team will participate in the creation of this local customized partnership to achieve the county planning goals. They can provide the following:

- Additional explanation and assistance with the use of the data presented in the county-based toolbox.
- The running of different scenarios based on action steps identified by the county-based planning team to identify the reductions achieved.
- Planning and facilitation of planning team meetings and the documenting the decisions made.
- The completion of the templates provided for the capturing of the countywide action plan.

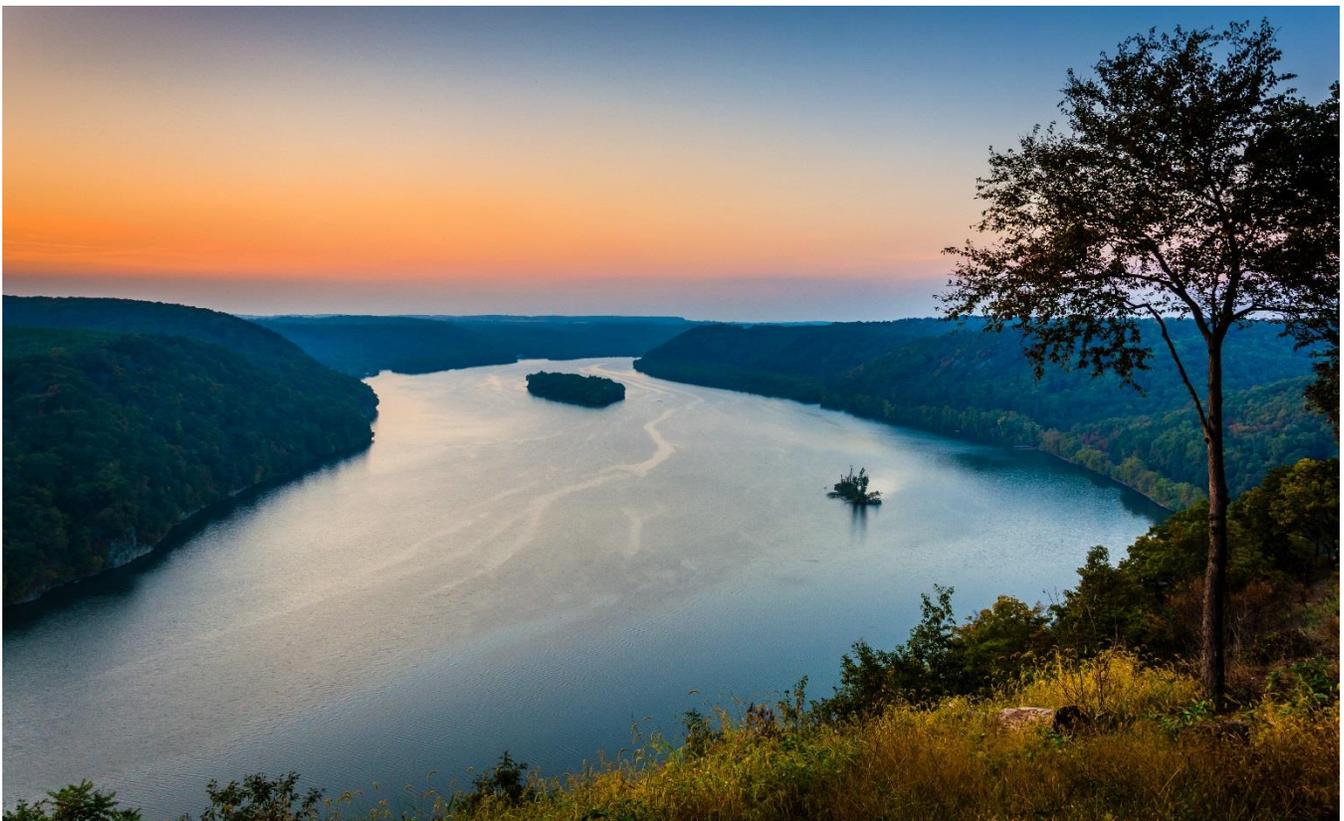
For more information:

[http://www.dep.pa.gov/Business/Water/Pennsylvania%e2%80%99s%20Chesapeake%20Bay%20Program%20Office/WIP3/Pages/Phase-III-WIP-\(Watershed-Implementation-Plans\).aspx](http://www.dep.pa.gov/Business/Water/Pennsylvania%e2%80%99s%20Chesapeake%20Bay%20Program%20Office/WIP3/Pages/Phase-III-WIP-(Watershed-Implementation-Plans).aspx)

# ***LANCASTER COUNTY COMMUNITY CLEAN WATER TOOLBOX***

**A County-Based Action Plan for Clean Water**

**June 2018**



# **LANCASTER COUNTY COMMUNITY CLEAN WATER TOOLBOX**

## **Resources to Help You Develop A County-Based Action Plan for Clean Water**

Pennsylvania Watershed Implementation Plan (WIP) Local Planning  
Process to Meet Countywide Goals

June 2018

# **LANCASTER COUNTY COMMUNITY CLEAN WATER TOOLBOX**

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# **LANCASTER COUNTY TOOLBOX**

## Pennsylvania Phase 3 Watershed Implementation Plan (WIP)

### Local Planning Process to Meet Countywide Goals

## **Introduction**

Welcome to your Community Clean Water Toolbox.

This document has been prepared to help you improve local water quality. This collaborative effort is being made throughout Pennsylvania's portion of the Chesapeake Bay Watershed. Each Pennsylvania county within the watershed will have a Toolbox with similar components tailored to that county's specific conditions.

### **What is the Toolbox?**

This toolbox has been developed as a starting point for each county to use to improve local water quality. It contains useful and specific data and information relevant to your county to assist you with reaching local water quality goals.

No county is required to use every tool in this toolbox! You are encouraged to add other tools as fits your local situation. This toolbox serves as a *guide* to assist with collaborative efforts, *not* as a regulatory tool.

You also will find a variety of resources that may be helpful in the Toolbox's Appendices.

## **Appendix I: The Local Story: Opportunities to Improve Local Water Quality and Meet Countywide Goals**

Information is available that can help inform local planning strategies. This information can help answer questions like:

- What is the water quality like in my area?
- How has it been changing?
- What are important sources of nutrients and sediments in my area?
- What opportunities exist to address these sources?
- Where geographically should we focus our efforts?

This Toolbox provides information to help answer those questions and to tell the local story of water quality in your county. In this Toolbox, you'll find information on local water quality, local sources and drivers of nutrients and sediments, best management practice information, and additional available resources.

The information in this Toolbox and the guidance provided for its use are meant to act as a starting point to help answer some common questions that arise during planning. Local groups can utilize whichever pieces of information they find most useful, supplement with their own local knowledge, and use the additional resources listed to find more information.

We hope this Toolbox gives you a foundation to build off in telling Lancaster County's local story and in identifying opportunities for meeting local goals.

## Pennsylvania's Clean Water Goal

**Figure 1. Pennsylvania Planning Targets**

Year	Nitrogen (M lbs/year)		Phosphorus (M lbs/year)	
	Delivered to the Bay	Delivered to Local PA Waterways	Delivered to the Bay	Delivered to Local PA Waterways
1985(Actual)	122.02	183.88	6.046	14.857
2017 (Actual)	107.31	161.94	3.801	9.640
2025 (Final TMDL Planning Target)	73.18	110.88	3.044	7.619
Remaining Reductions to be Achieved Through Local Planning Goals *	34.31	51.06	0.757	2.021

\*This table does not account for future (beyond 2025) pollution loads and potential impacts such as climate change, development and growth, and potential infrastructure or (cost of doing business) which may alter the amount of sediment reaching the Bay (currently held in place by the Conowingo Dam).

## Lancaster County's Clean Water Goal

**Figure 2. Countywide Goal for Lancaster County**

Year	Nitrogen (M lbs/year)	Phosphorus (M lbs/year)
	Delivered to Local Lancaster County Waterways	Delivered to Local Lancaster County Waterways
No Action	34,305,509	2,306,521
1985 (Actual)	32,610,837	1,789,271
2017 (Actual)	27,193,871	1,265,040
2025 (Final TMDL Planning Target)	15,729,211	796,735
Remaining Load to be Achieved Through Local Planning Goals *	11,464,660	468,305

The nitrogen and phosphorus planning targets for Pennsylvania in Figure 1 (above) are broken down into local planning goals for your county in Figure 2 (above). Added together across all counties, these goals will help Pennsylvania reach its assigned nutrient reduction planning targets.

## Depiction of Lancaster County's Goal

Figure 3. Hypothetical Journey to Lancaster County's Goal

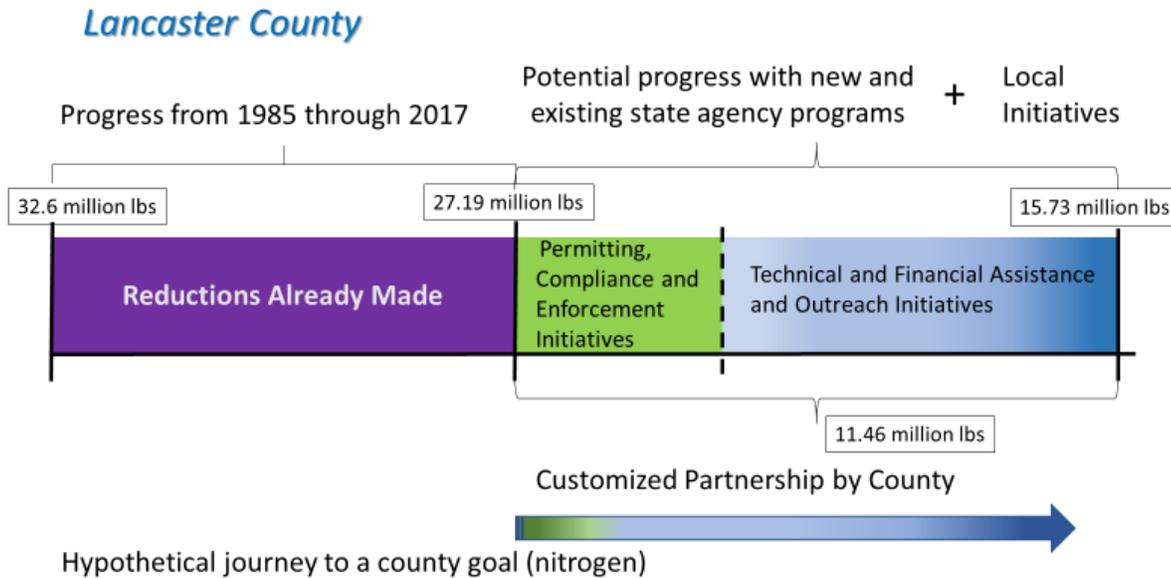


Figure 3 represents Lancaster County's hypothetical journey to countywide goals and overall water quality targets. Moreover, it represents Lancaster County's journey to clean water:

- The purple section represents the progress Lancaster County has made from 1985 through 2017.
- The green section depicts the estimated reductions that can be achieved between now and 2025 if all existing state agency permitting, compliance and enforcement initiatives are accomplished across the watershed. This will require ongoing effort to achieve these reductions through compliance. To be truly successful, these initiatives will also be more effective through additional assistance and collaboration at the local level.
- The blue section and the arrow across the bottom of the journey bar represent a series of technical, financial assistance and outreach initiatives that are now under development by the sector specific workgroups under the Phase 3 WIP Steering Committee. However, to be truly successful, these initiatives will need to be customized to each county's unique situation.
- Reductions from these initiatives will be estimated across the watershed, then customized as part of the individual countywide planning efforts to capture additional local resources and initiatives that can be added; as well as tailoring the watershed-wide initiatives to more effectively maximize these resources.
- The end result will be a countywide action plan for each county that identifies the customized partnership of local and watershed-wide initiatives that can be accomplished at the county level to reach the county planning target in the most effective manner.

## A Summary of Lancaster County's Water Quality Story

### Current Conditions of Lancaster County's Streams

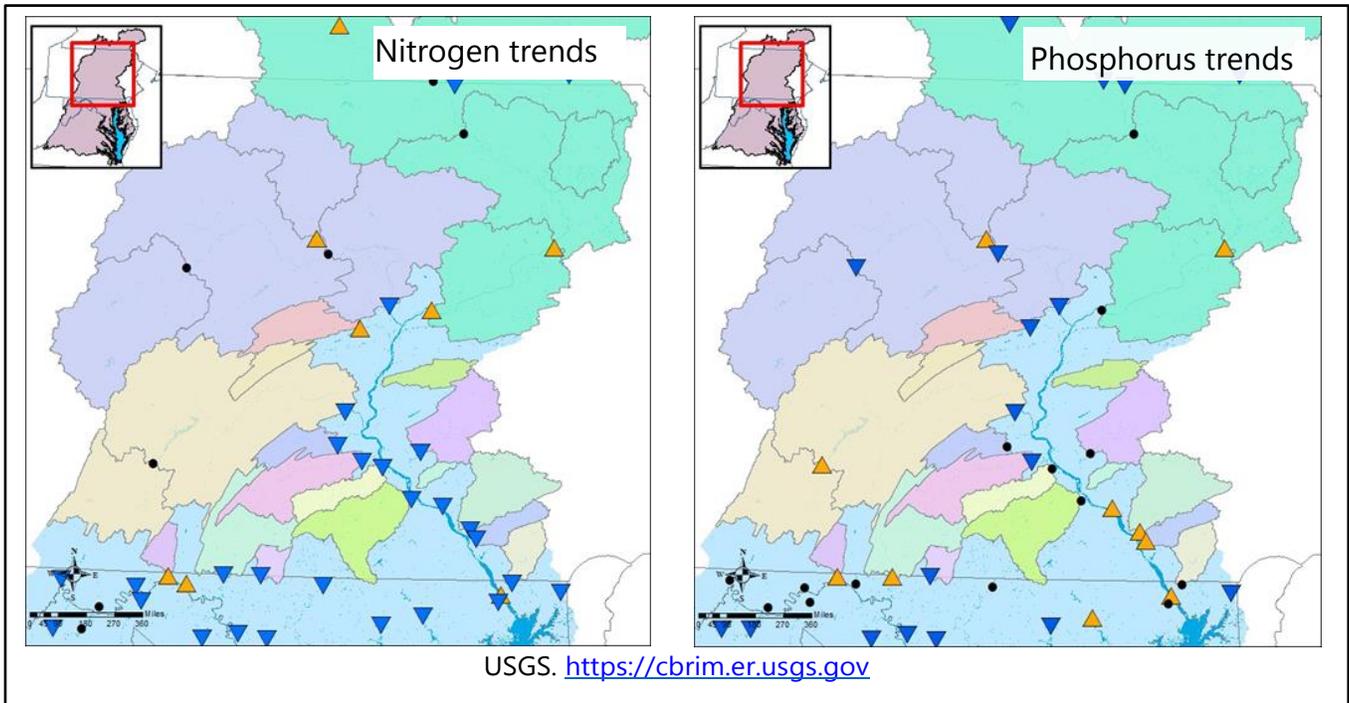
- Monitoring shows that streams in Lancaster County have the highest amounts of nitrogen, phosphorus and sediment of all monitored streams in the Chesapeake Bay region relative to watershed size.
- Water quality in Lancaster County's streams is changing over time:
  - The amount of nitrogen is going down in local streams, which means conditions are improving.
  - The amount of phosphorus is going up in the Pequea Creek and Conestoga Creek watersheds, which means conditions are degrading.
  - The amount of sediment is going up in the Octoraro Creek watershed, which means conditions are degrading. The amount of sediment is going down in the Conestoga River watershed, which means conditions are improving.

### Sources of Nutrients & Sediment in Lancaster County

- Streams in agricultural and developed/urban areas have the highest amounts of nitrogen, phosphorus and sediment; most nutrients and sediment in Lancaster County's streams are coming from agricultural and developed/urban lands.
- Effective management will address the specific sources of nutrients and sediment in Lancaster County:
  - On agricultural lands, the majority of nutrients are applied to the land as manure.
  - On developed/urban lands, the majority of nutrients entering local streams comes from stormwater outside regulated municipal separate stormwater sewer system (MS4) areas.
  - Wastewater and septic contribute a small portion of the nutrients to local streams, but can be important locally.
  - Most of the phosphorus and sediment in local streams comes from overland runoff during rain events; the most effective management practices reduce application of phosphorus to the land, reduce runoff of sediment, and reduce soil erosion.
  - Most of the nitrogen in streams in Lancaster County comes from groundwater, therefore the most effective management practices will reduce application of nitrogen to the land or prevent nitrogen from entering groundwater.
  - In both agricultural and developed/urban areas, erosion of stream banks are important sources of sediment to local streams.

## Opportunities for Implementation in Lancaster County

- Chiques Creek, Pequea Creek, Conestoga Creek and Cocalico Creek are all effective places to manage nitrogen, phosphorus and sediment in Lancaster County.
- Some effective practices to address nutrients and sediment are currently being implemented in Lancaster County, but there are many more opportunities within the county to increase implementation of those practices and to implement even more effective and cost-effective practices than those currently in place.



## Water quality trends vary geographically and patterns are changing across Pennsylvania's Chesapeake Bay Watershed

Understanding Pennsylvania's regional water quality trends can put trends in local watersheds, like those in Lancaster County, in perspective.

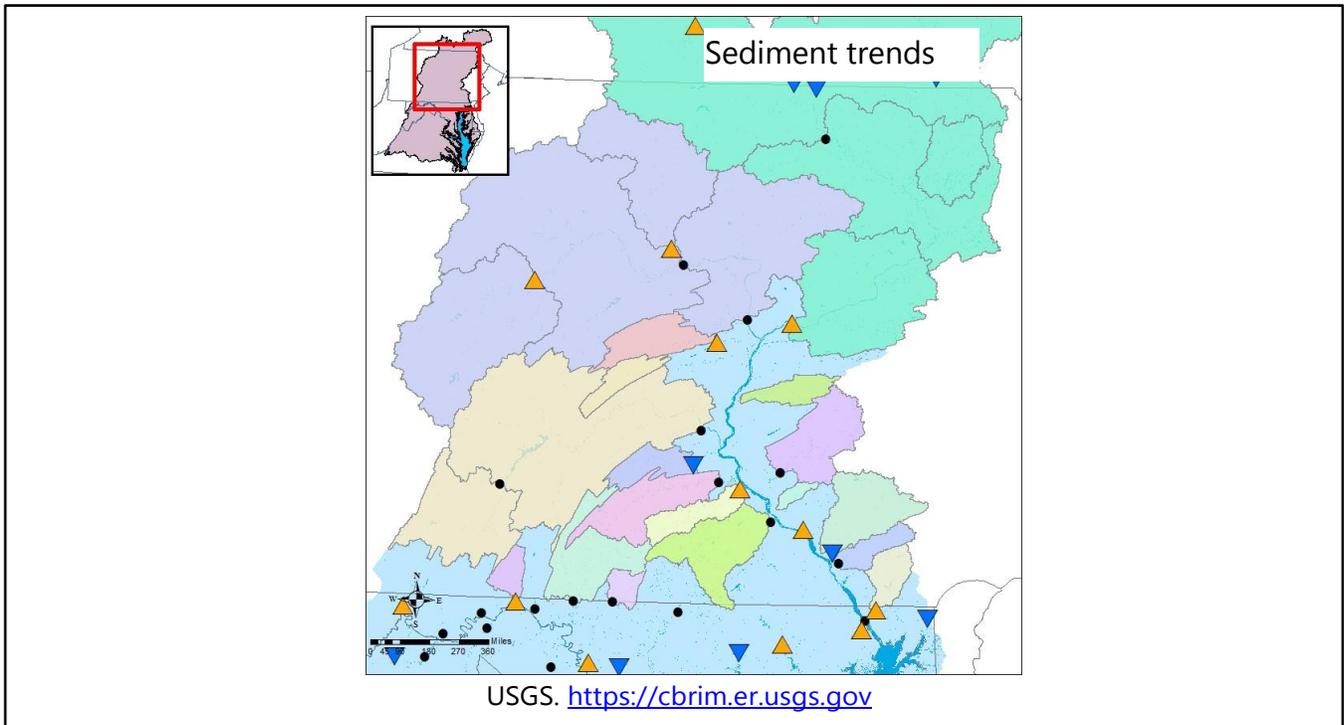
In addition to providing real-time water quality data, the USGS monitoring stations help to identify changes in water quality over time. These maps demonstrate nitrogen and phosphorus trends from 2007-2016.

