



Watershed Planning in the Pequea

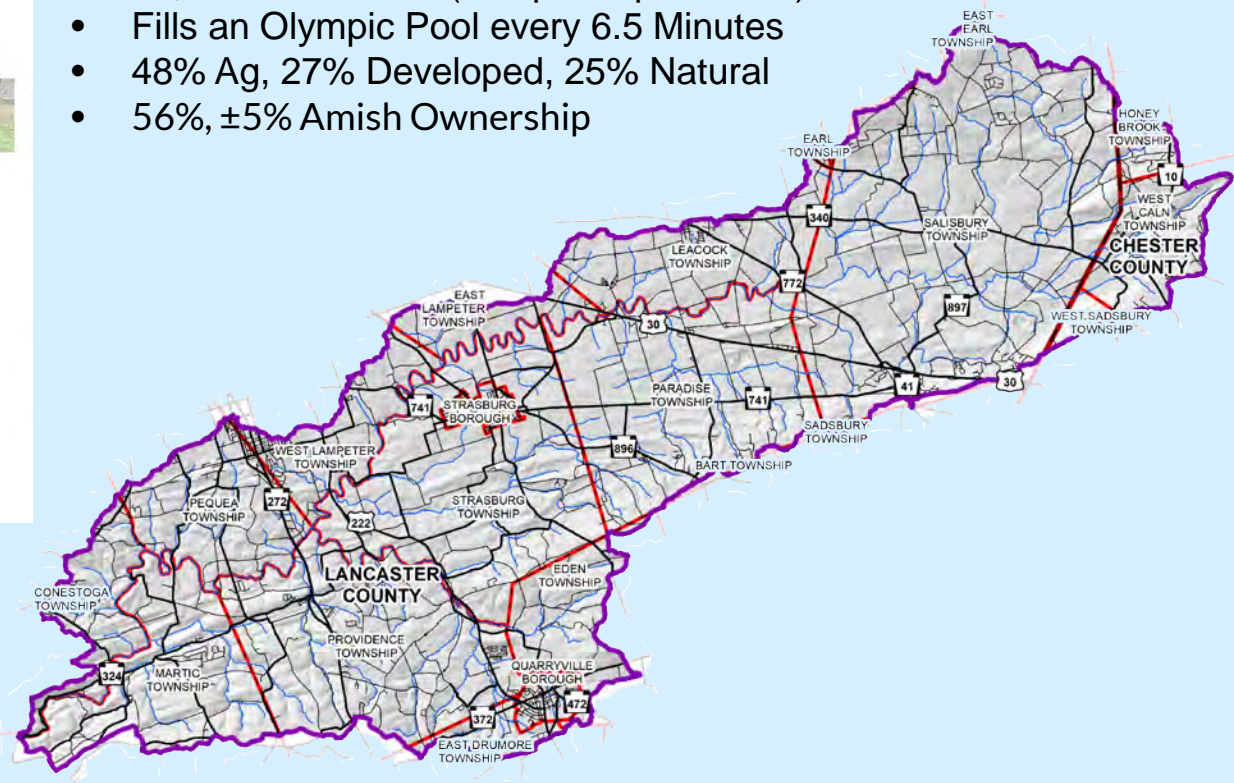
Meeting Federal Standards
through Local Approaches

Brian Gish, AICP
PA Senior Watershed Planner



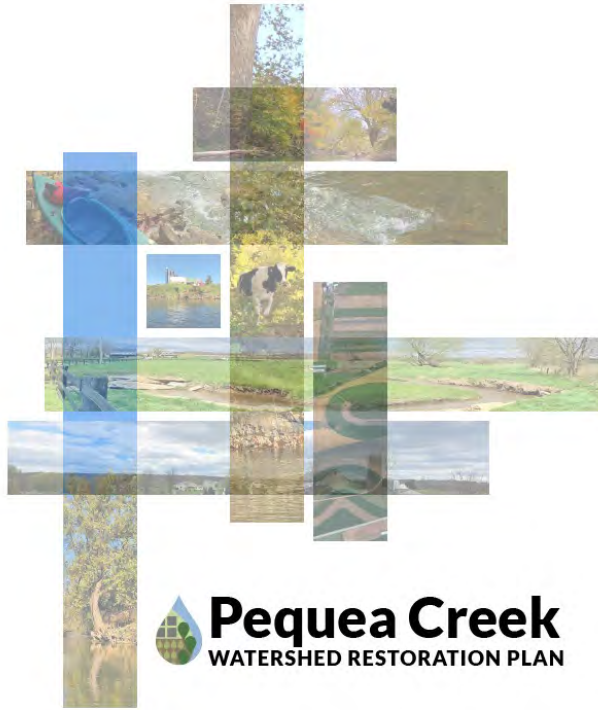
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- 153 Square Miles
- 240.5 Stream Miles
- 207 Miles Aquatic Life Impairments
- Watershed Roughly 25 Miles by 8 Miles
- 2 Counties, 18 Municipalities
- 50,000 Inhabitants (325 per Square Mile)
- Fills an Olympic Pool every 6.5 Minutes
- 48% Ag, 27% Developed, 25% Natural
- 56%, ±5% Amish Ownership




Pequea Creek

WATERSHED RESTORATION PLAN



Watershed Overview

(...or the right way, the wrong way, and the Pequea)