- Blue downward triangles = improving conditions
- Orange upward triangles = degrading conditions
- Black dots = no trend

These results tell us that:

- Nitrogen levels in streams have been improving throughout the region with a few exceptions.
- Phosphorus levels show varying patterns depending on local watershed, reflecting local changes. Trends in the lower Susquehanna are degrading.

Water quality trends for the USGS non-tidal stations are available at:  
<https://cbrim.er.usgs.gov/summary.html>.



## Water quality trends vary geographically and patterns are changing across Pennsylvania's Chesapeake Bay Watershed

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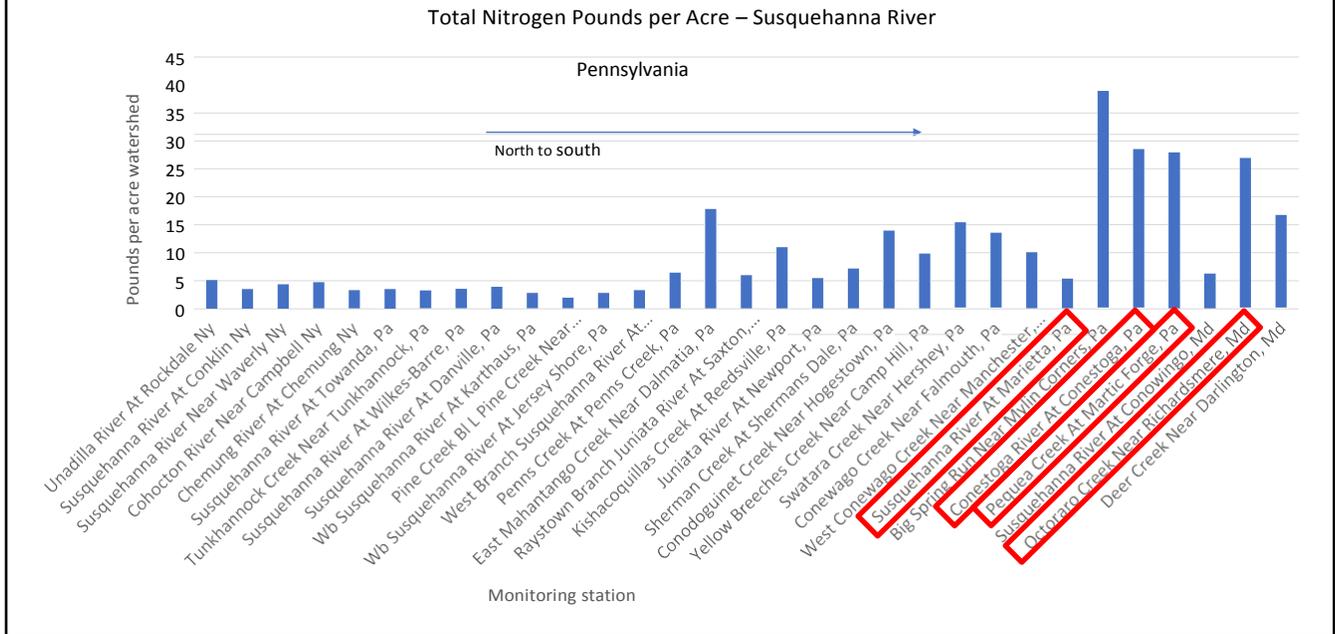
These results tell us that:

- Sediment levels show varying patterns depending on local watershed, reflecting local changes. In many cases across the region these trends are degrading.

Water quality trends for the USGS non-tidal stations are available at:

<https://cbrim.er.usgs.gov/summary.html>.

## USGS Monitoring Data Show Excess Nitrogen Levels in the Lower Susquehanna River Watershed



Source: USGS <https://cbrim.er.usgs.gov/>

Understanding where nutrients and sediment are highest across Pennsylvania streams can help focus planning efforts, especially in small watersheds.

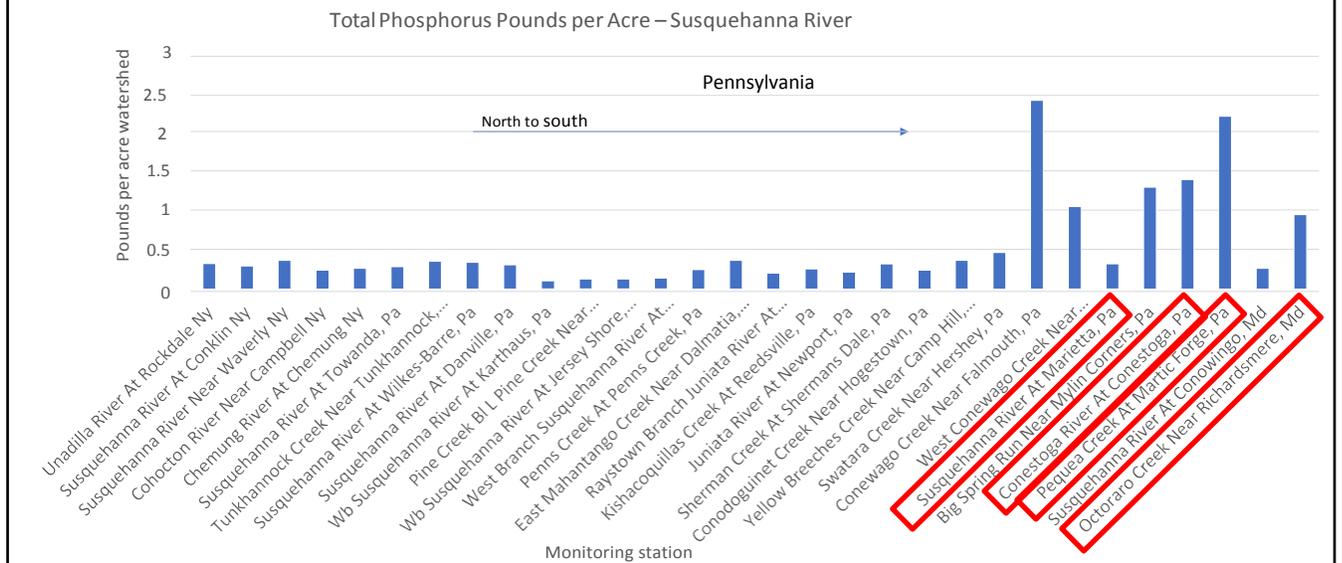
In the graph above, the bars show the annual pounds of nitrogen measured at monitoring stations divided by the acres of watershed draining into that station. The larger the bar, the more nitrogen there is in the watershed's streams relative to its size, and the greater the impact on streams.

Small watersheds in the Lower Susquehanna, including those in Lancaster County, have some of the highest amounts of nitrogen relative to their size. These watersheds can be some of the most effective places to manage nitrogen.

Lancaster County's small watersheds have high amounts of both nitrogen and phosphorus (next page), making them effective places to manage both simultaneously.

Water quality trends for the USGS non-tidal stations are available at: <https://cbrim.er.usgs.gov/summary.html>

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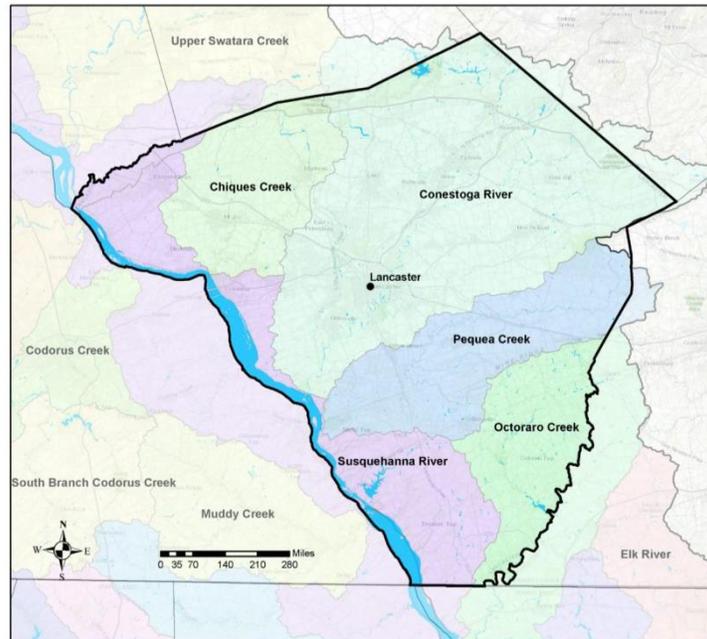
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Small watersheds in the Lower Susquehanna, including those in Lancaster County, have some of the highest amounts of phosphorus relative to their size. These watersheds can be some of the most effective places to manage phosphorus.

Lancaster County small watersheds have high amounts of both nitrogen (previous page) and phosphorus, making them effective places to manage both simultaneously.

Water quality trends for the USGS non-tidal stations are available at: <https://cbrim.er.usgs.gov/summary.html>.

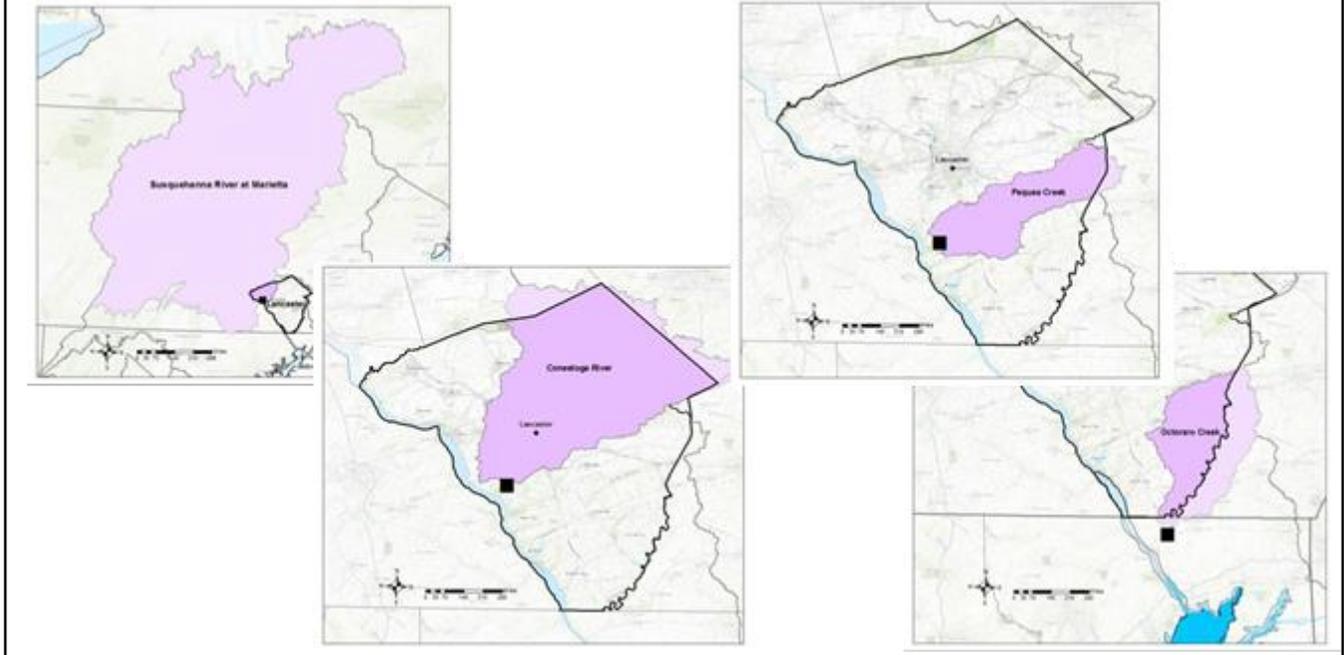
## Lancaster County's Local Watersheds



<https://cbrim.er.usgs.gov>

**The following pages provide in-depth information on local water quality in Lancaster County's monitored watersheds.**

## Water quality monitoring stations for Lancaster County's watersheds



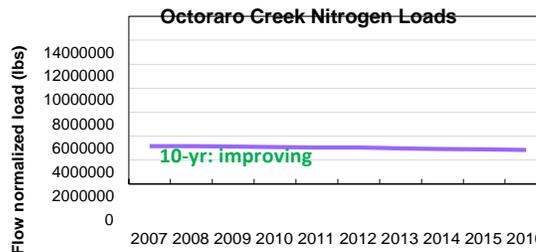
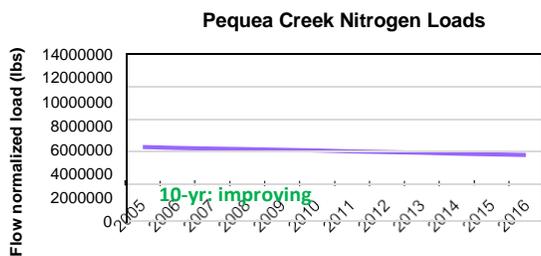
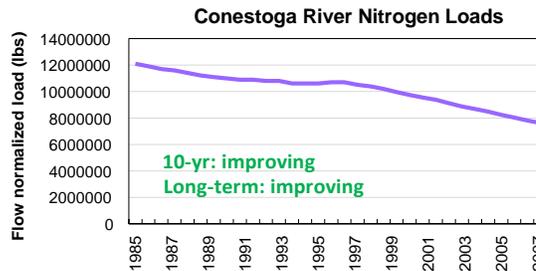
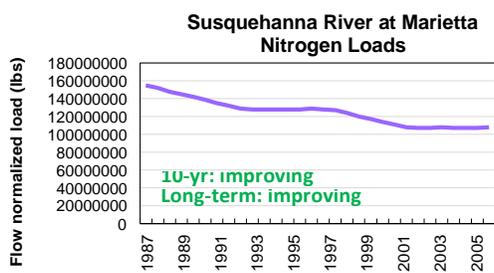
Four USGS monitoring stations (small squares) measure water quality in Lancaster County's watersheds. These maps depict the areas that drain into each of those monitoring stations.

- The Susquehanna River at Marietta measures water quality in the Susquehanna River, and therefore captures the regional picture of the entire Susquehanna River watershed above the monitoring station. This is the last monitoring station on the Susquehanna River before the Conowingo Dam.
- The Conestoga River and Pequea Creek monitoring stations and majority of the watersheds' areas are in Lancaster County.
- The majority of the Octoraro Creek watershed is in Lancaster County, but the monitoring station is in Maryland.

Water quality trends for the USGS non-tidal stations are available at:

<https://cbrim.er.usgs.gov/summary.html>.

## Nitrogen levels have been improving (going down) over time in Lancaster County's watersheds



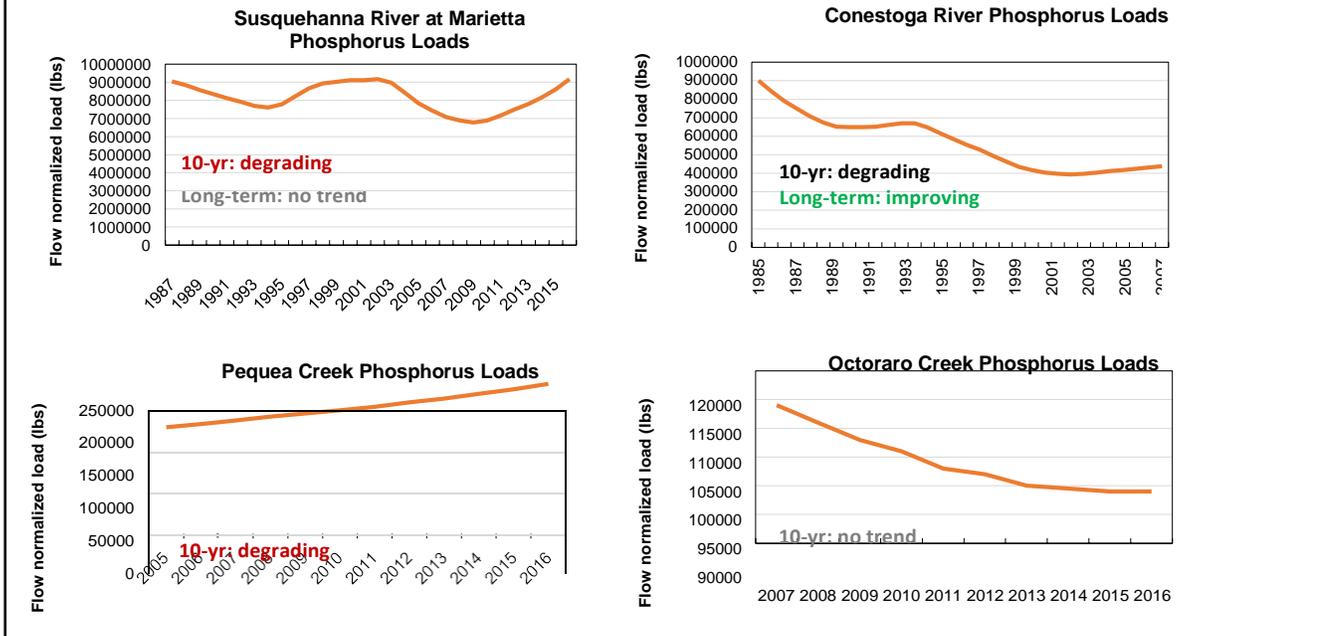
The monitored watersheds within Lancaster County show improving nitrogen trends (meaning that nitrogen is decreasing).

- Of Lancaster County's three local monitored watersheds (Conestoga, Pequea and Octoraro), Conestoga River has much higher nitrogen than Pequea and Octoraro. This is partially due to its larger size.
- The previous bar graphs show that when size is taken into account, the nitrogen load per acre of watershed is similar between these three, and that they are some of the highest loading watersheds in the Susquehanna River Basin.
- These watersheds would all be effective areas to focus efforts.
- Decreasing nitrogen is a result of decreasing deposition of nitrogen from the atmosphere onto the watershed (a result of the Clean Air Act), wastewater treatment plant upgrades, and some agricultural practices.

The graphs above take into account variability between years in river flow.

For more information, visit: <https://cbrim.er.usgs.gov/summary.html>.

## Phosphorus levels in Lancaster County streams vary – most sites show degrading conditions over the past 10 years



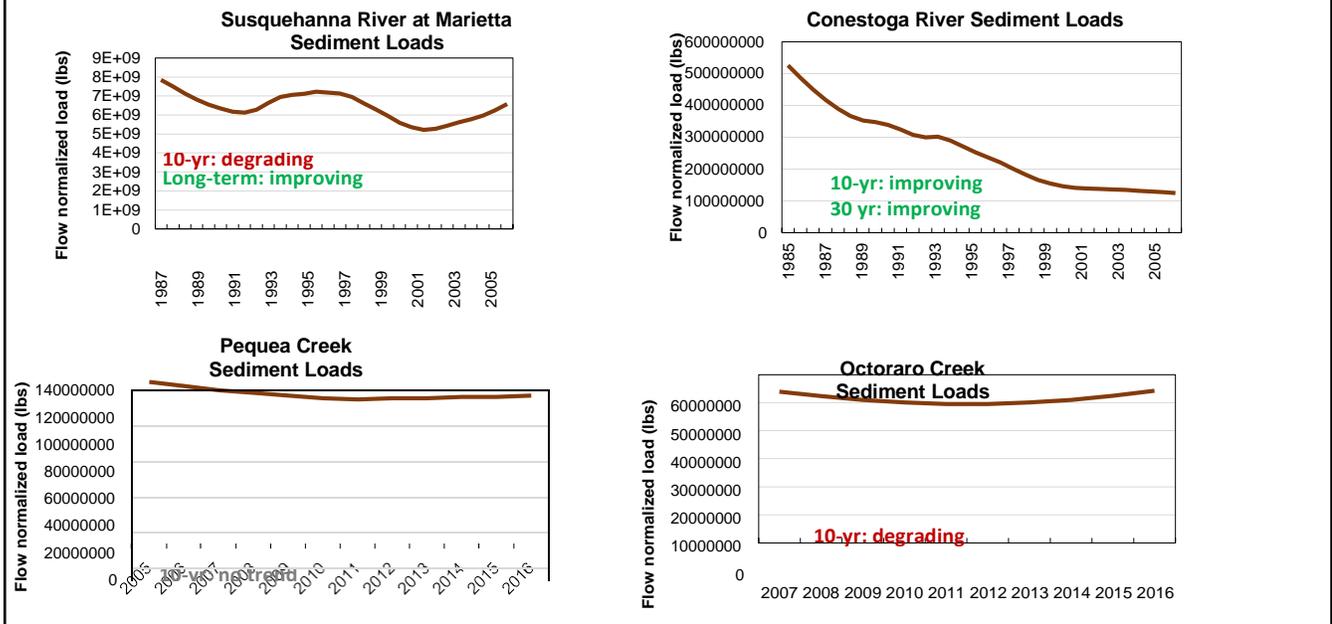
The monitored watersheds within Lancaster County show varying phosphorus trends (some are improving and some are degrading).

- Of Lancaster County's three local monitored watersheds (Conestoga, Pequea and Octoraro), Conestoga River has much higher phosphorus than Pequea and Octoraro. This is partially due to its larger size.
- The previous bar graphs shown previously show that when size is taken into account, the phosphorus load per acre of watershed is actually highest in Pequea Creek. All three are some of the highest loading watersheds in the Susquehanna River Basin.
- The high loads and degrading trends in these watersheds make them effective areas to focus efforts.

The graphs above take into account variability between years in river flow.

For more information, visit: <https://cbrim.er.usgs.gov/summary.html>.

## Sediment levels in Lancaster County's streams vary – some streams have improved while others have degraded

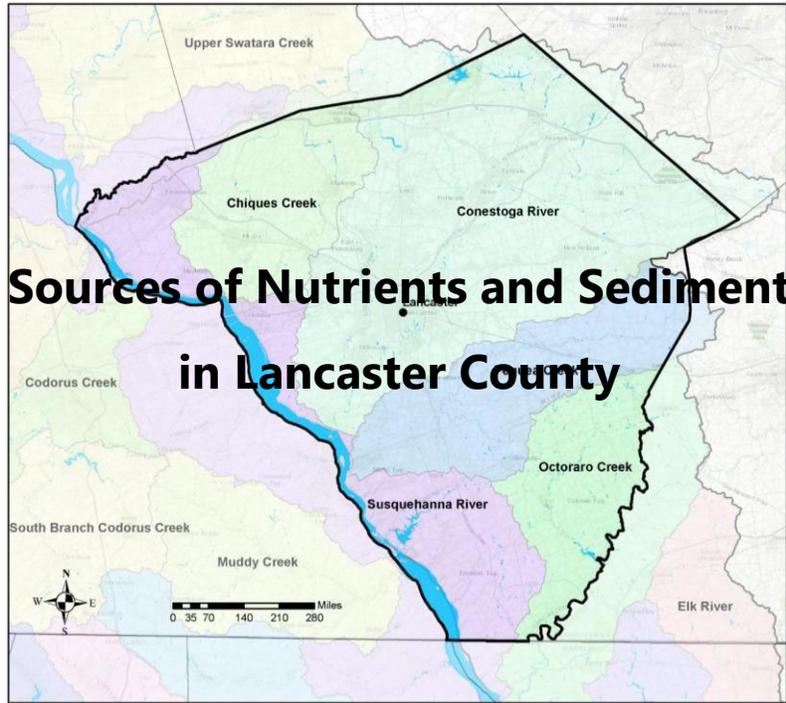


The monitored watersheds within Lancaster County show varying sediment trends (some are improving and some are degrading).

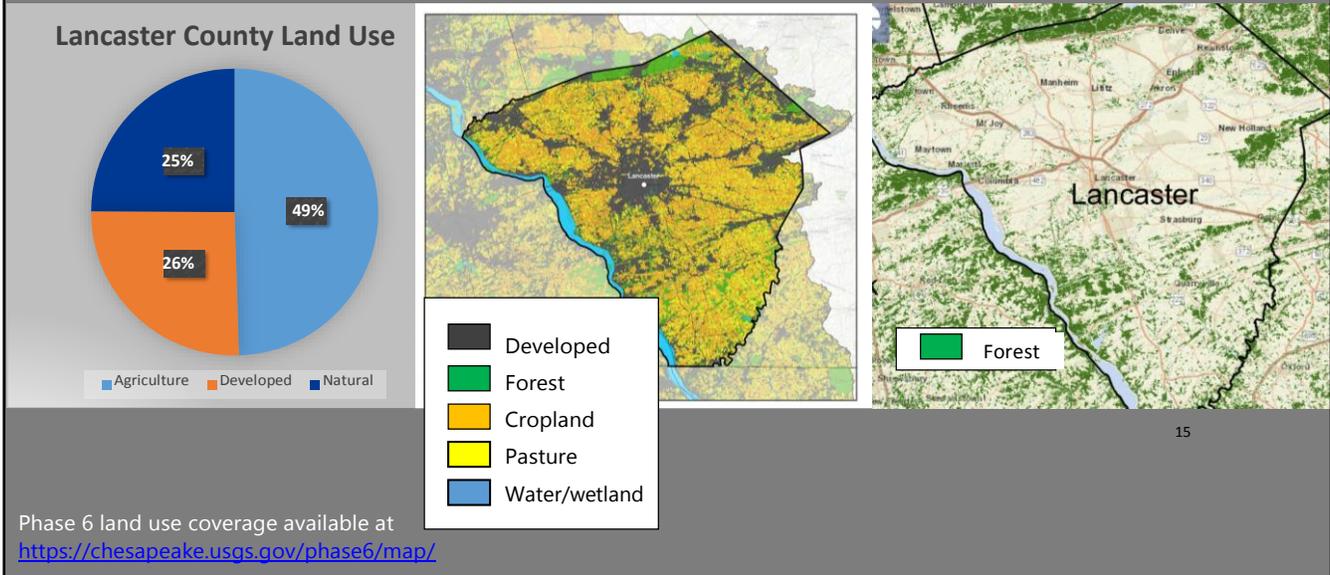
- Of Lancaster County's three local monitored watersheds (Conestoga, Pequea and Octoraro), Conestoga River has much more sediment than Pequea and Octoraro. This is partially due to its larger size.
- The bar graphs shown previously show that when size is taken into account, the phosphorus load per acre of watershed is actually highest in Pequea Creek. All three are some of the highest loading watersheds in the Susquehanna River Basin.
- The high loads and degrading trends in these watersheds make them effective areas to focus efforts.
- Phosphorus often travels attached to sediment. When phosphorus and sediment trends differ, it can be indicative of changes in dissolved phosphorus (not attached to sediment).

The graphs above take into account variability between years in river flow.

For more information, visit: <https://cbrim.er.usgs.gov/summary.html>.



# Lancaster County has much less forested land than most other Pennsylvania counties

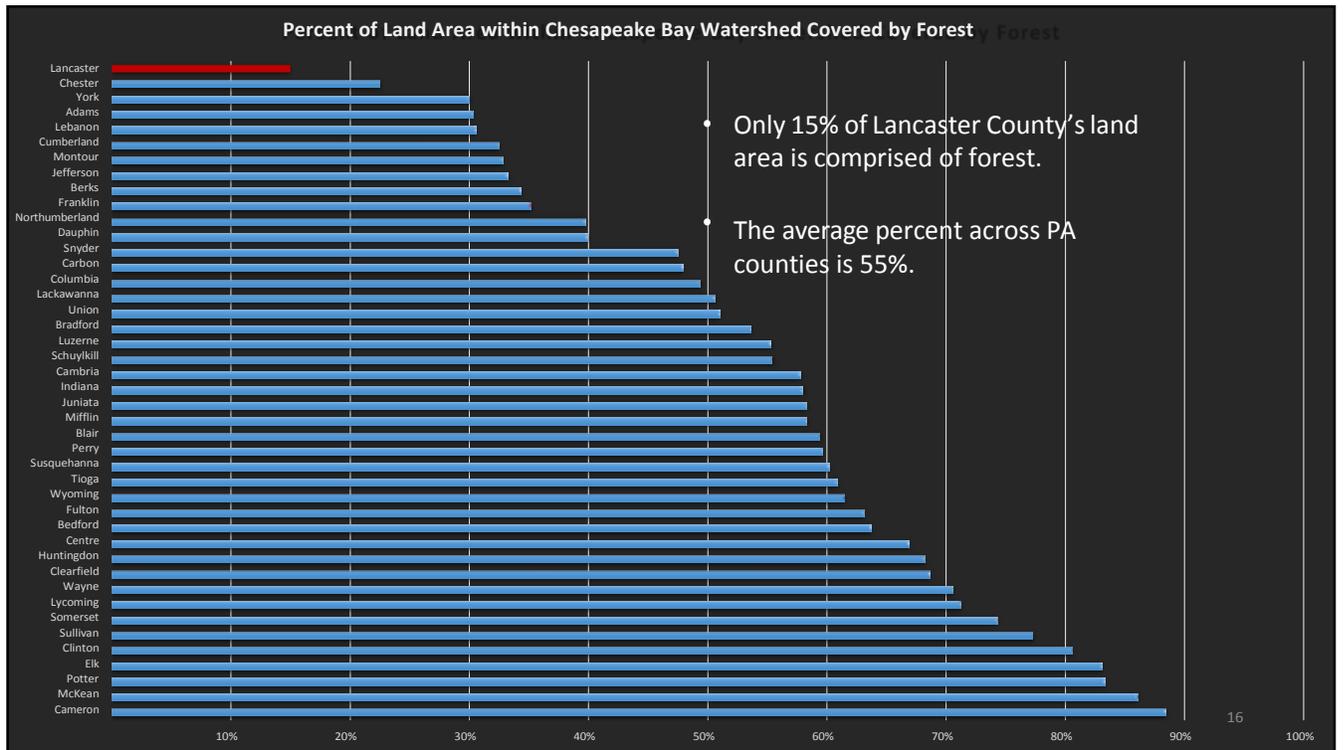


Lancaster County has unique challenges in restoring water quality.

- The pie chart above shows the breakdown of land uses in Lancaster County. Almost 75 percent of the county is agricultural or developed land, which is higher than most other counties in Pennsylvania.
- The maps above show the geography of land uses (middle) and specifically the small amount of forested land in the county (right).
- Agricultural and developed land generate more nutrients and sediment than forested land. Lancaster County has unique local water quality challenges in part due to its high acreage of these land uses.

High resolution land-use for the Chesapeake Bay watershed is available from USGS and the Chesapeake Bay Program at: <https://chesapeake.usgs.gov/phase6/>.

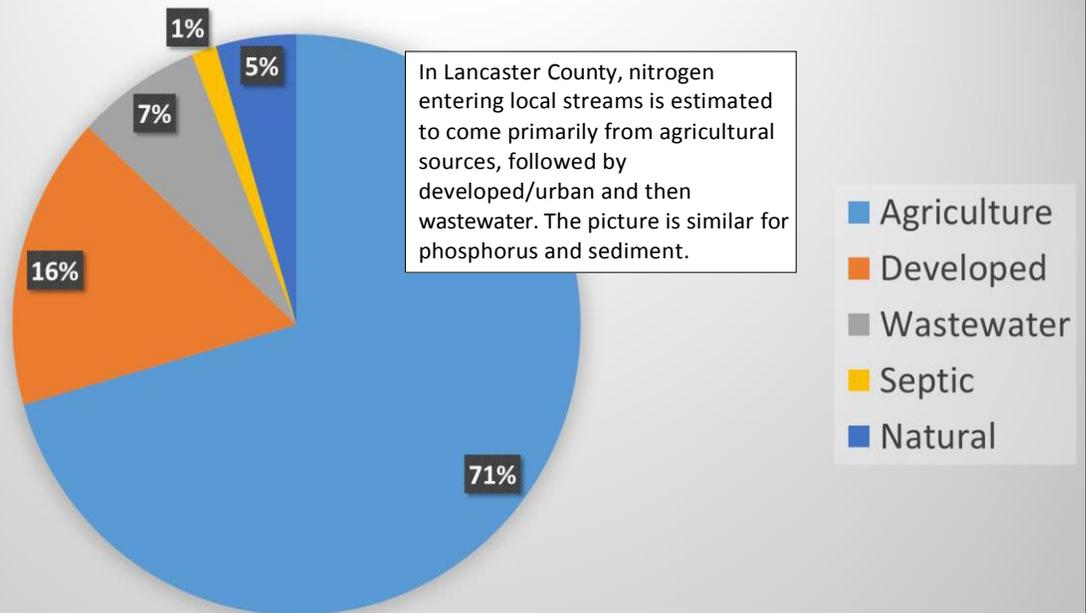
The maps above are from Falcone, 2015 (middle) and Google Earth (right). The breakdown of land use by county can be found on CAST at: <http://cast.chesapeakebay.net/>.



Lancaster County's land is only 15 percent forested. This is the least forested county of all counties in Pennsylvania's Chesapeake Bay watershed, representing a unique challenge for Lancaster County. The average for Pennsylvania counties is 55 percent forested land.

The breakdown of land use by county can be found on CAST at: <http://cast.chesapeakebay.net/>.

## Lancaster County - Nitrogen Delivered to Streams by Sector (2016)



17

The pie chart above shows the percentage of nitrogen delivered to local streams based on land use or activity. Most nitrogen entering local streams in Lancaster County comes from agricultural sources including cropland, pasture and barnyards.

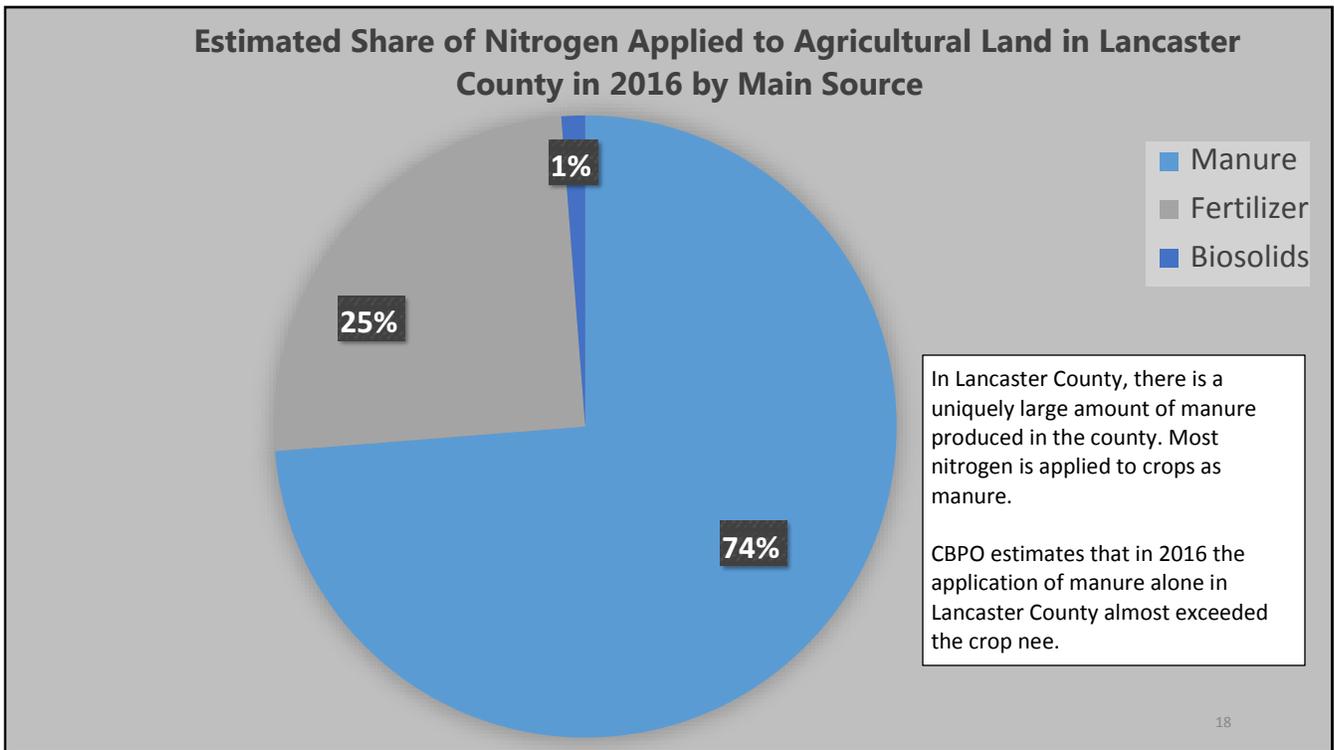
The developed/urban sector also contributes a fair amount of the load from stormwater.

Because agriculture and developed/urban sources make up the majority of the load in Lancaster County, these sectors will need to consider how they can supply the majority of the reductions to reach local goals. Wastewater and septic sources can also be reduced.

These estimates were generated using the Chesapeake Bay Program's Phase 6 Watershed Model. The model is generated using water quality monitoring data.

Estimated loads by sector can be found on CAST at:

<http://cast.chesapeakebay.net/>.

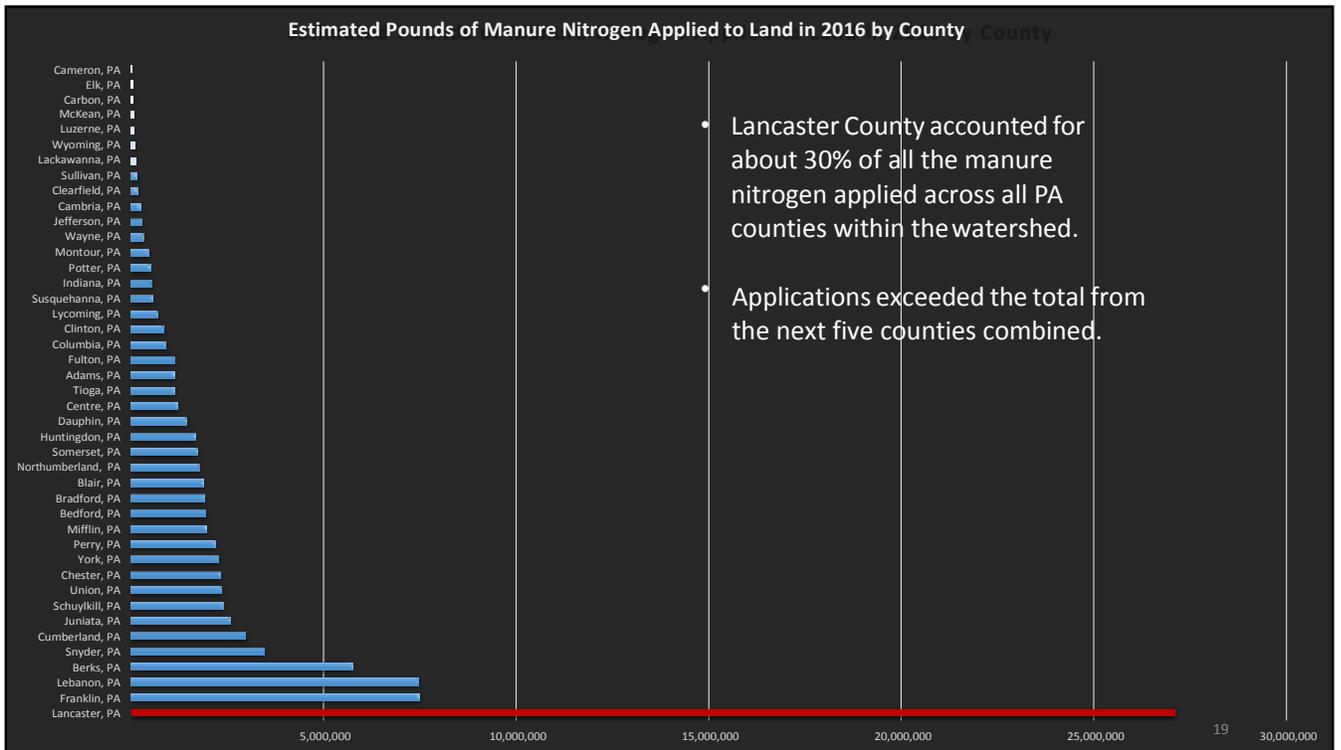


Understanding how nutrients are being applied to the land can lead to the sources that may need to be managed.