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Our Organization



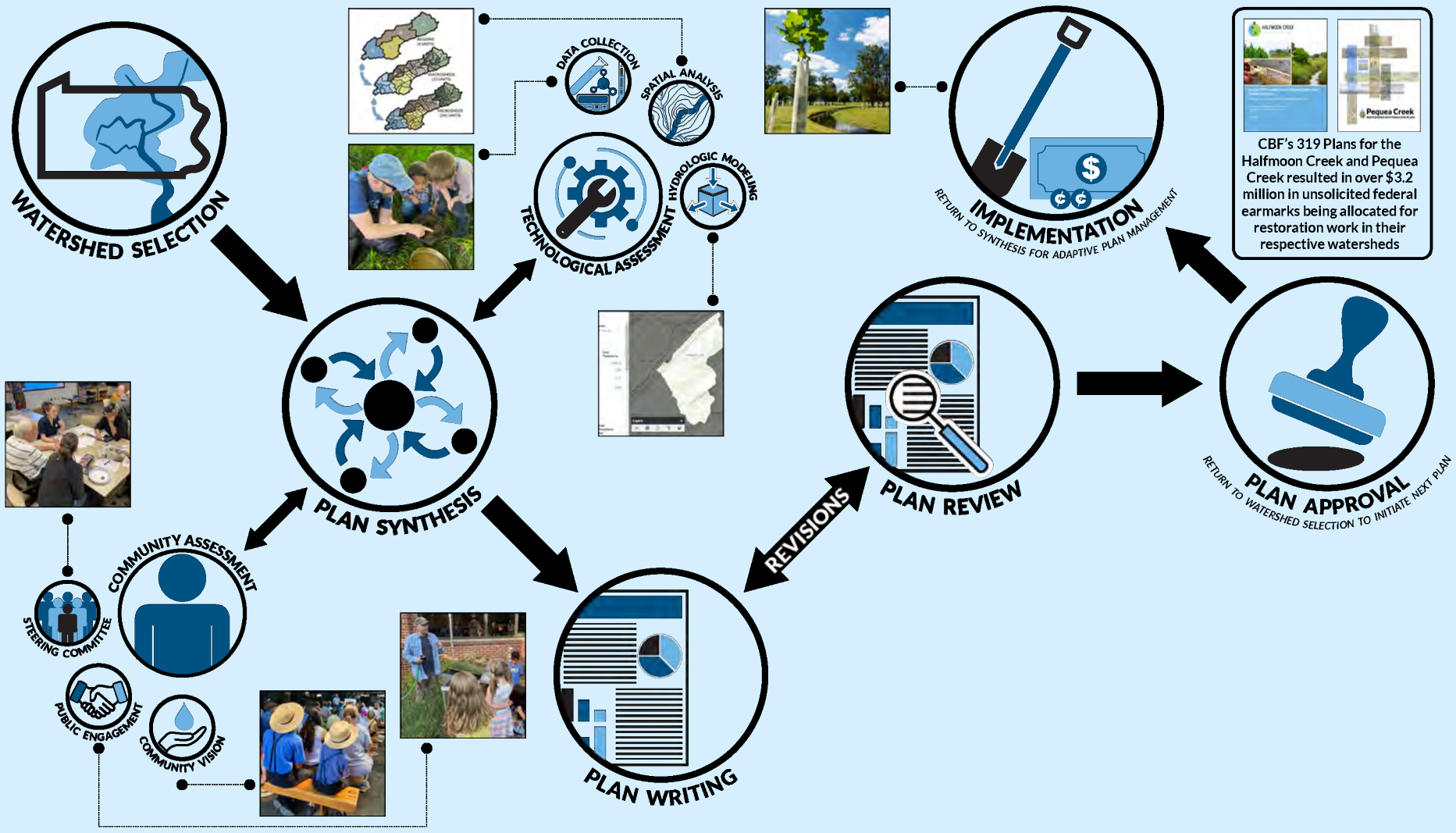
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Pennsylvania Presence



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Pennsylvania 319 Team



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CBF's Watershed Planning Process



Round One

2018 - 2021

Halfmoon Creek
24 Square Miles
Centre County,
Huntingdon County

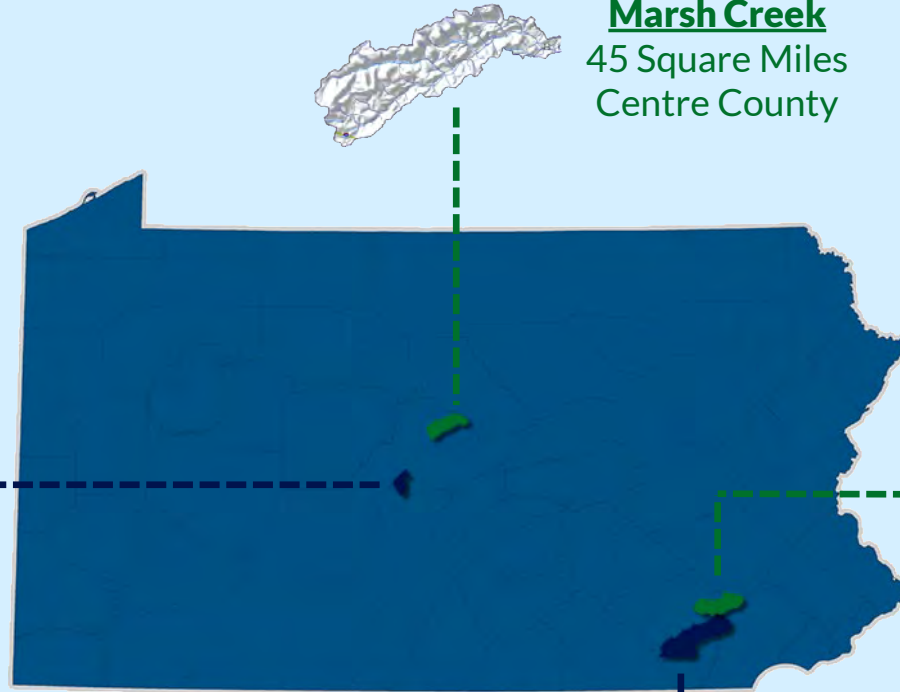
Pequea Creek
153 Square Miles
Lancaster County,
Chester County