- Most nutrients applied to agricultural land in Lancaster County are in the form of manure rather than fertilizer.
- The application of manure alone nearly exceeded the crop need in the county in 2016.
- Nutrients that are applied to agricultural land and not taken up by crops can negatively impact water quality.
- When identifying strategies to manage nutrient application, focusing on manure will address a large portion of the issue.

Estimated application of nutrients by source can be found on CAST at:

<http://cast.chesapeakebay.net/>.

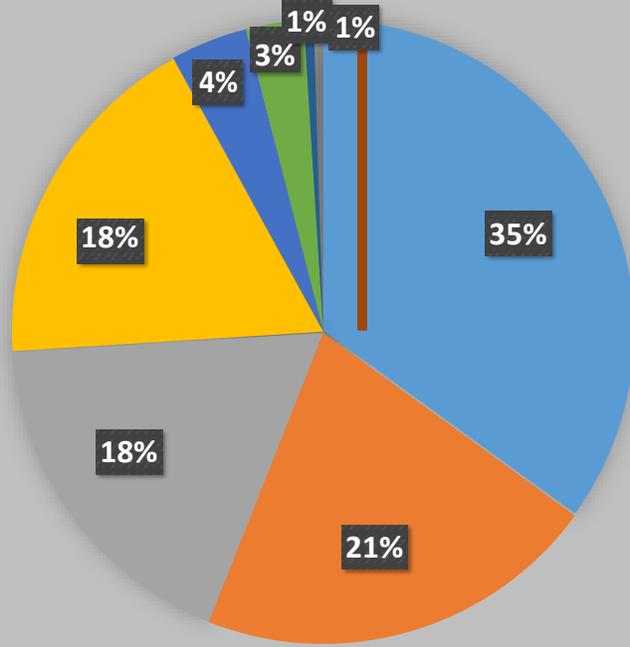


Lancaster County is unique in Pennsylvania with regard to the amount of manure that is produced and applied to the land. Practices that can effectively manage manure include:

- Practices that result in less application of nutrients to agricultural land, such as nutrient management, can address over-application of nutrients.
- Practices that manage manure, such as animal waste management systems and barnyard runoff control
- Practices that remove manure from the county, such as manure transport

Estimated application of nutrients by source can be found on CAST at <http://cast.chesapeakebay.net/>.

### Estimated Share of Manure Nitrogen Applied to Agricultural Land in Lancaster County in 2016 by Animal Source



Most manure in Lancaster County is produced by dairy, poultry and swine. Addressing manure from these sources will be important.

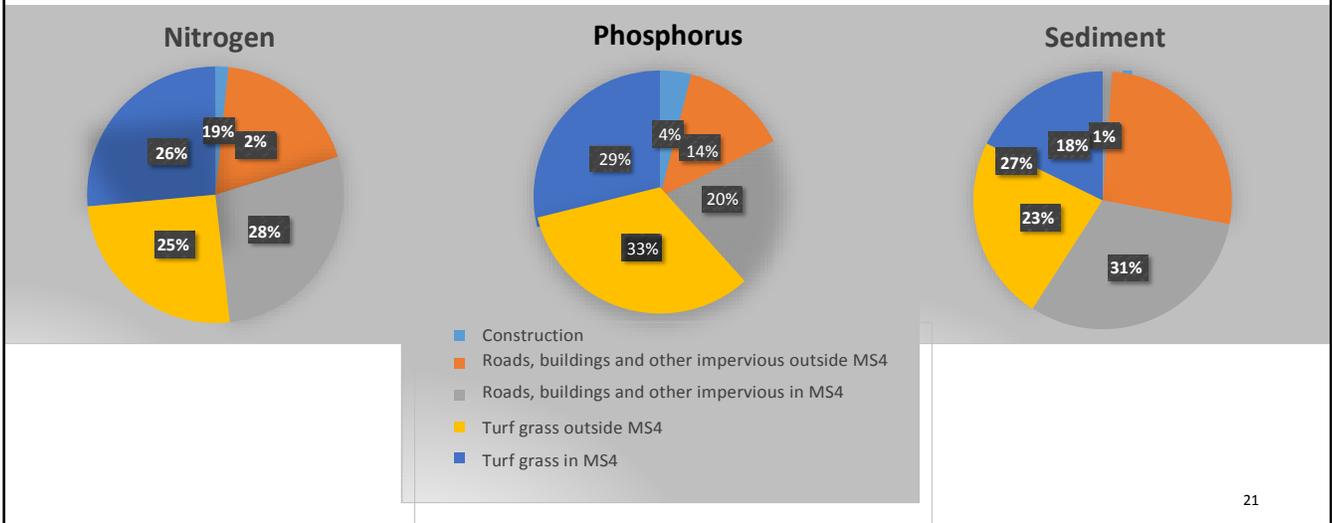
- dairy
- layers
- broilers
- swine
- pullets
- other cattle
- turkeys
- horses

Understanding where manure is coming from within the county will help identify opportunities to manage it.

Most manure in Lancaster County is from dairy, poultry and swine operations. Focusing efforts on implementing practices at these sort of operations can address a large portion of Lancaster County's manure management needs.

Estimated share of manure nutrient animal sources can be found on CAST at <http://cast.chesapeakebay.net/>.

## Lancaster County - Nitrogen Delivered to Streams from Developed/Stormwater Sector



The developed/stormwater sector is also an important source of nutrients and sediment in Lancaster County.

The charts above show the estimated breakdown of sources of nutrients and sediment to local streams exclusively from developed/urban lands.

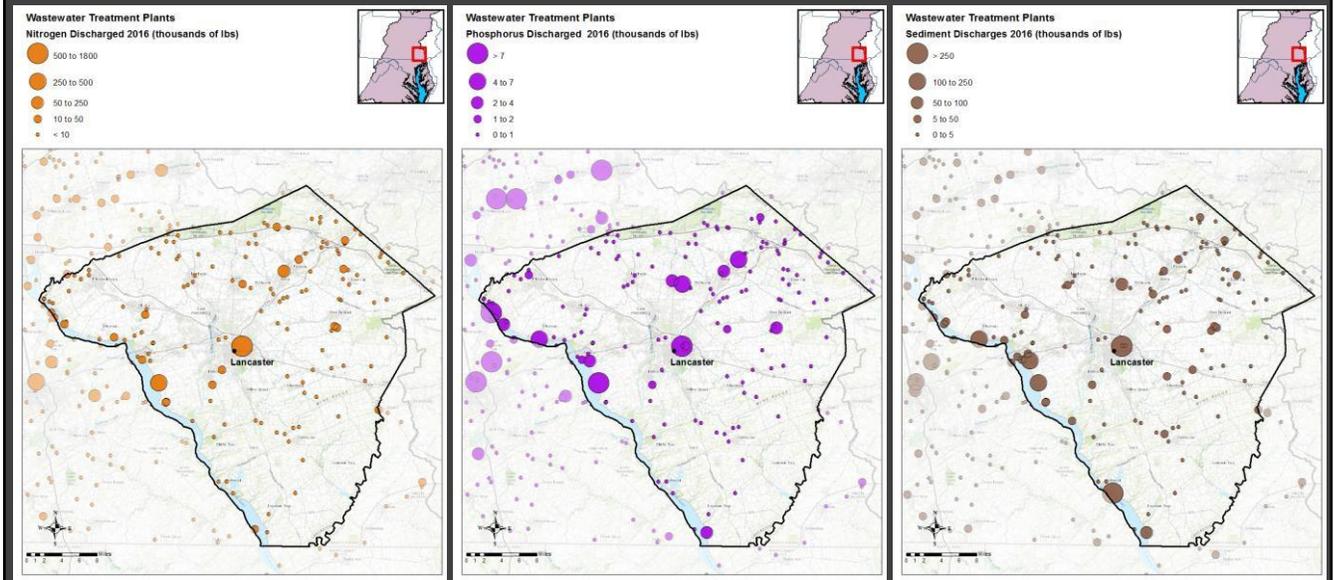
- MS4 (municipal separate storm sewer systems) areas are regulated by DEP.
- Land outside of MS4 areas is not regulated.
- Turf grass represents grassy and barren lands that have been altered through compaction, removal of organic material, and/or fertilization. These include all lawns and grassy areas in residential, commercial, recreational, cemeteries, shopping centers, etc.

Understanding where stormwater nutrient and sediment comes from is an important first step in addressing it.

- In Lancaster County, both impervious and turf grass areas are important sources to manage stormwater.
- Managing stormwater outside of regulated MS4 areas will also be important in Lancaster County.
- Managing these unregulated stormwater areas may take different outreach, voluntary programs and funding programs to implement practices.

Estimated loads by sources can be found on CAST at <http://cast.chesapeakebay.net/>.

## Wastewater Treatment Plant Locations and Loads



The maps above show the locations of wastewater treatment plants within Lancaster County and their annual discharges of nitrogen, phosphorus and sediment in 2016.

Although wastewater makes up a smaller portion of nutrient loads to streams in Lancaster County than agricultural or developed land, they are still important sources to control because their discharges enter streams directly.

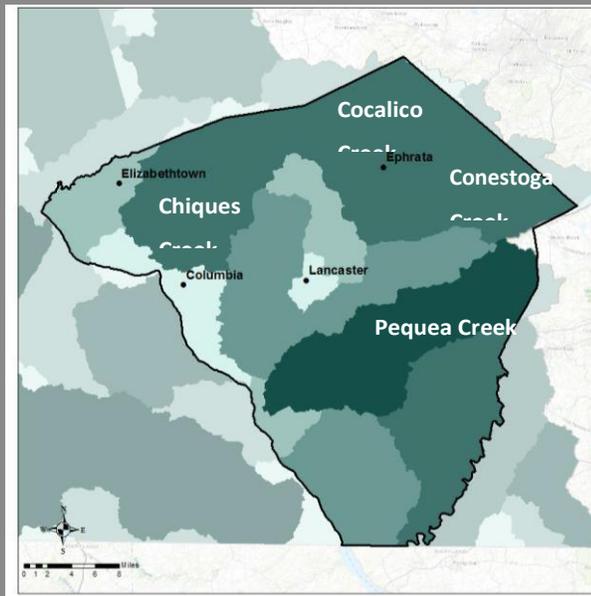
Understanding where the higher loading plants are can help identify opportunities for treatment plant upgrades in the future, if possible.

Reported wastewater treatment plant discharges and treatment plant locations are available from the Chesapeake Bay Point

Source Database:

[https://www.chesapeakebay.net/what/downloads/bay\\_program\\_nutrient\\_point\\_source\\_database](https://www.chesapeakebay.net/what/downloads/bay_program_nutrient_point_source_database)

## Septic System Density in Lancaster County



While septic systems do not make up a significant portion of the nitrogen entering Lancaster County's streams, they can be very important sources locally.

It will be important as development continues in the county to address high densities of septic systems.

Although on-lot septic systems do not make up a large portion of the load in Lancaster County, they can be very important local sources of nitrogen, especially when leaking into groundwater.

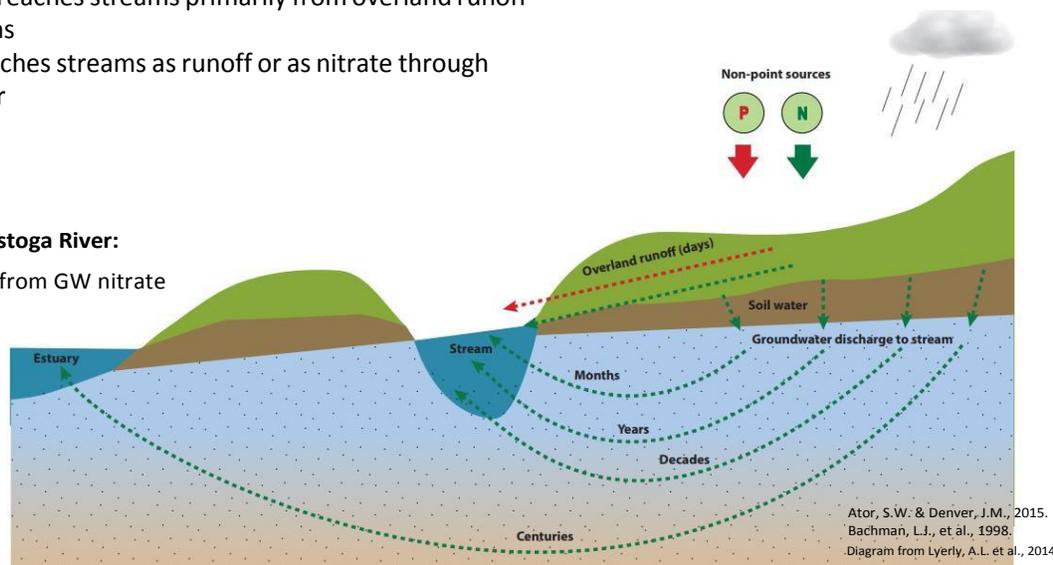
The map above shows the number of septic systems in different watersheds in the county, identifying potential areas of focus where septic system density is high.

Number of septic systems in each watershed can be found on CAST at <http://cast.chesapeakebay.net/>.

# The transport of nutrients matters for planning implementation

- Phosphorus reaches streams primarily from overland runoff during storms
- Nitrogen reaches streams as runoff or as nitrate through groundwater

**Conestoga River:**  
64% of nitrogen is from GW nitrate



The way in which nutrients and sediment reach our streams impacts which practices will be effective at controlling them.

Phosphorus and sediment travel over the top of the land during high runoff events such as storms and rainfall.

Nitrogen can travel over land as well, but in many watersheds, including those in Lancaster County, it travels to streams primarily at nitrate underground in groundwater.

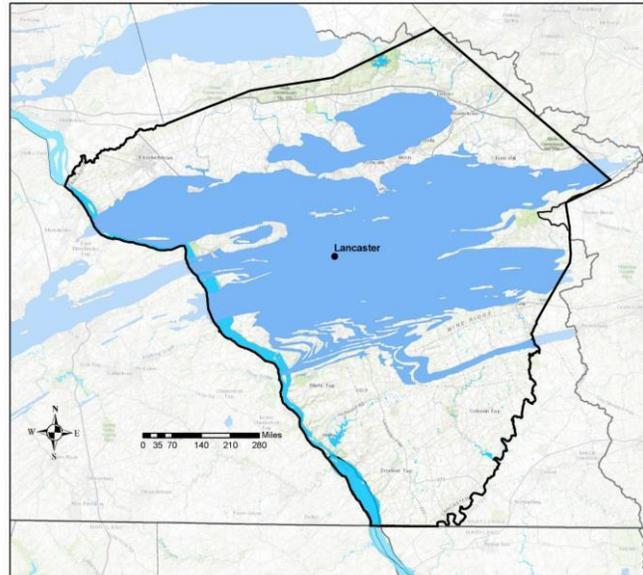
- For example, 64 percent of the nitrogen in the stream at the Conestoga River comes from groundwater nitrate.
- If agricultural practices only focus on overland runoff, they could be missing a lot of the nitrogen that is entering streams through groundwater.
- Once nitrogen is in groundwater, it is very difficult to remove. Effective practices include those that stop nitrogen from entering groundwater in the first place, like applying less nitrogen and planting cover crops.
- Riparian buffers can remove nitrate from groundwater if placed in effective locations.

## Lancaster County contains a large area vulnerable to groundwater contamination

- Geology makes the groundwater (and therefore streams) in some areas especially vulnerable to high nitrogen inputs
- These areas can be the most effective to focus practices for nitrate in groundwater
- Agricultural land on top of this vulnerable geology can particularly impact groundwater

 Karst/carbonate areas

Areas of vulnerable geology



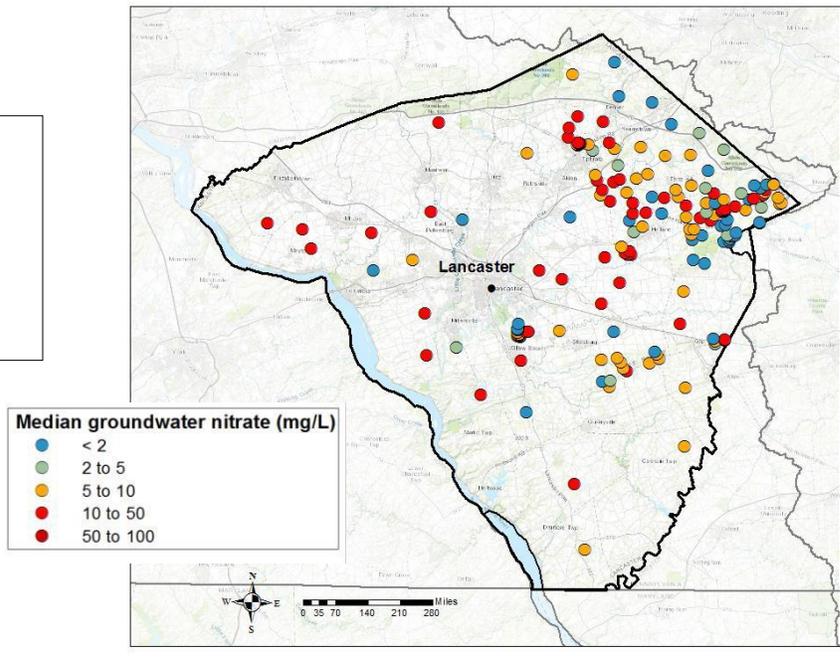
Modified from Jimmy Webber, USGS, using Brakebill, JW 2000, Ator, S. et al. 2005 and Nolan & Hitt, 2006.

Certain areas of the watershed are more vulnerable to nitrate contamination of groundwater because the geology under the soil makes it easier for nitrogen to enter groundwater and provides less opportunity for its removal to occur naturally.

- The map above shows these vulnerable areas, which have Karst or carbonate geology.
- Agricultural land on top of these areas makes the groundwater especially vulnerable due to the high inputs of nitrogen onto the landscape.
- These areas can be very effective for focusing efforts that keep nitrogen from getting into groundwater and are especially important areas to manage application of nitrogen.

## Certain areas of the watershed are more vulnerable

- Groundwater sampled in over the last few decades has Lancaster County consistently shown high nitrate levels
- In many cases, nitrate levels are above the safe drinking water threshold (>10 mg/L)



Modified from Jimmy Webber, USGS, using Brakebill, JW 2000, Ator, S. et al. 2005 and Nolan & Hitt, 2006.

Groundwater in Lancaster County has some of the highest nitrate levels in the United States.

- This is partially due to the vulnerable geology, and also to the over-application of nutrients over time.
- Because groundwater contributes a significant portion of nitrogen to streams in these watersheds, groundwater nitrate levels are good indicators of what will eventually enter streams.
- In many cases throughout Lancaster County, groundwater nitrate levels exceed the EPA's safe drinking water threshold of 10 mg/L. Many of these groundwater samples include those taken from private wells in rural areas.

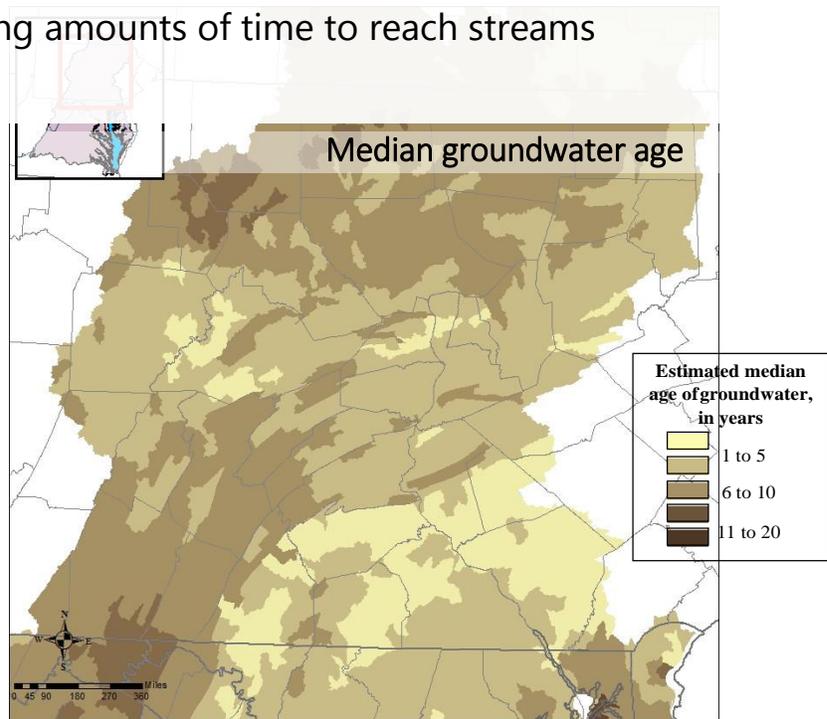
Groundwater quality data over multiple years can be found from USGS:

<https://water.usgs.gov/owq/data.html>.