Marsh Creek
45 Square Miles
Centre County

Round Two

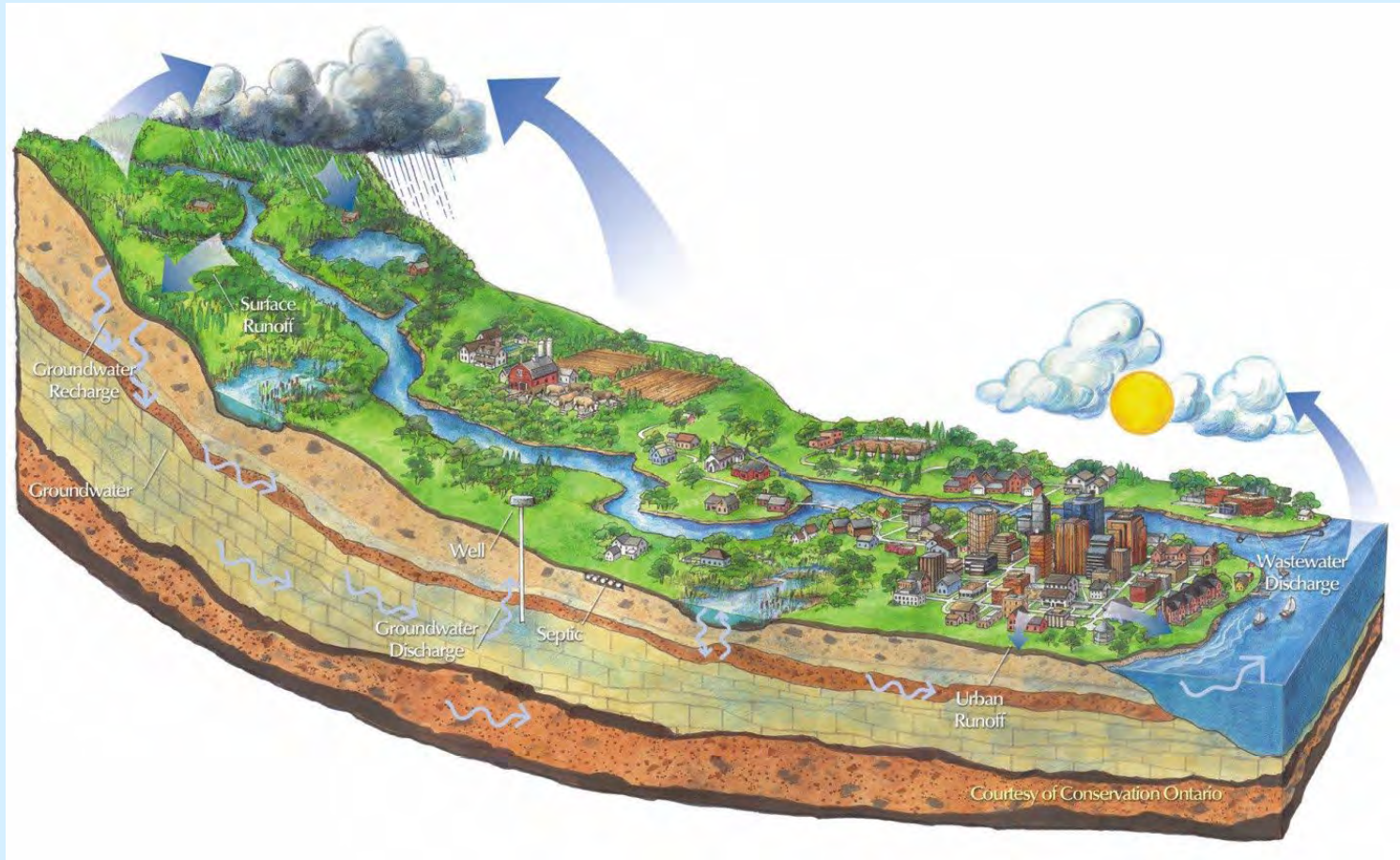
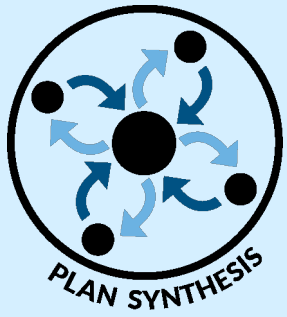
2021 - present

Upper Conestoga River
66 Square Miles
Lancaster County,
Berks County,
Chester County



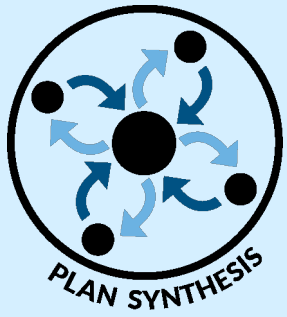
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Our Watersheds



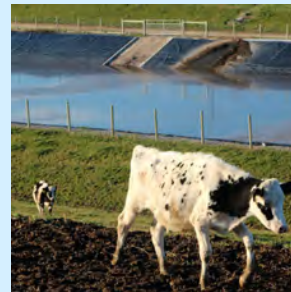
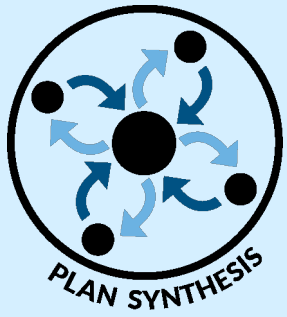
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Tributary & Community Focus



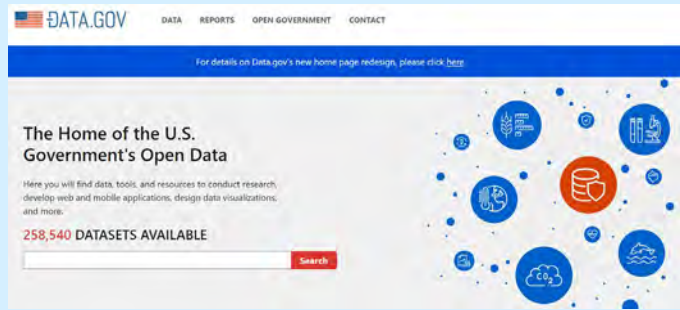
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Watershed Concerns & Issues



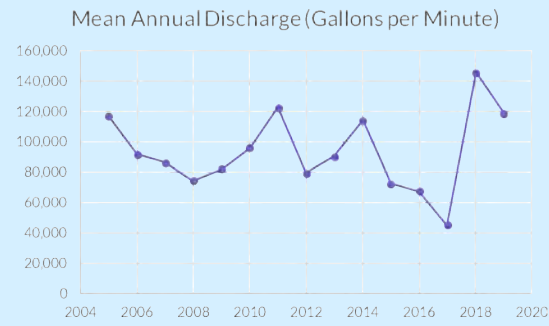
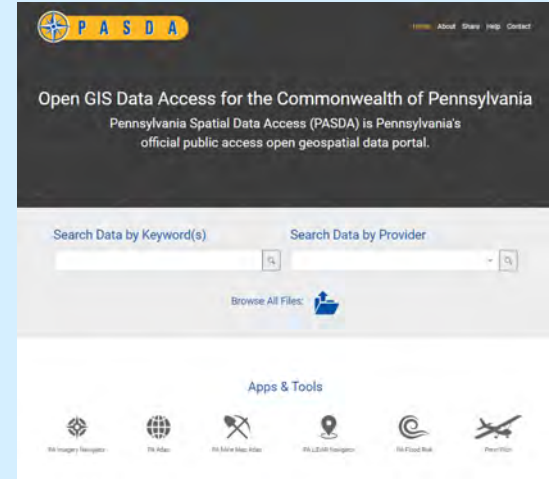
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Holistic Solutions



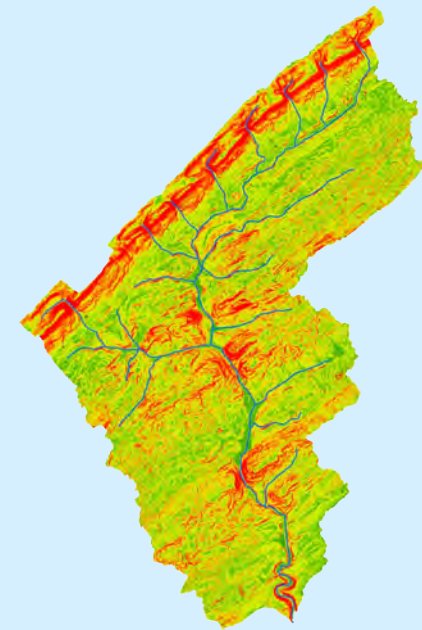
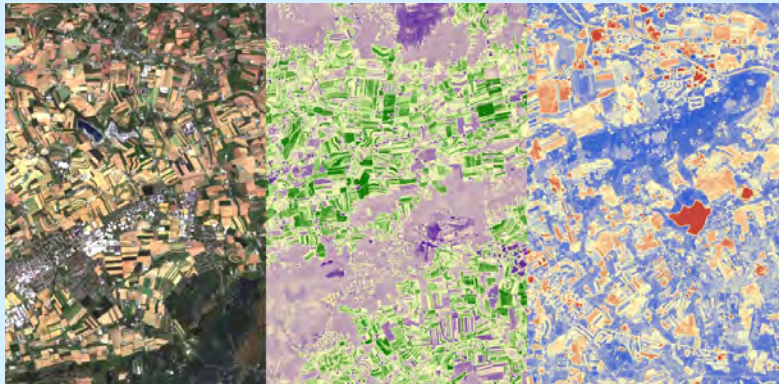
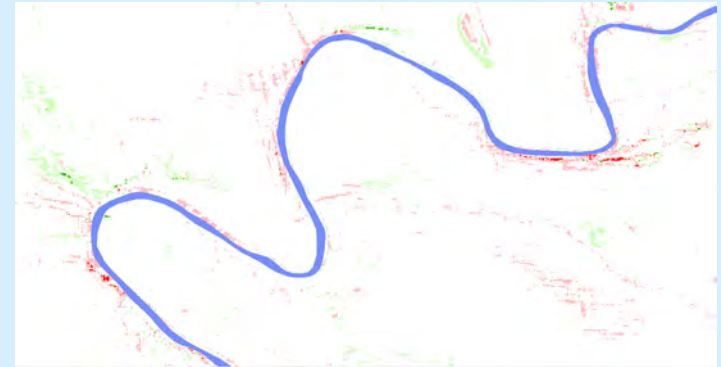
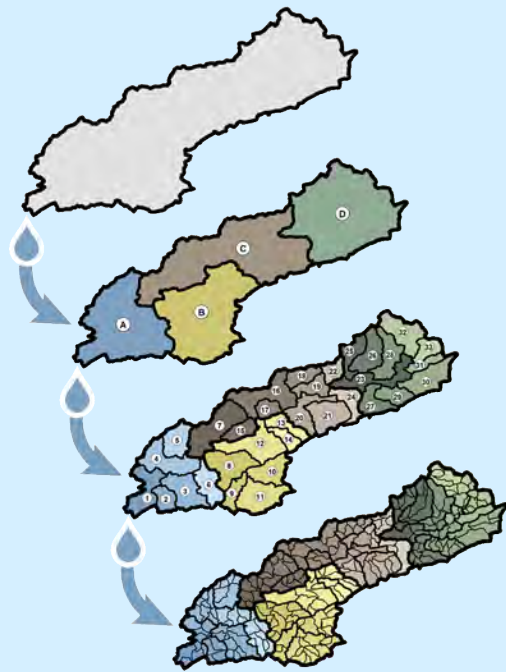
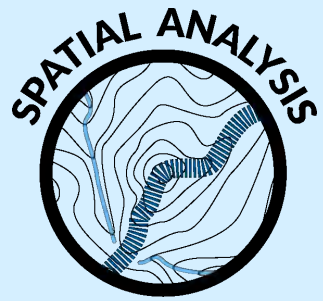
2022 Upper Conestoga (mecon)waterbody scores - Read-Only

	C	D	E	F	G	H
	STREAM	Lat	Long	Des Use	drainage area (sq mi)	2020 303(d) for Aquatic Life
2	Conestoga River	40.15040	-76.09700	WWF	5.4	IMPAIRED
3	Conestoga River	40.13960	-76.02950	WWF	43.1	IMPAIRED
4	Cedar Creek	40.13850	-76.02470	WWF	5.47	IMPAIRED
5	Little Conestoga River	40.14580	-75.99080	WWF	6.79	IMPAIRED
6	Little Conestoga River	40.13880	-75.96300	WWF	3.84	IMPAIRED
7	Conestoga River	40.14140	-75.99790	WWF	27.7	IMPAIRED
8	Conestoga River	40.13040	-75.97700	WWF	26.5	IMPAIRED
9	Conestoga River	40.13889	-75.91374	WWF	18	IMPAIRED
10	Conestoga River	40.14720	-75.88120	WWF	14.7	IMPAIRED
11	WB Conestoga River	40.15390	-75.89646	WWF	3.85	IMPAIRED
12	EB Conestoga River	40.15870	-75.87720	WWF	6.67	IMPAIRED
13	EB Conestoga River	40.16800	-75.87110	WWF	3.53	IMPAIRED