## Groundwater takes varying amounts of time to reach streams depending on location

- Nitrate in groundwater represents a range of ages from recent to decades old
- Benefits from management actions will manifest immediately as well as into the future
- Chesapeake Bay Program estimates the median groundwater age across Lancaster County is between 1 and 10 years, with much of the groundwater being less than 5 years old.
- This means we expect very little “lag time” between when a practice is implemented and when that practice’s impact can be seen in local streams. That presents a unique opportunity for quick, verifiable results that does not exist across most of the watershed.

Phase 6 WSM groundwater age estimates. DRAFT from Jimmy Webber, USGS and Ghopal Batt, Chesapeake Bay Program.

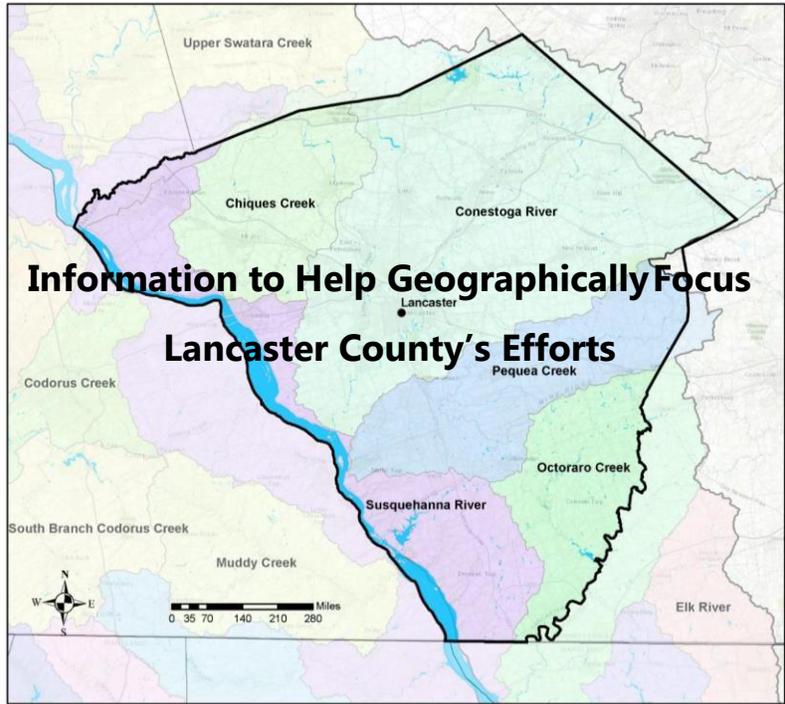


Groundwater takes anywhere from days to years to reach nearby streams.

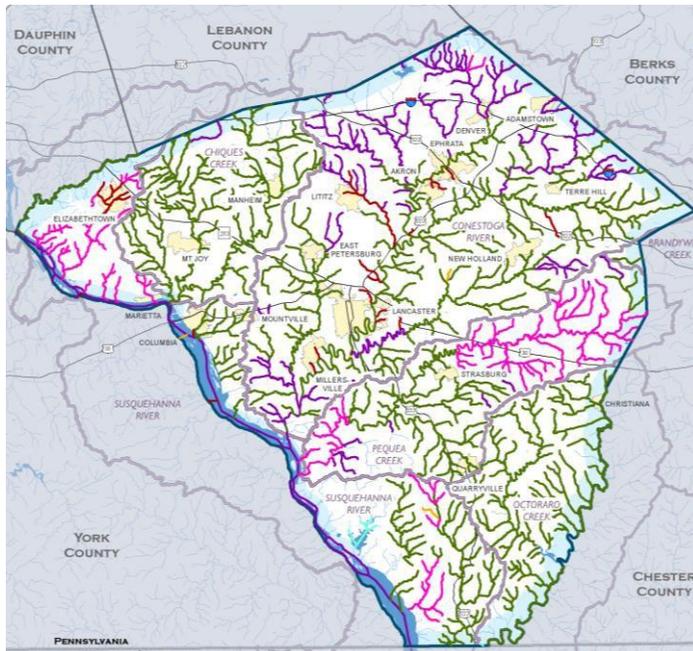
In Lancaster County, the groundwater is some of the youngest in the Chesapeake Bay watershed, meaning that it doesn't take long to reach streams.

This means that we should see decreased nutrient benefits in groundwater from local stream restoration and conservation efforts relatively faster than anywhere else in the Chesapeake Bay watershed.

Estimated groundwater age can be obtained from the Chesapeake Bay Program at [www.chesapeakebay.net](http://www.chesapeakebay.net).



Lancaster County's local sources of nutrients and sediment are impacting its streams



PADEP & SRBC

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**Impaired Waterway Miles by Type\***

- Agriculture - 975 mi.
- Source Unknown - 860 mi.
- Habitat Modification - 171 mi.
- Urban/Developed - 34 mi.
- Other - 3 mi.

\*DISCLAIMER: Depicts all stream assessment categories by primary source of impairment. Streams may be assessed on up to 4 types: Aquatic Life, Potable Water Supply, Fish Consumption, and Recreational. Maps depict all Aquatic Life assessment types, other assessment types are shown where possible. Impaired miles in legend may include duplication.

- Unassessed Stream 6 mi.
- River/Stream 1,499 mi.
- Major Watershed
- Water Body
- Major Road
- County Boundary
- State Boundary
- Lancaster County
- + City/Town



SOURCE: Impaired Streams, 2018 Integrated List from PADEP;  
 DISCLAIMER: Use of Map for Any Purpose on "As Is" Basis, No Warranties Provided. SRBC (1243b) 05-23-2018



Lancaster County has many streams that are impaired for different reasons.

Knowing the sources of these impairments help to prioritize or coordinate efforts.

- For example, many agricultural practices that address nutrients can also address siltation impairments from sediment.
- Many urban/developed practices that address nutrients and sediment also address the same causes of pathogen impairments.

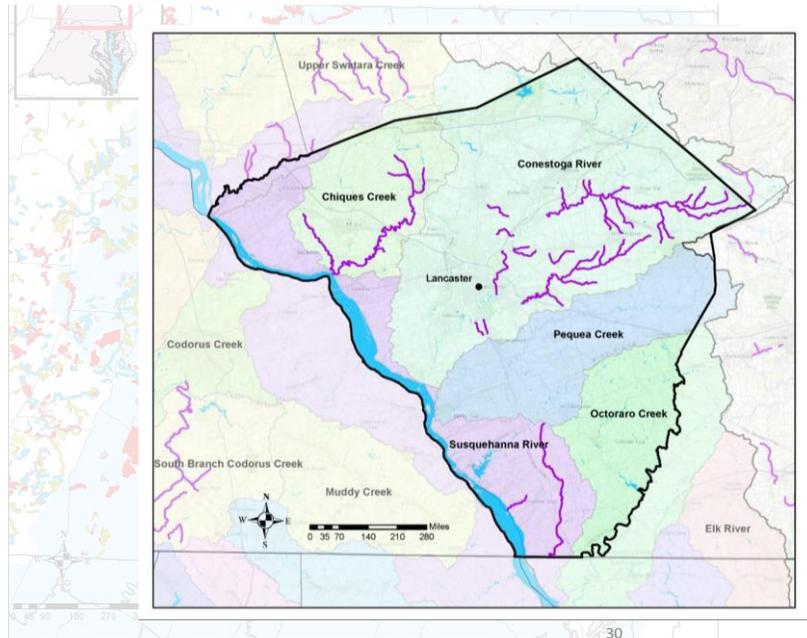
Local impaired waters listed on the 303(d) list can be found at PADEP:

<http://www.depgis.state.pa.us/integratedreport/index.html>.

## Local restoration efforts will help Lancaster County's waters first

### Pennsylvania's impaired streams

Local TMDLs

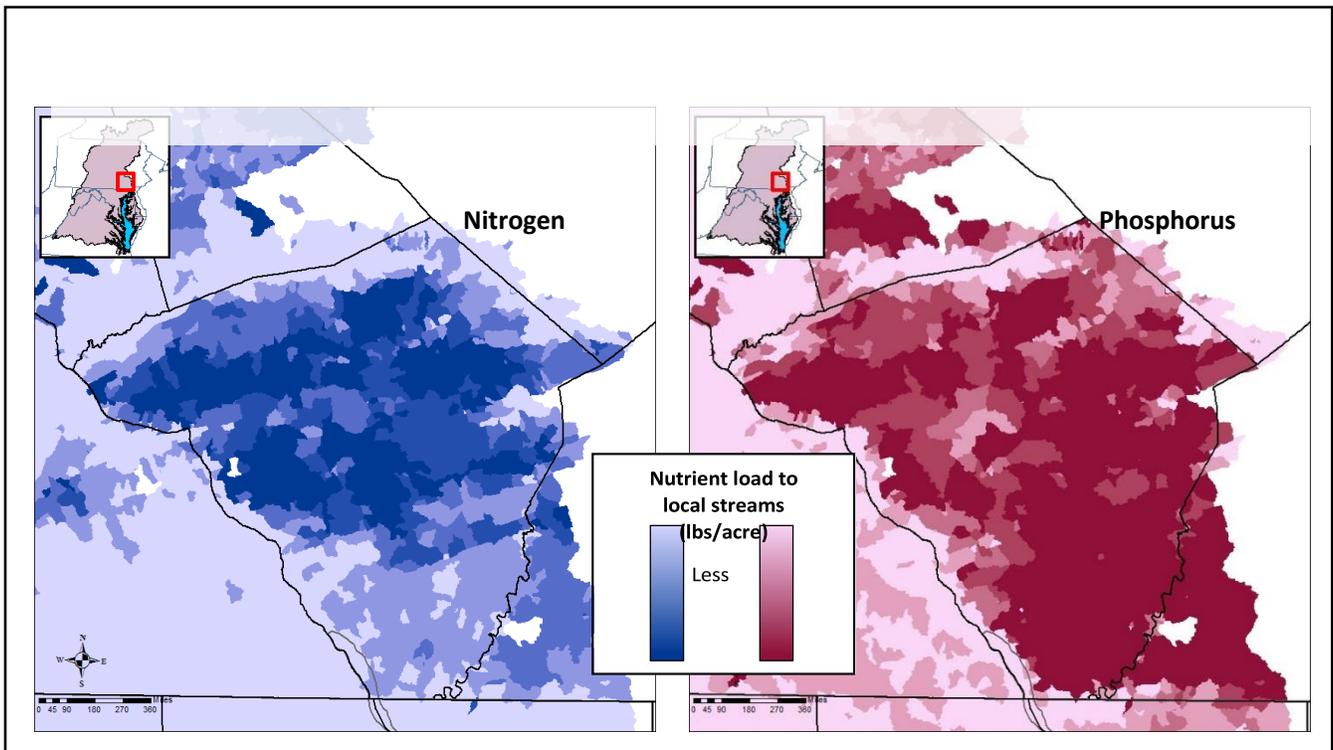


PADEP

While many waters are listed as impaired, only some of these impairments are being addressed through regulatory Total Maximum Daily Loads (TMDLs).

Local groups may want to coordinate restoration efforts to focus on the watersheds that already have these local TMDLs.

Local impaired waters listed on the 303(d) list that have TMDLs can be found at PADEP: <http://www.depgis.state.pa.us/integratedreport/index.html>.



**Focusing efforts on the highest loading areas within Lancaster County can result in the greatest water quality benefits**

We can estimate where the highest amounts of nitrogen and phosphorus are entering local streams.

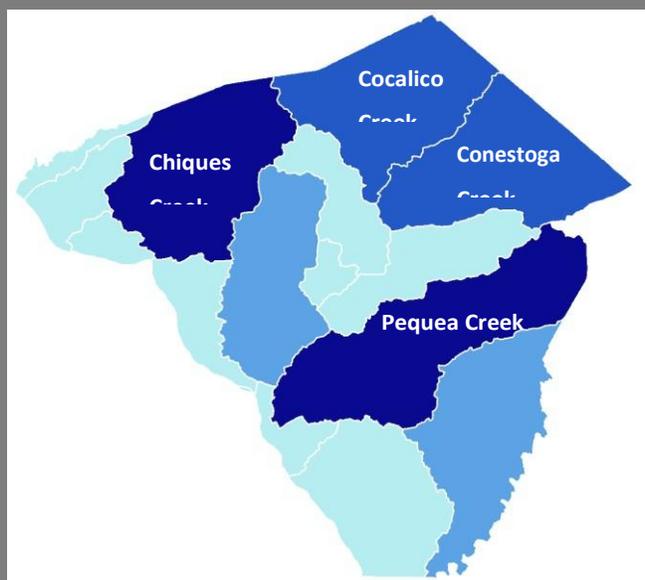
The maps above show these higher loading areas within Lancaster County.

Focusing efforts on the highest loading areas can result in the greatest water quality benefits by addressing a larger portion of the nutrients entering streams.

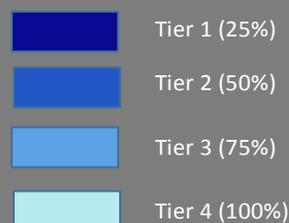
The maps above are generated from the USGS SPARROW model for the Chesapeake Bay watershed:

<https://pubs.usgs.gov/sir/2011/5167/>.

## Remaining agricultural nitrogen loads that could be controlled



- PA WIP Steering Committee has approved the concept of “tiers” to target restoration efforts
- 50% of the remaining agricultural nitrogen loads exist in just four well-known watersheds in Lancaster County.



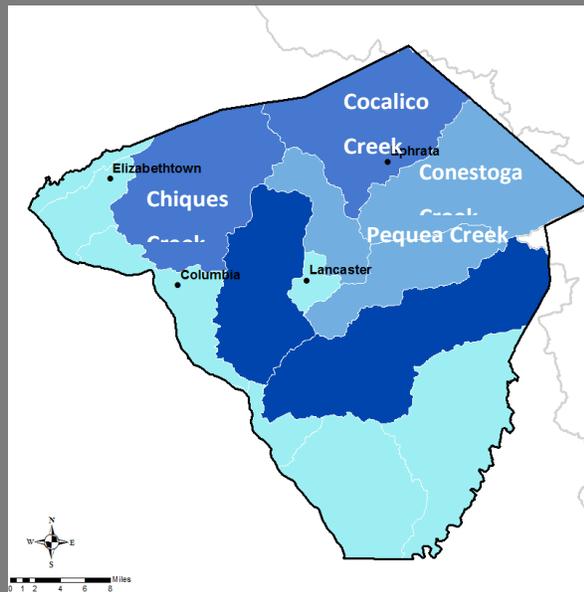
32

For each watershed within Lancaster County, we can estimate the remaining nitrogen and phosphorus reductions that are feasibly possible from the agricultural sector.

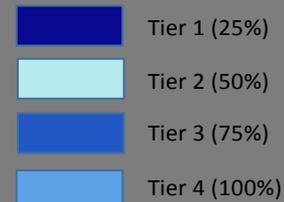
- Although we can never expect these areas to reduce all of these loads, identifying where the remaining reductions can come from can help to geographically focus efforts.
- The map above shows, for the total remaining nitrogen reductions possible in Lancaster County, where the remaining loads exist, broken into 25 percent tiers.
- For example, if we were to reduce nitrogen loads in the four darkest watersheds as low as feasibly possible, that would address 50 percent of the entire remaining nitrogen load.
- Pequea Creek, Chiques Creek, and Cocalico Creek are frequently in the top two tiers across nitrogen and phosphorus and both agricultural and developed sectors.

Remaining controllable agricultural loads represent the difference between 2016 Progress and the E3 scenario.

## Remaining developed land nitrogen loads that could be controlled



- PA WIP Steering Committee has approved the concept of “tiers” to target restoration efforts
- 50% of the remaining developed nitrogen loads exist in just four watersheds in Lancaster County.

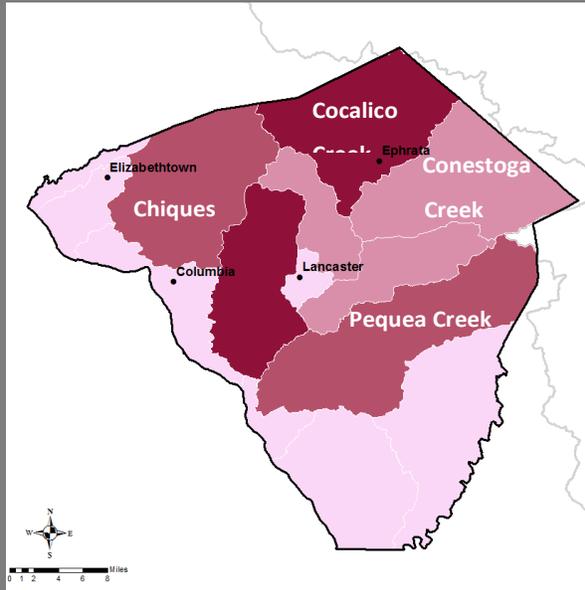


For each watershed within Lancaster County, we can estimate the remaining nitrogen and phosphorus reductions that are feasibly possible from the developed/urban sector.

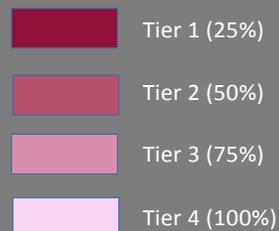
- Although we can never expect these areas to reduce all of these loads, identifying where the remaining reductions can come from can help to geographically focus efforts.
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- Pequea Creek, Chiques Creek, and Cocalico Creek are frequently in the top two tiers across nitrogen and phosphorus and both agricultural and developed sectors.

Remaining controllable developed land loads represent the difference between 2016 Progress and the E3 scenario.

## Remaining developed land phosphorus loads that could be controlled



- PA WIP Steering Committee has approved the concept of “tiers” to target restoration efforts
- 50% of the remaining developed phosphorus loads exist in just four watersheds in Lancaster County.



For each watershed within Lancaster County, we can estimate the remaining nitrogen and phosphorus reductions that are feasibly possible from the developed/urban sector.

- Although we can never expect these areas to reduce all of these loads, identifying where the remaining reductions can come from can help to geographically focus efforts.
- The map above shows, for the total remaining phosphorus reductions possible in Lancaster County, where the remaining loads exist, broken into 25 percent tiers.
- For example, if we were to reduce phosphorus loads in the four darkest watersheds as low as feasibly possible, that would address 50 percent of the entire remaining phosphorus load.
- Pequea Creek, Chiques Creek, and Cocalico Creek are frequently in the top two tiers across nitrogen and phosphorus and both agricultural and developed sectors.

Remaining controllable developed land loads represent the difference between 2016 Progress and the E3 scenario.