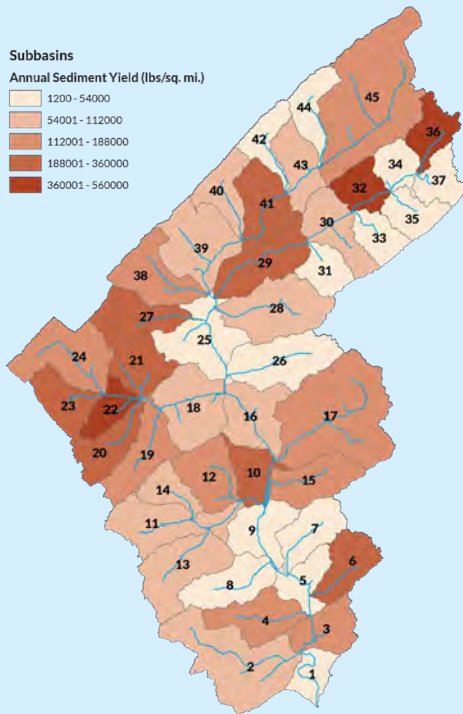
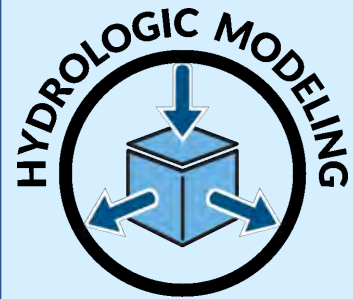
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Data Collection



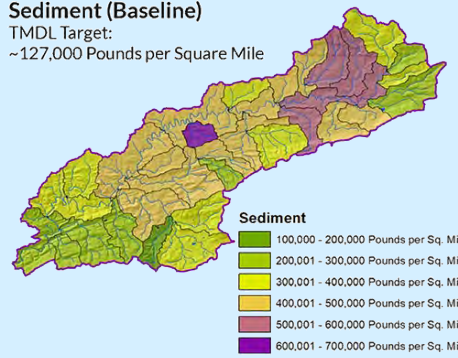
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Geospatial Analysis



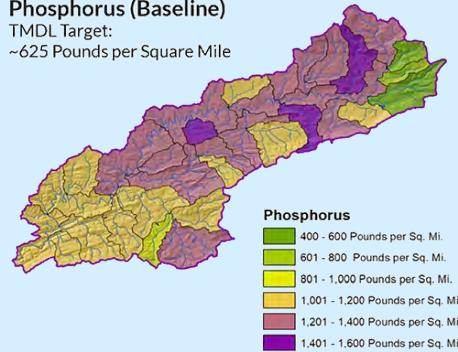
Sediment (Baseline)

TMDL Target:
~127,000 Pounds per Square Mile



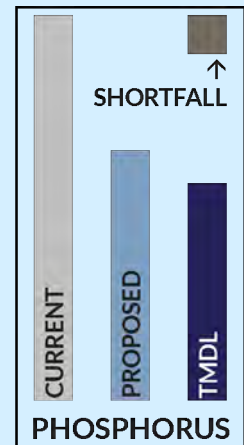
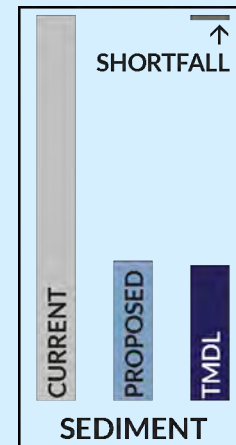
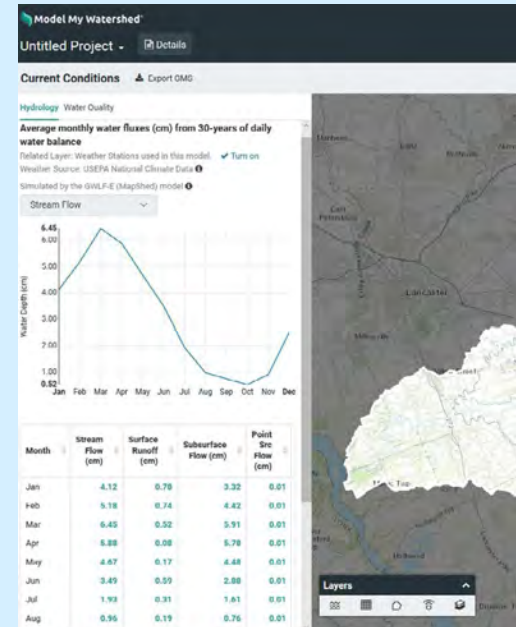
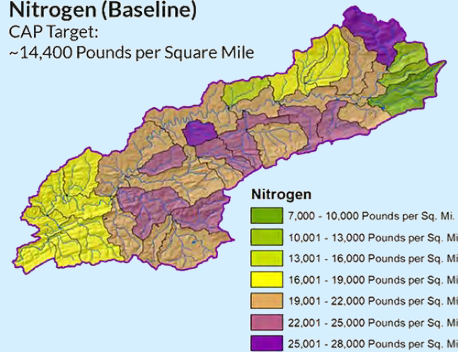
Phosphorus (Baseline)

TMDL Target:
~625 Pounds per Square Mile



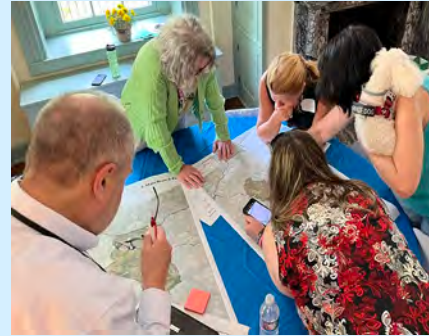
Nitrogen (Baseline)

CAP Target:
~14,400 Pounds per Square Mile



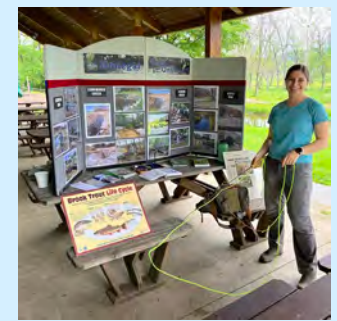
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Hydrologic Modeling



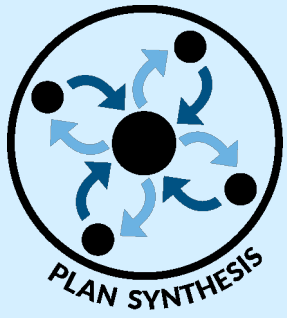
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Steering Committee



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Public Engagement



Quantitative + Qualitative = Success



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Striking the Balance



The Nine EPA Requirements

We Determine

Pollution Causes + Sources
 Pollutant Loading + Load Reductions
 Management Measures to Reduce Load
 Implementation Assistance
 Information/Education Component
 Project Schedule
 Interim, Measurable Milestones
 Indicators to Measure Progress
 Monitoring Component

Goals
 Values
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 Focus
 Engagement
 Strategies
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 Partnerships
 Buy-in

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Even if one had the resources to tackle the entire Potomac watershed to a large and complicated entity, and a one-size-fits-all approach would be an ill-fated attempt to return the stream to healthy state. Still, there are a number of universal considerations across the watershed. First is the central role that sediment plays in this aquatic ecosystem. The other requirements of the watershed, there is not a single-size-fits-all approach. The second is the Potomac not affected by siltation. Accordingly, lowering the sediment loads in the watershed is the priority. There are many ways to do this, including: 1) to prevent soil erosion from leaving their source through agricultural practices like cover crops and proper tillage management. The second is to stabilize stream banks to prevent the migration of sediment into waterways (as well as altering stream habitat, and nutrient loading). The third is to secure the sediment, preventing that which is already in the basin from being transported into the stream. Through stabilization and removal. The second item for a given location will vary, but each of these has a role to play in restoring the Potomac's health.

PREVENT

IMPEDE

SECURE



Photo Credit: George R. ...

Photo Credit: Matt ...

Acknowledgments

The Chesapeake Bay Foundation (CBF) would like to sincerely thank our project partners for their time, collaboration, and expertise given throughout the development of this Section 319 Watershed Management Plan for the Potomac Creek. Project partners include but are not limited to the Lancaster Clean Water Partners, Lancaster County Conservation District, Potomac Creek Watershed Association, Lancaster Conservancy, Lancaster County Planning Commission, Lancaster County SO Department, Chester County, Lancaster Family Trust, Chesapeake Conservancy Alliance for the Chesapeake Bay, Broad Water Research Center, Water Science Institute, Western Pennsylvania Conservancy, Theodore Roosevelt Conservation Partnership, Donnell Trust, Unfettered, Pennsylvania State University Center for Agricultural & Environmental Research, & Marshall College, Susquehanna River Basin Commission, DCNR, DNR, PA Wildlife Township, Salisbury Township, Starnig, Tickner's Mill Landfill, and the Anishin Community. We would especially like to thank the community members, landowners, and farmers of the watershed with whom we have connected and formed a shared, vested stake in this plan for a healthier Potomac Creek. Their invaluable perspectives and knowledge from living in the watershed for many years, sometimes across generations, gave us insight into more tangible solutions for the Potomac Creek Watershed. Last, all of this would not have been possible without the generous support of our funders. Thank you.



This monument is dedicated in memory of Greg Wilmes, a member of the plan's steering committee, whose efforts (2012) to improve water quality in Lancaster County will be sorely missed.

CONCLUSION

This ambitious restoration plan for the Halfmoon Creek Watershed achieves and surpasses the targeted maximum sediment load as recommended in the Halfmoon Creek TMDL. It does so by setting tangible goals set for the stakeholders, which are supported by locally specific solutions with community values in mind. Our action plan will seek to decrease nonpoint source pollutants, restore aquatic and riparian habitat in degraded areas, preserve ecologically critical landscapes in place, and foster community stewardship of the watershed to achieve our vision for a healthier Halfmoon Creek for generations to come.

Our analytical and collaborative approach took these goals a step further to define unique and specific concerns, goals, and strategies across seven different regions of the water shed. Thus, our approach is not a one-size-fits-all solution, but specifically tailored to address the varying concerns and needs of the community across the watershed with strategies that are most likely to succeed and be implemented. The implementation plan also lays out a plan of where and when to concentrate our efforts, beginning in the headwaters where great success has already been made, and then work our way downstream where more in-depth work, such as restoration, and time are needed. This approach will help ensure our resources and time are best managed for achieving success efficiently in an optimal time frame.

Our collective efforts amongst the CBF and the numerous local and regional partners working on this project yielded a great collaboration and foundation that is successfully set to continue from this planning stage to the next stages of implementation, adaptive management, and monitoring. We look forward to continuing to monitor this vision and action plan for a healthier Halfmoon Creek in the watershed, and alongside the waterbodies and communities that lie downstream.



"The true meaning of life is to plant trees, under whose shade you do not expect to sit in."
-Hilbert (Anonymous)

CONCLUSION

"In rivers, the water that you touch is the last of what has passed, and the first of that which comes; so with present time."

Leonardo da Vinci



Pictured below is the sun setting on the Susquehanna at the mouth of the Potomac. For millennia, water has made its way from the White Mountains to this confluence, aided by flows collected over thousands of square miles. A journey on to the Chesapeake, the Atlantic, and eventually the great biological cycle that is the very birth of the Potomac itself. The process is as vital to mortal as most can imagine. There is an order, an elegance, and a beauty. It's perfect. And it's beautiful to rest on that note. But we know it is not perfect. Over the last three centuries, the Potomac has experienced a profound decline. Gone are the banks, the rest of the Potomac. Streams flowing with brook trout, and spawning that, have given way to struggling ecological communities. On the other side, a new, higher-tech ecosystem, cement and asphalt, a harmful remnant of a noble past. These two diametrically opposed proportions, with similarities, only this parallel in many ways at the center of this plan how do we reconcile the past with the present, the best with the rest? The truth is that the Potomac will never be the stream that the first European immigrants encountered upon entering the watershed. But if it were possible, would we want it to be? Over the last three centuries, communities have been born of this watershed. Generations have been sustained by the fruits of its abundant Land. Cultural, economic, religious, and individual expressions have flourished.

And then, on its eternal journey, was always the Potomac. Amazing things have come to be in this watershed. But they were purchased on pain. It's time to start reaping that debt.

Attitudes have changed. Where a notion of conserving the environment was once the dominant paradigm, today there are more voices a philosophy of ambivalence, a reality in which the human and natural worlds exist in harmony. This latter ethos is the Potomac's future.

Contained in this plan is the road map to building that harmony. Fulfilling the plan's objectives will demand significant amounts of human effort, technical expertise, and financial support. It will require an embrace of different approaches and a willingness to break with long-standing practices. And it will necessitate bringing communities and generations, cultures and perspectives.

There are all ambitious goals. They are all realistic ones. There is a tremendous opportunity to facilitate lasting and substantial change in this watershed. One that one hundred years from now, a vibrant and environmental quality arrives at the same place. This plan outlines these first steps, the incremental successes that will build upon one another and the Potomac once again a healthy stream, from its headwaters to its mouth. We owe this to our past, our present, and our future. We owe it to ourselves.