# Identifying Opportunities and Choosing Best Practices



### Most Cost-effective Agricultural Practices for Nitrogen Reduction in Lancaster County

Sector	BMP	Cost per unit BMP	Nitrogen Lbs Reduced per unit BMP	Nitrogen \$/lb reduced/year
Agriculture	Dairy Precision Feeding and/or Forage Management	-9.95	3.1329	-3.18
Agriculture	Conservation Tillage	0	4.92294	0
Developed	Nutrient Management Plan	0	1.06001	0
Agriculture	Alternative Crops	18.26	47.93361	0.38
Agriculture	Grass Buffer	56.95	84.09757	0.68
Agriculture	Soil Conservation and Water Quality Plans	1.94	2.37917	0.82
Agriculture	Wetland Restoration on floodplains	96.58	81.17254	1.19
Agriculture	Forest Buffer	157.35	108.37584	1.45
Agriculture	Narrow Grass Buffer	56.95	36.61654	1.56
Agriculture	Streamside Grass Buffer w/ Exclusion Fencing	277.3	178.08983	1.56
Agriculture	Water Control Structures	17.74	10.65233	1.67
Agriculture	Barnyard Runoff Control	567.46	332.68128	1.71
Agriculture	Agricultural Stormwater Management	1584.68	579.68926	2.73
Agriculture	Cropland Irrigation Management	4.57	1.50721	3.03

### Most Cost-effective Developed Practices for Nitrogen Reduction in Lancaster County

Sector	BMP	Cost per unit BMP	Nitrogen Lbs Reduced per unit BMP	Nitrogen \$/lb reduced/year
Developed	Forest Planting	92.23	10.41	8.86
Developed	Forest Buffer	153.28	13.81	11.10
Developed	Bioswale	865.95	10.31	84.02
Developed	Infiltration Practices w/o sand, veg. – A/B soils, no underdrain	1,093.35	11.78	92.83
Developed	Tree Planting – Canopy	107.78	1.09	98.81
Developed	Wet Ponds and Wetlands	330.44	2.94	112.21
Developed	Dry Extended Detention Ponds	342.62	2.94	116.35
Developed	Vegetated Open Channels a/b Soils, no underdrain	819.32	6.63	123.66
Developed	Bioretention/raingardens – C/D soils, underdrain	1,059.40	3.68	287.81
Developed	Storm Drain Cleaning	0.62	0.00	337.71

The list above reflects the top 15 agriculture and top 10 developed, most cost-effective practices at reducing nitrogen in Franklin County.

This list can serve as a starting point to assess feasibility of practice implementation.

For example, even though Alternative Crops are cost-effective, this practice involves replacing crops with others such as switchgrass, which may not be a feasible practice to implement.

Descriptions of the BMPS and the methods for generating cost-effectiveness can be found on the CAST website at <http://cast.chesapeakebay.net>.

The most effective practices were determined using CAST and isolating reductions from individual BMPs. Most effective practices list are available from CAST at <http://cast.chesapeakebay.net>.

## Remaining Opportunities in Lancaster County for Agricultural Practices

Practice	Current Reported Implementation	Acres Remaining
Basic Nutrient Management	21%	241,286
Conservation Tillage	44%	112,976
Cover Crop	32%	138,385
Prescribed Grazing	7%	41,532
Barnyard Runoff Control	76%	386
Prescribed Grazing	7.1%	41,700
Soil & Water Conservation Plans	16.2%	260,409
Forest Buffers	N/A	24,000

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This chart shows the current implementation in Lancaster County of some effective agricultural practices, and the remaining acres of land in the county available to implement those practices.

The current reported implementation percent reflects how much of the land that is available for a particular practice already has that practice reported to be implemented on it.

For example, prescribed grazing's current percent implementation reflects that 7 percent of pasture land in Lancaster County is currently reported to have prescribed grazing implemented. 41,532 acres of pasture remain in the county without prescribed grazing, which may represent an opportunity for further implementation of that practice.

Remaining opportunity is determined as the difference between reported implemented acres and all available acres on which the practice can be implemented. Land on which BMPs can be implemented are available in CAST. Reported implementation is available on CAST at <http://cast.chesapeakebay.net>.

## Remaining Opportunities in Lancaster County for Stormwater Practices on Developed/Urban Land

Practice	Current Reported Implementation	Acres Remaining
Erosion & Sediment Control	100%	0
Stormwater Management	5.3%	150,739

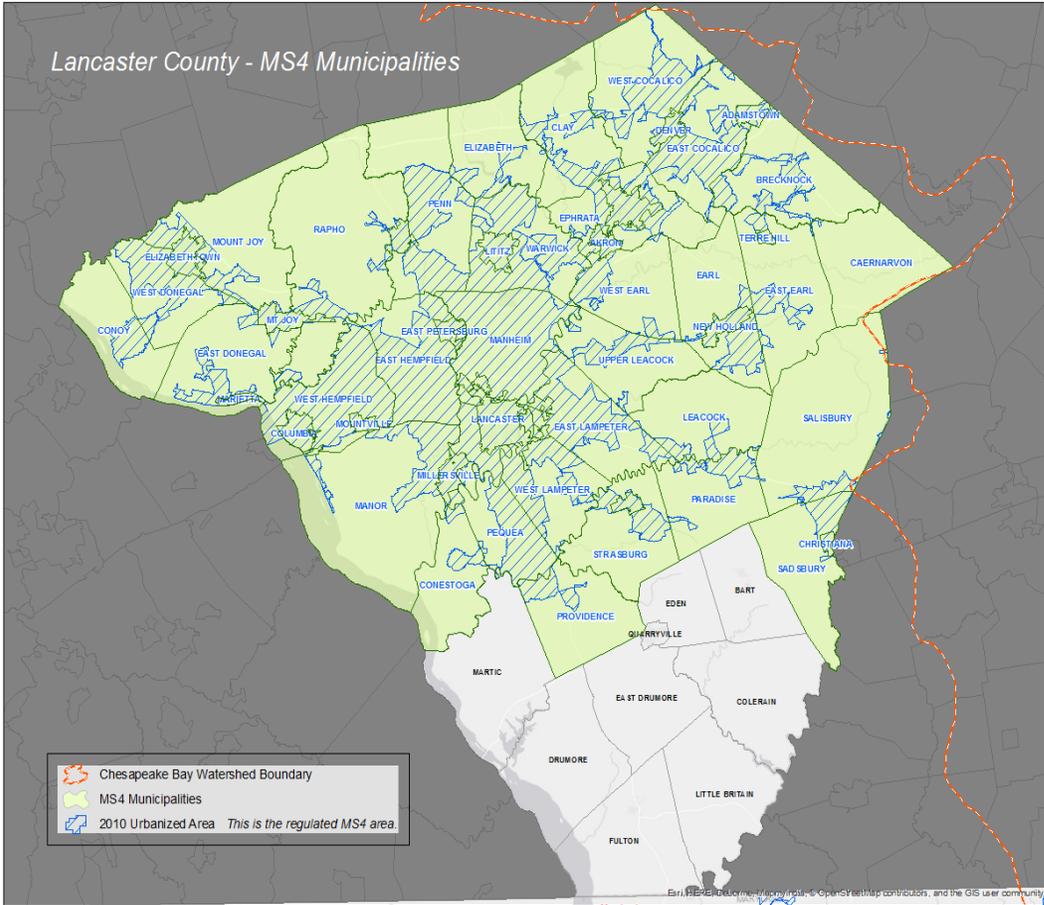
38

This chart shows the current implementation in Lancaster County of stormwater practices, and the remaining acres of land in the county available to implement those practices.

Erosion and sediment control addresses construction areas and time periods. However, sediment from developed land and from erosion of streams on developed land persist as issues long after construction is over. Therefore, stormwater management is incredibly important for managing these issues once construction ends.

Opportunities exist in Lancaster County to implement stormwater management practices in developed and urban areas.

Remaining opportunity is determined as the difference between reported implemented acres and all available acres on which the practice can be implemented. Land on which BMPs can be implemented are available in CAST. Reported implementation is available on CAST at <http://cast.chesapeakebay.net>.



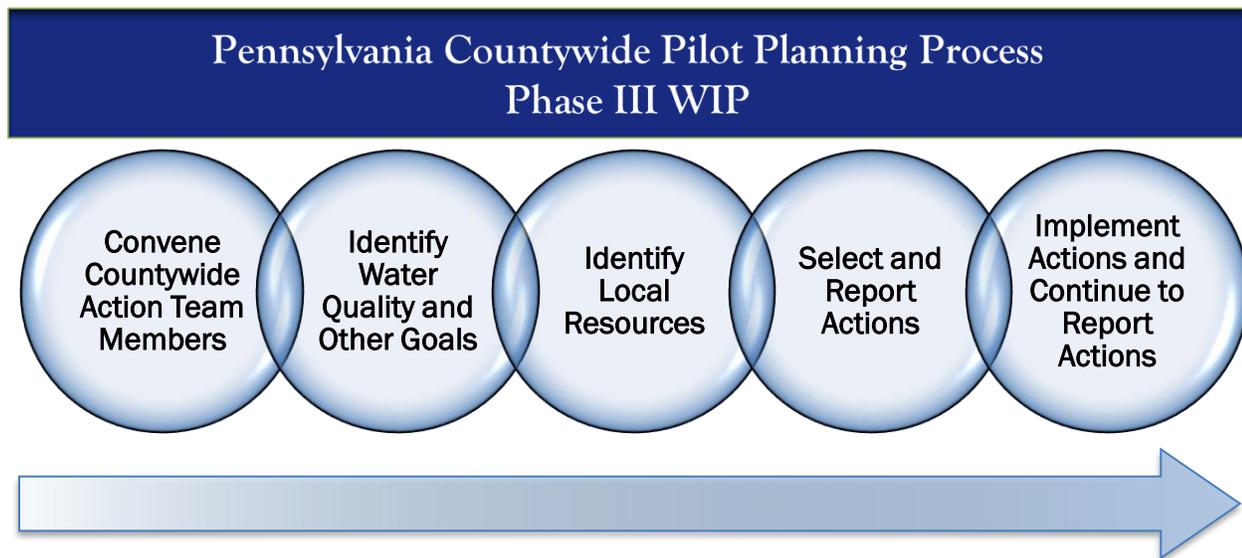
## **Appendix II: Beginning the Local Planning Process**

- **Outlining the Countywide Planning Team Process**
- **Timeline and Sample Planning Process**

## Outlining the Countywide Planning Team Process

There are many choices to make about how county planning goals will be achieved. More importantly, in addition to achieving nutrient and sediment reduction planning goals, this is an opportunity for other local goals of importance to be identified as part of this planning partnership. Yes, these goals will include water quality improvements, but they may also include items such as economic development, enhancing habitat for brook trout, increasing public access to your local waters, and more.

**Figure 1. Basic Planning Overview**



**The basic planning process reduced to its core elements is straightforward:**

1. Convene a countywide planning team with diverse representation;
2. Select a planning team leader;
3. Define goals you wish to accomplish alongside water quality goals;
4. Identify local resources to help you meet those goals and supplement the support provided by the state and other entities;
5. In partnership with the state support team, determine and report the actions appropriate for your county to meet the identified goals and plan how they will be implemented;
6. Set up an Implementation Team to ensure implementation and reporting of results.

Details follow below and in Figure 2.

1. *Convene a countywide planning team with diverse representation*

Membership criteria may include:

- Relevant knowledge
- Willing to act
- Relevant resources
- Those impacted by actions
- Others willing to come to the table and contribute to consensus.

2. *Select a countywide planning team leader*

Leaders may come from the county planning department, conservation district, or other organizations with credibility, commitment, and capability to develop consensus.

3. *Define goals you wish to accomplish alongside water quality goals*

What are your local priorities? These may include local water quality, cost savings, public access, urban trees, brook trout, economic development, public health, protecting lands, and more.

4. *Identify local resources to help you meet those goals and supplement the support provided by the state and other entities*

These may include your county's comprehensive plan and your capital improvement plan.

5. *In partnership with the state support team, determine and report the actions appropriate for your county to meet the identified goals and plan how they will be implemented*

Work in partnership with state agencies, nonprofits, and others with expertise and experience to determine which actions work best for your County. Ensure legitimacy for these actions with early, consistent outreach, inclusion, and transparency for your group's decisions.

6. *Identify the necessary steps and provisions that are essential to ensure the action plan is implemented.*

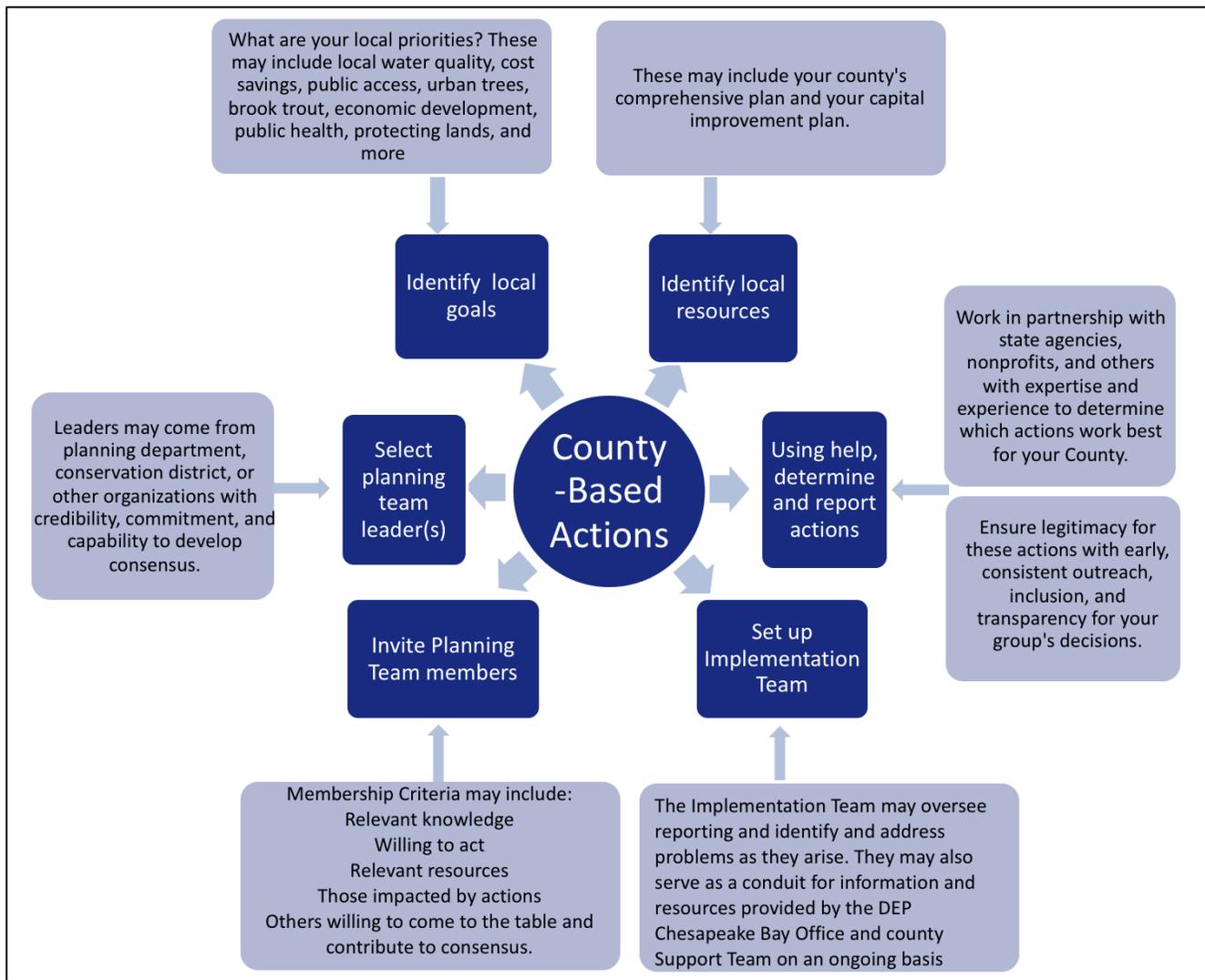
This could potentially include the identification of an Implementation Team to oversee and coordinate implementation and the reporting of results.

**How you do this is up to the local leaders in each county!**

Each countywide planning team will have many options to decide for themselves:

- Who should serve on the countywide planning team;
- Who will lead the countywide planning team;
- Which co-benefit goals they wish to work on in addition to the local water quality goals;
- Which resources will be most helpful in meeting those goals;
- Which steps will be taken to meet those goals, and by whom.

**Figure 2. Sample Countywide Planning Process**



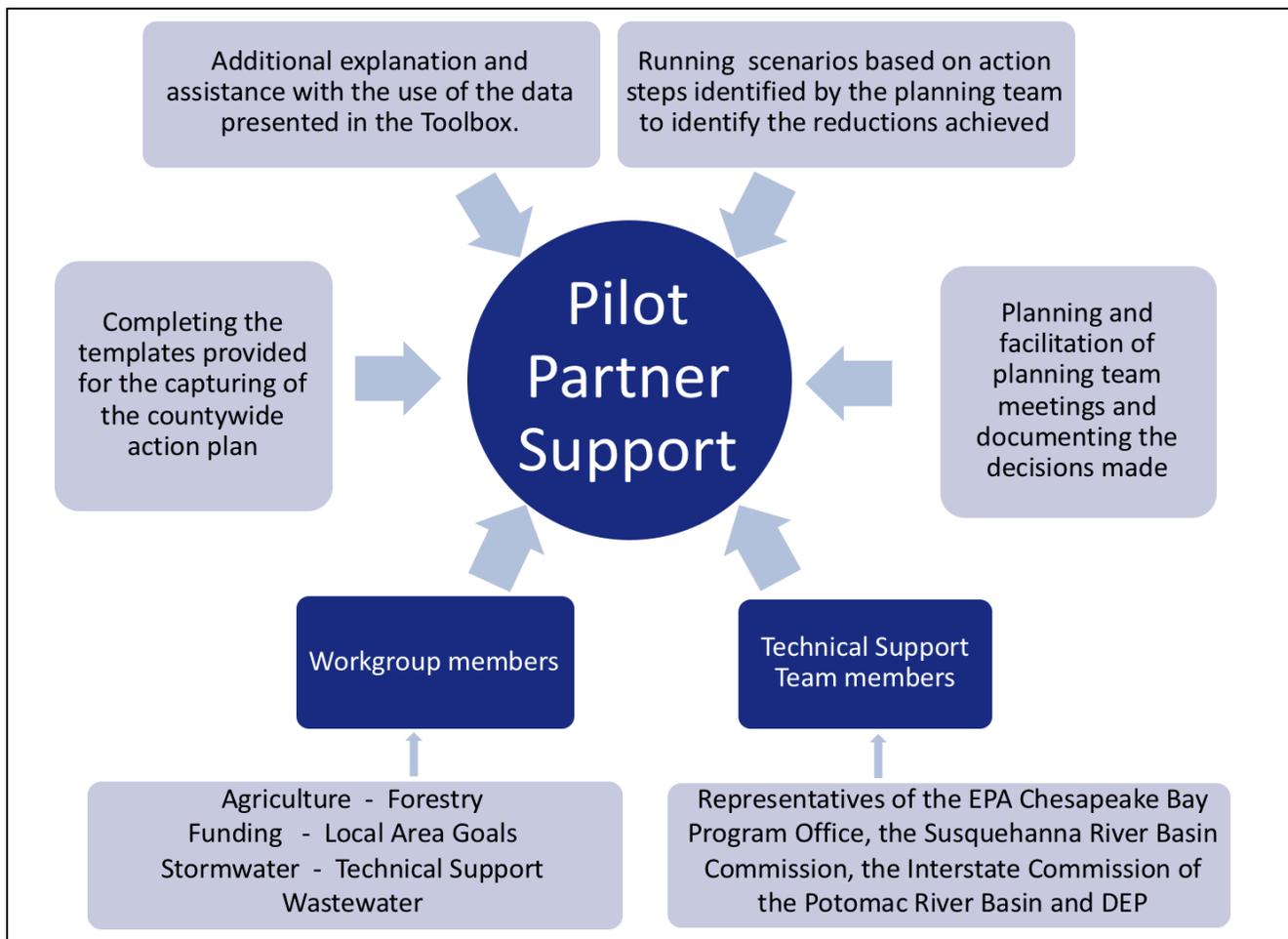
There will be a County Partner Support Team comprised of the following members to facilitate the development of the countywide plan:

- Pennsylvania's Department of Environmental Protection (DEP) Chesapeake Bay Office staff person(s)
- A member of the Technical Support Team, comprised of representatives of the EPA Chesapeake Bay Program Office, the Susquehanna River Basin Commission, the Interstate Commission of the Potomac River Basin and DEP.
- A member of the different sector workgroups working with the Phase 3 Watershed Implementation Plan (WIP) Steering Committee to develop Pennsylvania's Phase 3 WIP. These members will be participating on an as needed basis to facilitate an understanding of the work and analyses completed by their respective workgroups.