It's up to us to translate this vision into reality. Now is the time.

"Harmony with land is the harmony with a friend; you cannot cherish his right hand and chop off his left."

Aldo Leopold

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A Focus on Design



pennsylvania
DEPARTMENT OF ENVIRONMENTAL
PROTECTION



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Plan Review



HALFMOON CREEK
Our Vision for a Healthy Stream

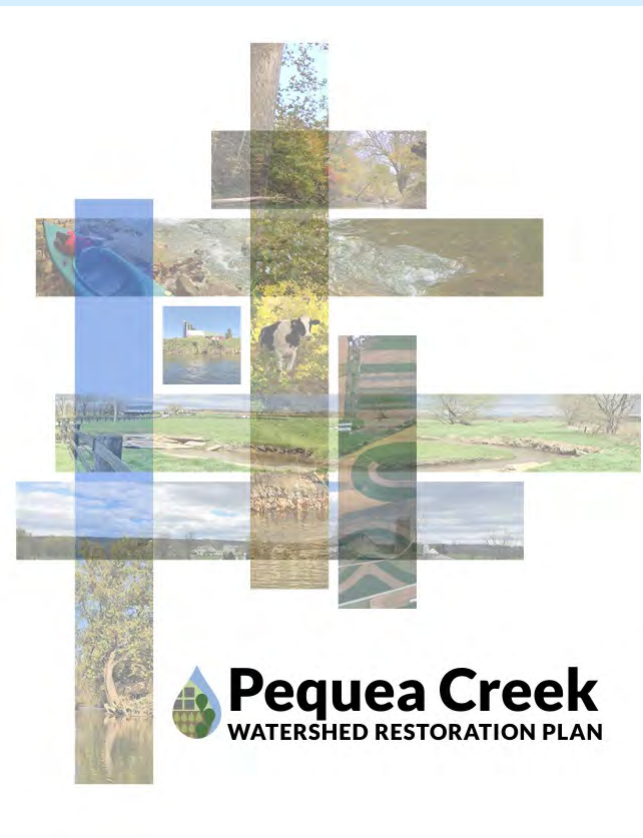


Section 319 Nonpoint Source Pollution Watershed Management Plan

Halfmoon Creek, Centre and Huntingdon Counties, PA

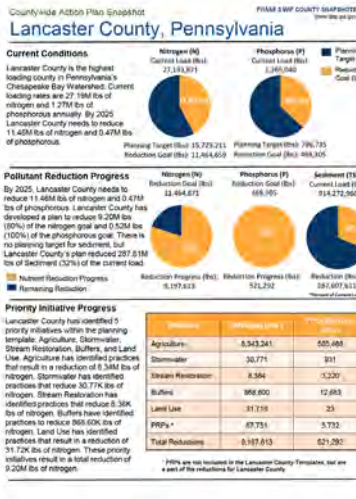
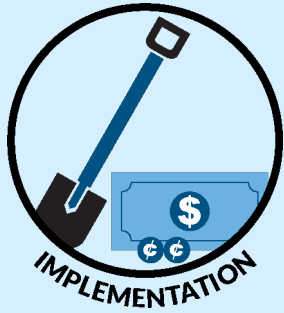
Prepared by the Chesapeake Bay Foundation
with collaboration from Project Partners

July 2021



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Plan Approval



CHESAPEAKE BAY FOUNDATION
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Plan Implementation

The Nine EPA Requirements

Pollution Causes + Sources
Pollutant Loading + Load Reductions
Management Measures to Reduce Load
Implementation Assistance
Information/Education Component
Project Schedule
Interim, Measurable Milestones
Indicators to Measure Progress
Monitoring Component

We Determine

Goals
Values
Priorities
Focus
Engagement
Strategies
Format
Partnerships
Buy-in





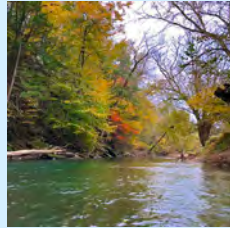
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Having a Dialogue with EPA

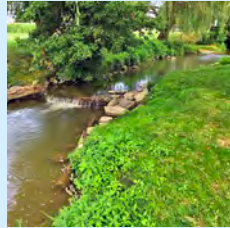
Watershed-Wide



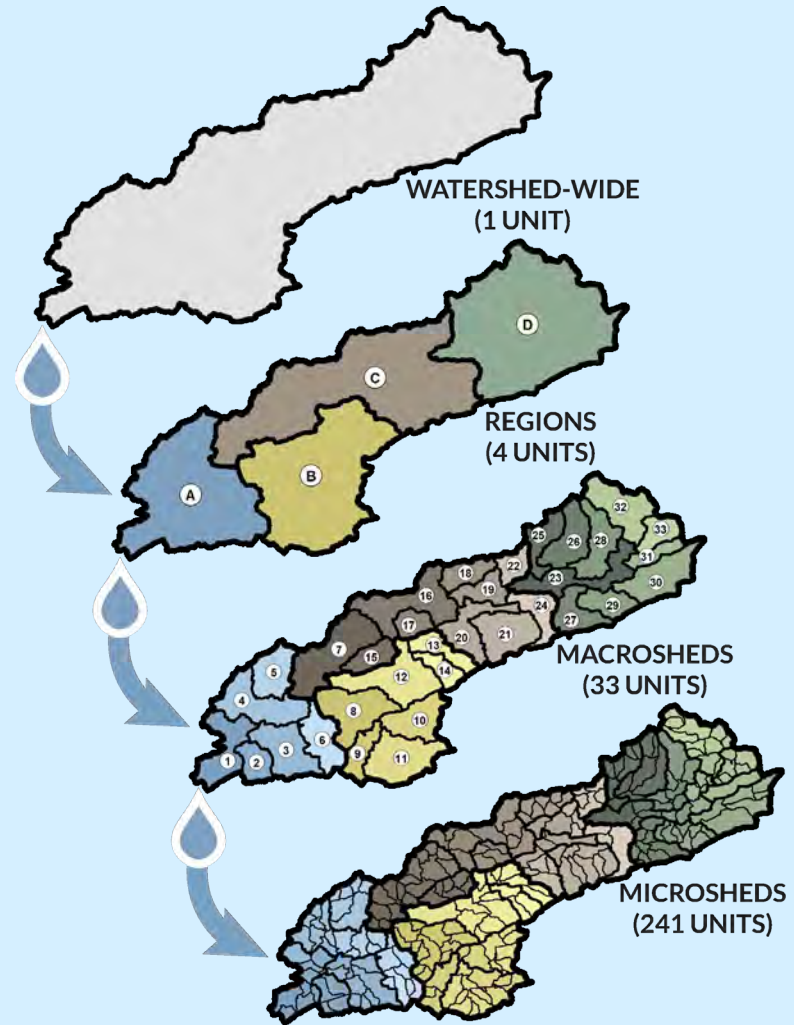
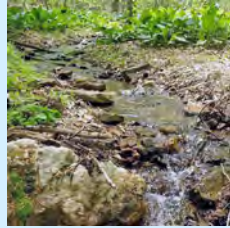
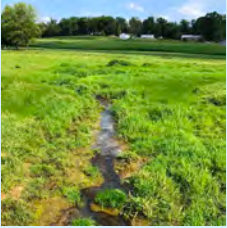
Regions