This Support Team is there to help and participate in the creation of this local customized partnership to achieve the countywide planning goals. These include:

- Additional explanation and assistance with the use of the data presented in the Toolbox.
- The running of different scenarios based on action steps identified by the planning team to identify the reductions achieved.
- Planning and facilitation of planning team meetings and documenting the decisions made.
- The completion of the templates provided for the capturing of the countywide action plan.

**Figure 3. County Partner Support**



**Timeline and Sample Planning Process**

Below you will find sample agenda items, outcomes, and potential next steps for the countywide planning process. See Figure 4 at the end for a graphic description of this sample process.

***Sample Plan for an Organizing Meeting of County Leadership – (May-June) Month 1***

Key Agenda items:

1. Introduce project goals and Toolbox
2. Discuss potential challenges and ways of meeting them
3. Identify inclusive set of invitees to the countywide planning team
4. Develop draft countywide planning team ground rules and schedule
5. Identify action items and who will be responsible for each item.

### Desired Outcomes:

At the end of this meeting, the county local leaders will have identified the next steps they need to take to convene the countywide planning team to complete this effort. This includes:

1. Identifying all the key players that need to be part of the planning team to ensure that no one has been left out.
2. Developing county planning team ground rules and protocols with a proposed schedule for completion of this effort.
3. Identifying any potential challenges and barriers with possible solutions to address them.
4. Identifying action items and who will be responsible for each item.

### Potential next steps:

1. Provide meeting summary
2. Invite identified participants

## ***Sample Plan for Countywide Planning Team Meeting 1 – Month 1 (June)***

### Key Agenda items:

1. Introduce the Phase 3 WIP, organizational structure, overall timeline, and the role of the local countywide planning groups.
2. Revise if needed and confirm draft ground rules and schedule.
3. Review county-specific data provided by the Support Team and available in the Toolbox.
4. Identify local priorities and co-benefits to be addressed in this plan.
5. Begin to identify resources, such as existing sites and projects in place to build on.
6. Identify information needs for the next meeting.

### Desired Outcomes:

At the end of this meeting, the countywide planning team will be able to:

1. Describe the Phase 3 WIP process and the Steering Committee and workgroup roles.
2. Understand the timeline for completion of the countywide action plan and what elements are expected to be included in that plan.
3. Describe ground rules and schedule they will follow to complete the countywide action plan.
4. Analyze the county-specific data provided by the Support Team and in the Toolbox.
5. Describe the local priorities and goals that will be part of the planning process.
6. Describe what information needs to be provided.

### Potential Next Steps:

1. Provide meeting summary.
2. Compile local plans and information that are not part of the Toolbox that can be of use in the development of the countywide action plan.

3. Make assignments, as appropriate, of the local countywide planning team and the Support Team.

### ***Sample Plan for Countywide Planning Team Meeting 2 – Month 2 (July)***

#### Key Agenda items:

1. Review the watershed-wide scoping scenarios completed by the workgroups to identify potential reductions from existing enforcement, compliance and permitting programs.
2. Review the technical and financial assistance and outreach initiatives.
3. Refine the list of local applicable priorities and co-benefits to be included in the action plan.
4. Develop the additional local initiatives and data sources for those initiatives that will be included in the countywide action plan.

#### Desired Outcomes:

At the end of this meeting, the countywide planning team will be able to:

1. Describe the results of the watershed wide scoping scenarios.
2. Describe the technical and financial assistance and outreach initiatives.
3. Define a list of local applicable priorities and co-benefits to be included in the action plan.
4. Define the additional local initiatives and data sources for those initiatives that will be included in the countywide action plan.

#### Potential Next Steps:

1. Provide meeting summary.
2. In partnership with members of the local planning team, members of the Support Team run scoping scenarios to customize the watershed wide results to account for county-specific situations and demographics in order to maximize resources.
3. The Support Team, using information provided by the local planning team, runs scenarios to identify potential reductions achieved from additional local initiatives.

### ***Sample Plan for Countywide Planning Team Meeting 3 – Month 3 (August)***

#### Key Agenda items:

1. Finalize action steps to be included in the countywide action plan.
2. Determine expected reductions from those actions steps.
3. Explore the various goals and outcomes that implementation will achieve.
4. Discuss the role and potential membership of a countywide implementation team.
5. Plan for public opportunity to review and comment on the draft countywide action plan, including a public meeting.

### Desired Outcomes:

At the end of this meeting, the countywide planning team will be able to:

1. Report of the action steps to be included in the countywide action plan.
2. Report of the expected reductions to be achieved from those action steps.
3. Describe the goals and outcomes to be achieved from the implementation of these action steps.
4. Report the role and potential membership of a countywide implementation team.
5. Describe how public input will be used to improve the draft countywide action plan.

### Potential Next Steps:

1. Provide meeting summary.
2. The local planning team and the Support Team will identify available resources to be devoted to each action step. They will also identify any gaps in available resources.
3. Begin completion of templates provided for the submittal of the countywide action plan.
4. Publicize opportunities to provide input on the draft countywide action plan, including the public meeting.

## ***Sample Plan for Countywide Planning Team Public Meeting – (September) Month 4***

### Key Agenda items:

1. Describe the Phase 3 WIP process and the Countywide Planning Team, Steering Committee, and workgroup roles.
2. Offer opportunity for comments, questions, and responses from members of the countywide planning team.

### Desired Outcomes:

The purpose of this meeting is to solicit input on the draft countywide action plan.

1. Countywide planning team can describe input from public.
2. Countywide planning team will understand what may strengthen the plan.

### Potential Next Steps:

1. Finalize plan for submittal to DEP.
2. Allow final review of the final draft by all members of the countywide planning team, either through email or through one last meeting.
3. Submit countywide action plan to the DEP Chesapeake Bay Office by October.

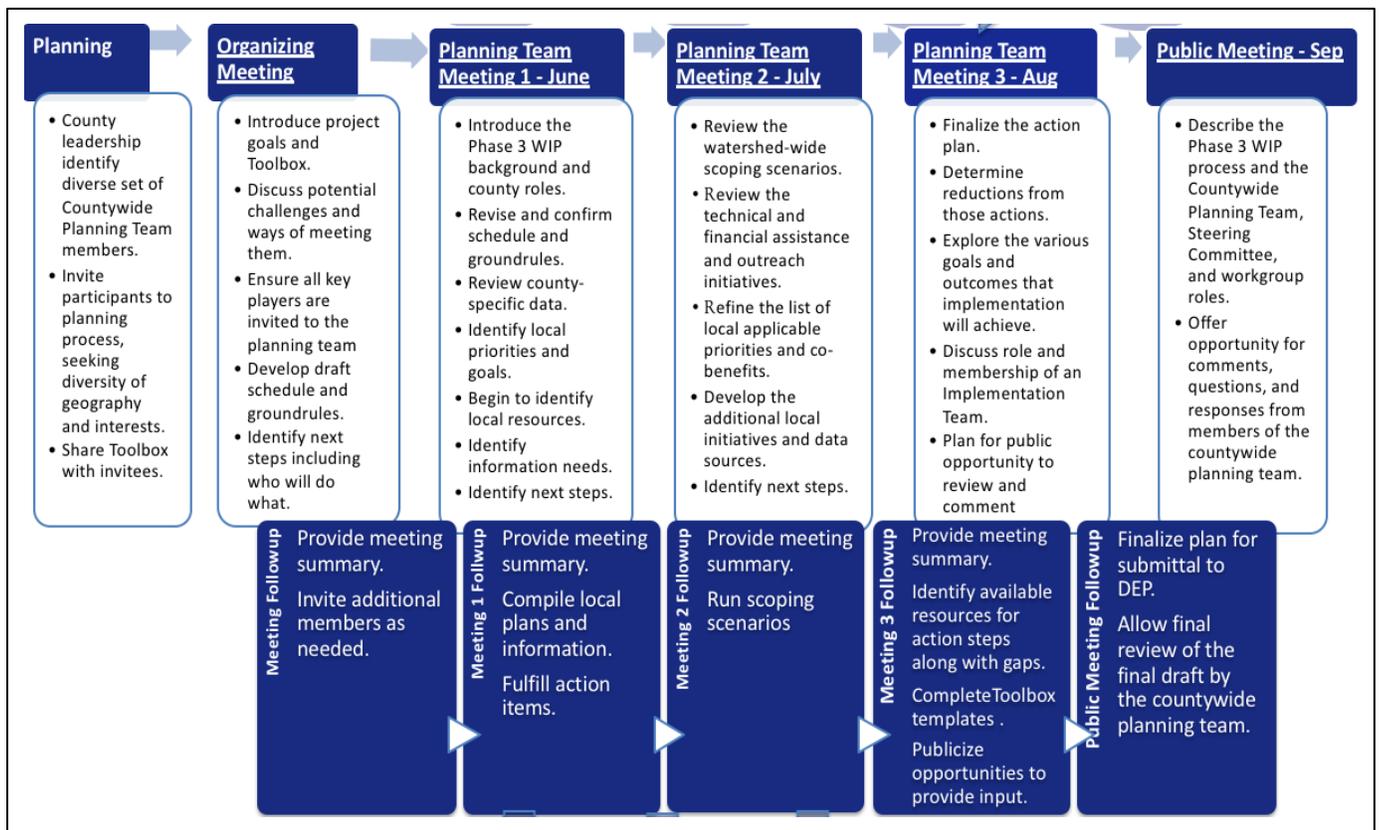
## ***Countywide Implementation Team***

Following acknowledgments for the hard work by countywide planning team members, it will be time to move into an implementation and reporting phase. Rather than starting all over again, it makes sense to have the countywide planning team identify a group that would accomplish this task.

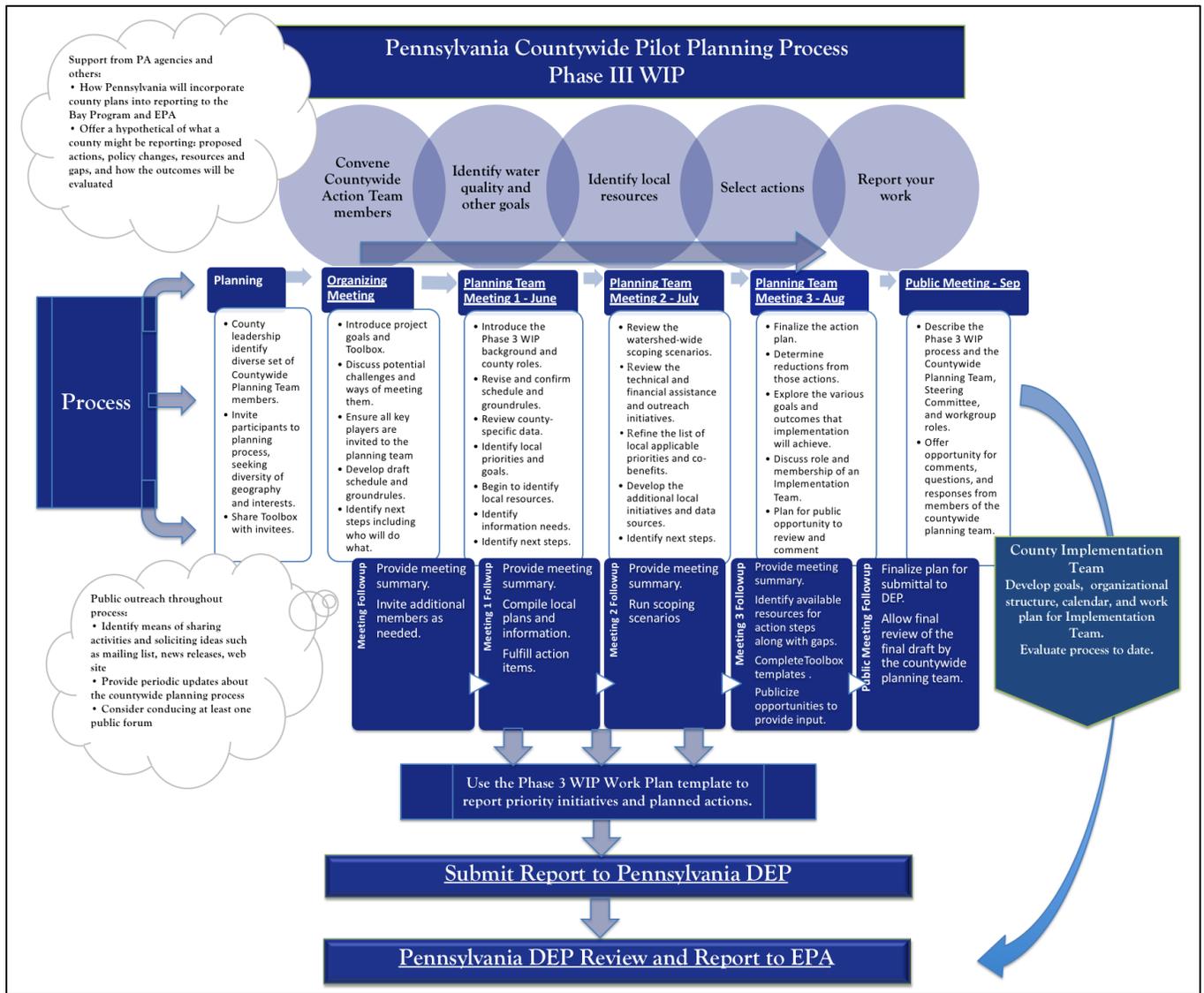
Countywide Implementation Team tasks may vary by county depending on local goals. Each county-based local area will use the three templates in the provided Toolbox to finalize their countywide action plan.

The Implementation Team may oversee the implementation of individual action items to ensure the identified responsible parties are following through with their identified tasks. They can also serve as a conduit for the annual reporting of these elements, identifying and addressing problems as they arise. They may also serve as a coordinator between the county and the DEP Chesapeake Bay Office as new information and resources are developed. Figure 5 is an overall schematic of this process showing how this would work.

**Figure 4. Sample Plan for Countywide Planning Meeting Agendas and Followup**



**Figure 5. Overall Pennsylvania Sample Countywide Pilot Planning Process**



## **Appendix III: Reporting Local Action Plans – Establishing a Countywide Implementation Team**

### **Reporting Local Plans – Establishing a Countywide Implementation Team**

Throughout the planning process, countywide planning team members will need to discuss how, when, and who will be needed to move into an implementation and reporting phase. Rather than starting all over again, it is recommended that the countywide planning team identify several members to serve as the implementation team. The tasks for each implementation team to accomplish may vary by county depending on local goals.

### **Reporting Progress**

The implementation team may oversee the annual reporting of these elements, identifying and addressing problems as they arise. They may also serve as a conduit for information and resources provided by the DEP Chesapeake Bay Office and county Support Team on an ongoing basis.

Designated countywide groups (partnerships, local governments, county conservation districts, and other identified stakeholders) will utilize the following templates, found in this appendix, to report priority initiatives and planned actions to achieve goals and objectives.

- Phase 3 Watershed Implementation Plan (WIP) Planning and Progress Template
- Detailed BMP Entry Form Template
- County Resources Inventory Template

These templates will be submitted electronically to DEP as part of the countywide action plan and on an annual basis thereafter. DEP will submit local county action plans to U.S. EPA as part of its annual submission of state milestones. Electronic versions of these templates are available on DEP's Phase 3 WIP webpage in Excel format for download and use here:

[http://www.dep.pa.gov/Business/Water/Pennsylvania%e2%80%99s%20Chesapeake%20Bay%20Program%20Office/WIP3/Pages/Phase-III-WIP-\(Watershed-Implementation-Plans\).aspx](http://www.dep.pa.gov/Business/Water/Pennsylvania%e2%80%99s%20Chesapeake%20Bay%20Program%20Office/WIP3/Pages/Phase-III-WIP-(Watershed-Implementation-Plans).aspx) .

These templates allow partners to identify public and private resources, actions that partners can take or have undertaken, where and by when, as well as identify potential challenges and/or issues that could impede implementation of initiatives.

The templates below provide examples to assist local level planning efforts.

Phase 3 Watershed Implementation Plan (WIP) Planning and Progress Template								
<i>Examples in Italics / Detailed information on following page</i>								
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	Resources Available: Technical & Funding	Resources Needed: Technical & Funding	Potential Implementation Challenges/Issues
<b>Priority Initiative 1: <i>Improve Trout Habitat of xxx Creek</i></b>								
<b>1.1</b>	<i>Dam removal and stream restoration</i>	<i>Remove dam and restore 1,000 feet of impaired stream channel</i>	<i>PA Fish and Boat Commission, Trout Unlimited, and YYY Twp.</i>	<i>xxx Creek at SR?? Bridge, YYY Twp.</i>	<i>March through Sept. 2019</i>	<i>Project Planning Completed. \$xx from ?? agency allocated</i>	<i>XX staff resources for future Verification Inspection</i>	<i>Adjacent property access required</i>
<b>1.2</b>	<i>Install Stream Exclusion Fence w/Forest Buffer</i>	<i>Buffer an additional 15 acres of stream corridor through YYY Twp.</i>	<i>County Cons. Dist., NRCS</i>	<i>YYY Twp.</i>	<i>June through Sept. 2019</i>	<i>Xx resources for project coordination \$xx from ?? agency</i>	<i>XX staff Buffer Maintenance/ Inspections</i>	
<b>Priority Initiative 2: <i>Address Flooding of ZZZ Creek in QQQ Boro</i></b>								
<b>2.1</b>	<i>Improve SW management and infiltration</i>	<i>Reduce impervious surfaces, retrofit aging SW basins to meet current standards</i>	<i>Shopping Center Development Corp., County Planning Office, QQQ Boro</i>	<i>QQQ Boro</i>	<i>To begin July 2019 and extend through 2024</i>	<i>Boro Engineer support, Partial DCED Funding</i>	<i>Boro Oversight and Inspections</i>	<i>To be applied as building permits issued</i>

## Phase 3 Watershed Implementation Plan (WIP) Planning and Progress Template

### Each county-based local area will use this template to identify:

1. Inputs – These are both existing and needed resources, public and private, to implement the identified priority initiative. These include both technical and financial resources, such as personnel, supplies, equipment and funding.
2. Process – what is each partner able to do where and by when. These are the action items listed under each priority initiative.
3. Outputs and outcomes – both short and long-term. These are the priority initiatives identified by each county. The performance targets are the intermediate indicators that will measure progress.
4. Implementation challenges – any potential issues or roadblocks to implementation that could impede outputs and outcomes

**For each Priority Initiative or Program Element:** Use the fields, as defined below, to identify the inputs and the process that will be followed to achieve each priority initiative. This is the “who, what, where, when and how” of the plan:

**Description** = What. May include programs that address prevention, education, or as specific as planned BMP installations that will address the Priority Initiative. A programmatic or policy effort will require some ability to quantify the anticipated benefits which will allow calculation of the associated nutrient reductions.

**Performance Target** = How. This is an extension of the Description above. The Performance Target details the unique BMPs that will result from implementation of the Priority Initiative and serves as a benchmark to track progress in addressing the Priority Initiative. Performance Targets may be spread across multiple Responsible Parties, Geographies, and Timelines based on the specifics of the Initiative.

**Responsible Party(ies)** = Who. This is/are the key partner(s) who will implement the action items through outreach, assistance or funding, and who will be responsible for delivering the identified programs or practices.

**Geographic Location** = Where. This field identifies the geographic range of the planned implementation. This could extend to the entire county or down to a small watershed, based on the scale of the Priority Initiative, range of the Responsible Party, or planned funding/resources. *NOTE: Resource limitations alone should not limit potential implementation as additional funding may become available in the future.*

**Expected Timeline** = When. Provide the expected completion date for the planned activity. This should be a reasonable expectation, based on knowledge and experience, that will aid in tracking progress toward addressing the Priority Initiative.

**Resources Available: Technical & Funding** = Technical and financial resources already secured/available to implement the program. This is the total of the existing resources identified in the **County Resources Inventory Template** below allocated to the Priority Initiative as a whole; or, if available, to each action.

**Resources Needed: Technical & Funding** = Technical and financial resources needed/outstanding to implement the program. Total of the additional resources projected and needed in the **County Resources Inventory Template** below allocated to the priority initiative as a whole; or, if possible, to each action.

**Potential Implementation Challenges/Issues** = This field will note challenges and issues that may delay program implementation.

## **Detailed BMP Entry Form Template**

### **Phase 3 PA Watershed Implementation Plan**

The Priority Initiatives that you outline in the **Phase 3 WIP Planning and Progress Template** will be used to create a scenario in the Chesapeake Assessment Scenario Tool (CAST) application (<http://cast.chesapeakebay.net/>). This application is used to calculate the reductions associated with the planned activities that you provide.

The **Detailed BMP Entry Form Template** below offers a streamlined approach to develop scoping scenarios that will be used by the Commonwealth's technical workgroup to calculate the nutrient reductions associated with your plan. In addition to the **Phase 3 WIP Planning and Progress Template** above, more specific details of BMP implementation at the component level need to be developed to allow for CAST model processing and future tracking and reporting.

**Bolded** column headings are mandatory and BMPs can be added using the dropdown menus provided in the template Excel spreadsheet. The selected dropdown option in the Excel spreadsheet will associate the correct measurement name and measurement unit options with the selected practice.

<b>Detailed BMP Entry Form Template</b> (with example from Priority Initiative 1 in the <b>Phase 3 WIP Planning and Progress Template</b> )							
Objective ID/Project Description/Opt. Text Field	BMP Name	Measurement Name	Measurement Unit	BMP Extent	County	Priority Watershed (Optional)	Land Use Selection
1.1	Stream Restoration Ag	Length Restored	FEET	1000			Agricultural
1.2	Exclusion Fence with Narrow Forest Buffer	Acres	ACRE	15			Pasture

**Objective ID/Practice Description/Optional Text Field** = This field is a text field that can be used to link the practice to the Priority Initiative or other descriptive text from the Priority Initiative/Programmatic BMP template.

**BMP Name** = The Chesapeake Bay Program BMP name for the practice, which can be selected from the dropdown menu of available BMPs in the Excel template located at:  
[http://www.dep.pa.gov/Business/Water/Pennsylvania%e2%80%99s%20Chesapeake%20Bay%20Program%20Office/WIP3/Pages/Phase-III-WIP-\(Watershed-Implementation-Plans\).aspx](http://www.dep.pa.gov/Business/Water/Pennsylvania%e2%80%99s%20Chesapeake%20Bay%20Program%20Office/WIP3/Pages/Phase-III-WIP-(Watershed-Implementation-Plans).aspx) .

**Measurement Name** = This is the measurement method associated with the BMP and will auto-populate in the Excel spreadsheet, or offer a dropdown of available options for reporting, based on the BMP Name selected.

**Measurement Unit** = The text name of the units of measure for the designated practice. This will auto-populate in the Excel spreadsheet with selection of BMP Name, or offer a dropdown of available options for reporting.

**BMP Extent** = The actual quantity of additional units of BMP to be implemented, reported in the Measurement Unit designated.

**County** = County to which these BMPs should be credited.

**Priority Watershed** (optional) = If planning is specific to a priority watershed within the county, this watershed can be identified here.

**Land Use Selection** (optional) = Locating BMPs to designated Chesapeake Bay Model Land Uses increases the accuracy of modeling output. If no value is given, the BMP will be applied to the sector generally and spread across available Land Uses within that sector. "Regulated" land uses refer to the Urbanized Area (MS4) on Developed land and permitted Concentrated Animal Feeding Operations on Agricultural land. Combined Sewer System (CSS) or Combined Sewer Outfall (CSO) lands are associated with urban lands located within the catchment of the combined sewer system.

## **County Resources Inventory Template Phase 3 PA Watershed Implementation Plan**

The **County Resources Inventory Template** is to be used to capture all available and needed resources; including labor or staff resources, the dedication of land for practice installation and funding. It is intended to serve as an inventory of all available and needed resources that may assist with efforts to improve local water quality. These resources can include, but are not limited to dollars, land, staff time or match.

The template below identifies the amount of funding the Commonwealth currently has on record as having been allocated to Lancaster County from the listed existing state and federal funding sources for Chesapeake Bay restoration activities. The first step is to verify these amounts and add any additional local funding that was used for match to these programs.

This template can then be used in coordination with the **Phase 3 WIP Planning and Progress Template** and **Detailed BMP Entry Form Template** to identify existing and needed resources to implement the priority initiatives and BMP installations identified in the scoping scenarios that will be created for countywide planners, in partnership with DEP's technical support team.

## County: Lancaster

<i>Program</i>	<i>Type of Resource</i>	<i>Source</i>	<i>2014-15</i>	<i>2015-16</i>	<i>2016-17</i>	<i>2017-18</i>	<i>2018-19</i>	<i>2019-20</i>
<b>Conservation District Fund Allocation Program</b> • Match	Dollars	State	\$54,307	\$54,268	\$54,274			
	Choose an item.	Choose an item.						
<b>ACT 13 - Unconventional Gas Well Funding</b> • Match	Dollars	State	\$589,701	\$501,562	\$467,969			
	Choose an item.	Choose an item.						
<b>Ch. 102/NPDES and Ch. 105 Program Permit Processing Fees</b> • Match	Dollars	State	\$474,200	\$586,425	\$536,955			
	Choose an item.	Choose an item.						
<b>Chesapeake Bay Program</b> • Match	Dollars	Federal	\$855,500	\$982,956	\$1,001,150			
	Choose an item.	Choose an item.						
<b>Dirt and Gravel Roads Program</b> • Match	Dollars	State	\$77,144	\$77,144	\$77,819			
	Choose an item.	Choose an item.						
<b>Natural Resource Conservation Service</b> • Match	Dollars	Federal	\$1,373,400	\$2,035,192	\$2,945,908	\$3,506,164	\$3,506,164	
	Choose an item.	Choose an item.						
<b>EPA Section 319 Program</b> • Match	Dollars	Federal		\$206,950	\$529,467			
	Choose an item.	Choose an item.						
<b>Growing Greener</b> • Match	Dollars	State	\$33,000	\$620,092	\$618,033			
	Choose an item.	Choose an item.						

<i>Program</i>	<i>Type of Resource</i>	<i>Source</i>	<i>2014-15</i>	<i>2015-16</i>	<i>2016-17</i>	<i>2017-18</i>	<i>2018-19</i>	<i>2019-20</i>
<b>Environmental Education Grants</b>	Dollars	State	\$2,704	\$9,000	\$5,902	\$6,000	\$6,000	
	• Match	Choose an item.						
<b>PennVest NPS Stormwater</b>	Dollars	State	\$597,455	\$700,040	\$943,016	\$394,520	\$394,520	
	• Match	Choose an item.						
<b>Department of Agriculture</b>	Dollars	State	\$4,212,576	\$4,576,492	\$2,817,869	\$5,362,477	\$5,362,477	
	• Match	Choose an item.						
	• Match	Choose an item.						
	• Match	Choose an item.						
	• Match	Choose an item.						
	• Match	Choose an item.						
	• Match	Choose an item.						
	• Match	Choose an item.						
	• Match	Choose an item.						
	• Match	Choose an item.						
	• Match	Choose an item.						
	• Match	Choose an item.						
	• Match	Choose an item.						
	• Match	Choose an item.						

<i>Program</i>	<i>Type of Resource</i>	<i>Source</i>	<i>2014-15</i>	<i>2015-16</i>	<i>2016-17</i>	<i>2017-18</i>	<i>2018-19</i>	<i>2019-20</i>
• Match	Choose an item.	Choose an item.						
	Choose an item.	Choose an item.						
• Match	Choose an item.	Choose an item.						
	Choose an item.	Choose an item.						
• Match	Choose an item.	Choose an item.						
	Choose an item.	Choose an item.						
• Match	Choose an item.	Choose an item.						
	Choose an item.	Choose an item.						
• Match	Choose an item.	Choose an item.						
	Choose an item.	Choose an item.						
• Match	Choose an item.	Choose an item.						
	Choose an item.	Choose an item.						
• Match	Choose an item.	Choose an item.						
	Choose an item.	Choose an item.						
• Match	Choose an item.	Choose an item.						
	Choose an item.	Choose an item.						

<i>Program</i>	<i>Type of Resource</i>	<i>Source</i>	<i>2014-15</i>	<i>2015-16</i>	<i>2016-17</i>	<i>2017-18</i>	<i>2018-19</i>	<i>2019-20</i>
• Match	Choose an item.	Choose an item.						

## Appendix IV. Resources and Contact Information

The following list will provide you with expanded resources and contacts to assist you with planning efforts. Your support team contact names and information are also provided as your points of contact throughout your county action planning and implementation process.

<b>Lancaster County Support Team Members</b>	<b>WIP Planning Role</b>	<b>Organization</b>		<b>E-mail</b>	<b>Phone</b>
Nicki Kasi	DEP Chesapeake Bay Office – Overall WIP lead for Lancaster County	PA DEP		vbkasi@pa.gov	717-772-4053
Tyler Shenk	WIP Technical Support lead for Lancaster County	Susquehanna River Basin Commission (SRBC)		tshenk@srbc.net	717-238-0423 ext. 1117

I'm trying to:	How you can use this information	Resource	Contact	E-mail	Online Resource
<b>Find funding opportunities:</b>					
Finding the Green!	A guide to state funding opportunities for conservation, recreation and preservation projects	PA Growing Greener Coalition			<a href="http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_20028890.pdf">http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_20028890.pdf</a>  <a href="https://www.findingthegreen.com/">https://www.findingthegreen.com/</a>
<b>Understand local water quality in my county:</b>					
Current nutrient and sediment levels in streams	This will show quantity of nutrients and sediment at the water quality monitoring stations in non-tidal (watershed) streams. The user can understand the status of their local waters, and can use it to prioritize high loading areas for restoration.	USGS	Tyler Shenk, SRBC		<a href="https://cbrim.er.usgs.gov/summary.html">https://cbrim.er.usgs.gov/summary.html</a>
Trends in nutrients and sediments in streams over time	This will show long- and short-term trends in nutrients and sediment at the water quality monitoring stations in non-tidal (watershed) streams and can identify whether improvements are or are not being made.	USGS	Tyler Shenk, SRBC		<a href="https://cbrim.er.usgs.gov/summary.html">https://cbrim.er.usgs.gov/summary.html</a>
Local water quality monitoring and case studies	If long-term or short-term monitoring stations do not exist in the county, additional studies or water quality monitoring may still be available within the county.	USGS Pennsylvania Water Science Center	Tyler Shenk, SRBC		<a href="https://pa.water.usgs.gov/">https://pa.water.usgs.gov/</a>

<b>I'm trying to:</b>	<b>How you can use this information</b>	<b>Resource</b>	<b>Contact</b>	<b>E-mail</b>	<b>Online Resource</b>
Other water quality monitoring and other parameters	If long-term or short-term monitoring stations do not exist in the county, recent water quality sampling results may still be available at sites within the county.	Water Quality Data Portal	Tyler Shenk, SRBC		<a href="https://www.waterqualitydata.us/">https://www.waterqualitydata.us/</a>
Groundwater water quality monitoring	Groundwater quality monitoring data may be available within the county to help determine if nitrate levels are high in groundwater or have been in the past.	Water Quality Data Portal	Tyler Shenk, SRBC		<a href="https://www.waterqualitydata.us/">https://www.waterqualitydata.us/</a>
Local impaired waters and causes of impairments	Identifying locally impaired waters can be one of many ways to prioritize watersheds within a county for restoration efforts and see where water quality issues have already been identified.	PA DEP & SRBC	Tyler Shenk, SRBC		<a href="http://www.depgis.state.pa.us/integratedreport/index.html">http://www.depgis.state.pa.us/integratedreport/index.html</a>
Local Total Maximum Daily Loads	Identifying current Total Maximum Daily Loads within a county's watersheds can be one of many ways to prioritize restoration efforts, and to see where current efforts are already potentially underway.	PA DEP & SRBC	Tyler Shenk, SRBC		<a href="http://www.depgis.state.pa.us/integratedreport/index.html">http://www.depgis.state.pa.us/integratedreport/index.html</a>
Estimated local sources of nutrients and sediment	This can help identify which specific sources (e.g. crops, pasture, septic, regulated stormwater) nutrients and sediment are coming from to help understand manageable local sources.	Chesapeake Bay Program CAST	Tyler Shenk, SRBC		<a href="http://cast.chesapeakebay.net/">http://cast.chesapeakebay.net/</a>

<b>I'm trying to:</b>	<b>How you can use this information</b>	<b>Resource</b>	<b>Contact</b>	<b>E-mail</b>	<b>Online Resource</b>
Estimated breakdown of nutrient and sediment sources by sector (agriculture, wastewater, stormwater, etc.)	This can help identify which sectors nutrients and sediment are coming from to help understand manageable local sources.	Chesapeake Bay Program CAST	Tyler Shenk, SRBC		<a href="http://cast.chesapeakebay.net/">http://cast.chesapeakebay.net/</a>
Geographic areas estimated to be largest sources of nutrients and sediment	This can identify where the estimated highest loading areas of the watershed are currently, which can be used as one way to focus restoration efforts.	Chesapeake Bay Program CAST	Tyler Shenk, SRBC		<a href="http://cast.chesapeakebay.net/">http://cast.chesapeakebay.net/</a>
Manageable sources of nutrients being applied to landscape (e.g. manure, fertilizer)	This can identify the quantity of nutrients being applied to agricultural land as manure, fertilizer and biosolids within a county, which can be used to understand controllable sources.	Chesapeake Bay Program CAST	Tyler Shenk, SRBC		<a href="http://cast.chesapeakebay.net/">http://cast.chesapeakebay.net/</a>
Application of nutrients to agricultural land over time	This can be used to determine if nutrient inputs to agricultural land are increasing or decreasing.	Chesapeake Bay Program CAST	Tyler Shenk, SRBC		<a href="http://cast.chesapeakebay.net/">http://cast.chesapeakebay.net/</a>
Animal production over time	This is useful to assess whether animal production is increasing or decreasing, and which animals are produced in the county.	Chesapeake Bay Program CAST	Tyler Shenk, SRBC		<a href="http://cast.chesapeakebay.net/">http://cast.chesapeakebay.net/</a>
Estimated nutrient need by crops in county		Chesapeake Bay Program CAST	Tyler Shenk, SRBC		<a href="http://cast.chesapeakebay.net/">http://cast.chesapeakebay.net/</a>
Analysis of nutrient application compared to need by crops	This can identify if over-application of nutrients is estimated to be occurring in the county, which can identify management options such as manure transport or nutrient management.	Chesapeake Bay Program CAST	Tyler Shenk, SRBC		<a href="http://cast.chesapeakebay.net/">http://cast.chesapeakebay.net/</a>

<b>I'm trying to:</b>	<b>How you can use this information</b>	<b>Resource</b>	<b>Contact</b>	<b>E-mail</b>	<b>Online Resource</b>
Pathway that nitrogen, phosphorus and sediment reach local streams	This can determine the relative importance of different pathways, such as: groundwater, overland runoff, stream erosion. Utilizing practices that address these pathways is one way to focus restoration efforts.	Chesapeake Bay Program	Tyler Shenk, SRBC		In development
Contribution of nitrogen from groundwater to local streams	This can identify areas where BMPs that focus on groundwater can be especially effective.	USGS	Tyler Shenk, SRBC		In development
Vulnerable groundwater areas	This will show areas of the watershed that are especially vulnerable to groundwater contamination by nitrate. These are important places to control nitrogen going into groundwater.	Chesapeake Bay Program	Tyler Shenk, SRBC		In development
Critical drinking water source protection areas	This will identify areas within the county that are utilized as sources for public drinking water, and can be one way to prioritize conservation or restoration efforts.	SRBC	Tyler Shenk, SRBC		In development
Estimated or measured soil phosphorus levels	High soil phosphorus levels can mean more phosphorus traveling to streams. This can identify areas where over-application of phosphorus may be occurring, and can be one way to prioritize conservation and restoration efforts.		Tyler Shenk, SRBC		

I'm trying to:	How you can use this information	Resource	Contact	E-mail	Online Resource
<b>Identify effective management practices:</b>					
Most cost-effective practices to control nutrients and sediment in county	Utilizing the most cost-effective (\$/lbs reduced) practices for that county can be one way to prioritize practices by taking into account cost.	Chesapeake Bay Program CAST	Tyler Shenk, SRBC		<a href="http://cast.chesapeakebay.net/">http://cast.chesapeakebay.net/</a>
Most effective practices to control nutrients and sediment in county	Utilizing the most effective practices (lbs reduced/unit BMP) for that county can be one way to prioritize practices based on water quality benefits.	Chesapeake Bay Program CAST	Tyler Shenk, SRBC		
Efficiency of certain practices as removing nutrients and sediment	This information can be used to choose effective practices, and also to choose practices that are effective for multiple nutrients or sediment.	Chesapeake Bay Program CAST	Tyler Shenk, SRBC		<a href="http://cast.chesapeakebay.net/">http://cast.chesapeakebay.net/</a>
Estimated cost of best management practices	This can provide estimated costs of implementing, operating and maintaining each BMP.	Chesapeake Bay Program CAST	Tyler Shenk, SRBC		<a href="http://cast.chesapeakebay.net/">http://cast.chesapeakebay.net/</a>
Local co-benefits associated with best management practices	This can help identify additional benefits beyond water quality associated with each BMP.	PA DEP	Nicki Kasi, DEP		In development
<b>Identify opportunities in my county to implement management practices:</b>					
Practices already being reported in county	This can show what has already been reported as implemented within a county to check for accuracy and completeness.	Chesapeake Bay Program CAST	Tyler Shenk, SRBC		<a href="http://cast.chesapeakebay.net/">http://cast.chesapeakebay.net/</a>
Effectiveness of practices reported as being implemented	This analysis can determine if the most effective practices to benefit water quality are being implemented.	Chesapeake Bay Program CAST	Tyler Shenk, SRBC		<a href="http://cast.chesapeakebay.net/">http://cast.chesapeakebay.net/</a>

<b>I'm trying to:</b>	<b>How you can use this information</b>	<b>Resource</b>	<b>Contact</b>	<b>E-mail</b>	<b>Online Resource</b>
Estimated cost of practices reported as being implemented	This analysis can determine the current estimated cost of practices reported to be implemented.	Chesapeake Bay Program CAST	Tyler Shenk, SRBC		<a href="http://cast.chesapeakebay.net/">http://cast.chesapeakebay.net/</a>
Most effective places geographically to focus practices to improve water quality	This can identify the highest loading areas within the county, which can be some of the most effective places to focus restoration efforts.	Chesapeake Bay Program CAST	Tyler Shenk, SRBC		<a href="http://cast.chesapeakebay.net/">http://cast.chesapeakebay.net/</a>
		USGS SPARROW Model	Tyler Shenk, SRBC		<a href="https://pubs.usgs.gov/sir/2011/5167/">https://pubs.usgs.gov/sir/2011/5167/</a>
Analysis of local practices compared to local sources of nutrients and sediment	This analysis can determine if the practices currently reported as being implemented actually address the local source of nutrients and sediment.	Chesapeake Bay Program	Tyler Shenk, SRBC		
Remaining opportunity areas in county to implement specific practices	This can identify the remaining total acres or other unit available to implement different BMPs.	Chesapeake Bay Program CAST	Tyler Shenk, SRBC		<a href="http://cast.chesapeakebay.net/">http://cast.chesapeakebay.net/</a>
Areas with regulatory opportunities within county (e.g. municipal stormwater)	This can identify areas where regulatory frameworks already exist for implementing restoration efforts, such as permitted municipal stormwater areas.	USGS Phase 6 Land Use Viewer	Tyler Shenk, SRBC		<a href="https://chesapeake.usgs.gov/phase6/map/">https://chesapeake.usgs.gov/phase6/map/</a>