Macrosheds



Microsheds



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The Tiered Approach



TIER I

PRIORITY PRESERVATION AREAS

(3 Basins, 9% of Pequea Creek Watershed, 5% of Resource Allocation)



TIER II

NEAR-TERM RESTORATION AND DELISTING AREAS

(7 Basins, 23% of Pequea Creek Watershed, 80% of Resource Allocation)



TIER III

LONG-TERM RESTORATION AND OUTREACH AREAS

(23 Basins, 68% of Pequea Creek Watershed, 15% of Resource Allocation)

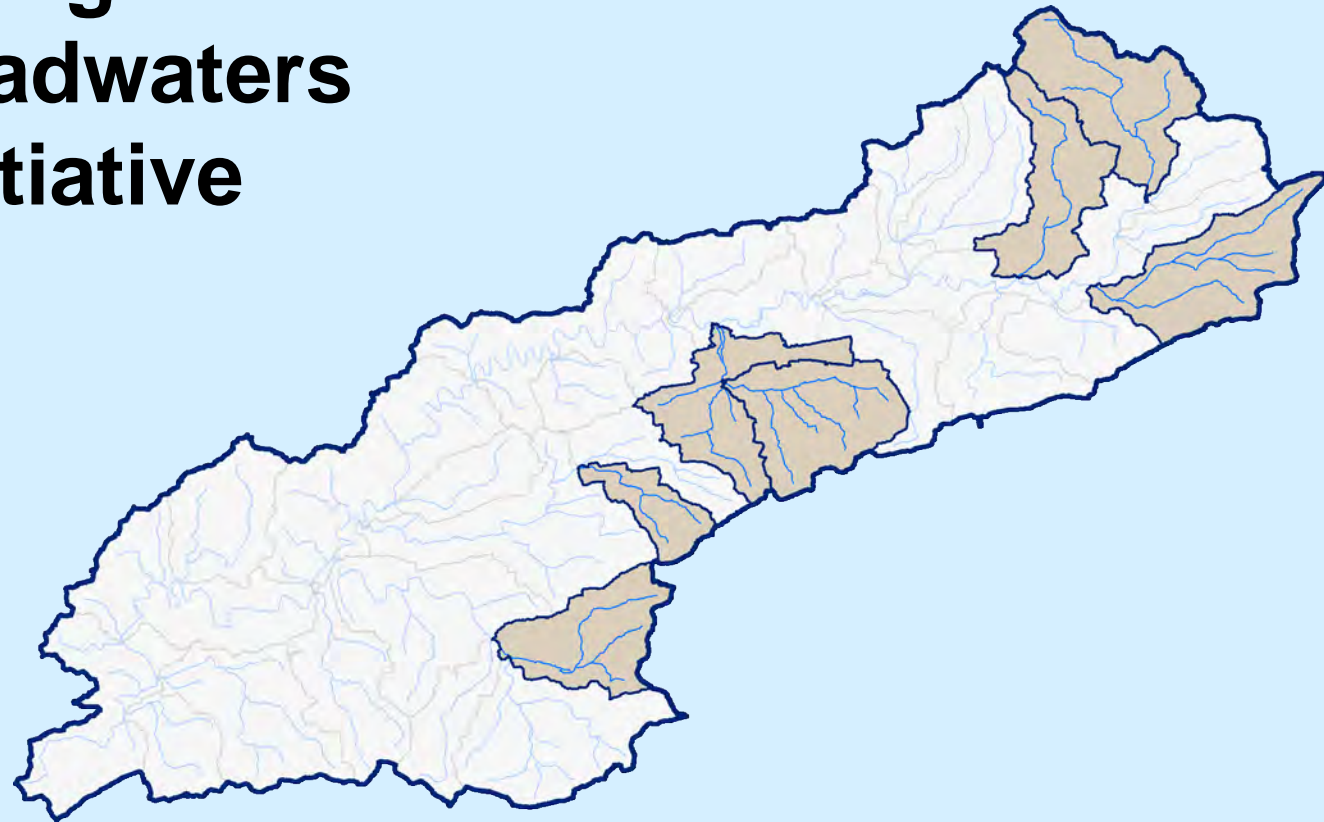


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The Tiered Approach

Near Delisting Healthy Headwaters Existing Initiative



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The Tiered Approach

2022 Pennsylvania Integrated Water Quality Report

Clean Water Act Section 303(d) List and 305(b) Report

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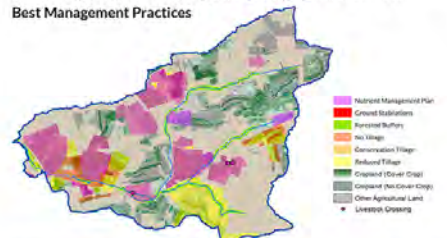
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Open "C:\QB64\Projects\Integrated_2024\List_05-2024_Parsed.csu" For Output
Line Input #1, Temp
Print #2, "Use_Category,Status,Stream_Name,COMID,HUC08_ID,HUC08_Name,Count
Dim Shared RecordID, ReachCode(2), Tally, CS, Count As Long
Dim Shared Miles(2) As Double
Dim Shared COMID$(2), LastCOMID$, UseCategory$(2), Status$(2), ImpCategory
Dim Shared CauseSource$(2, 11)
IsFirst = 1
CS = 0
While Not EOF(1)
'For F = 1 To 100
Input #1, UseCategory$(2), Status$(2), StreamName$(2), COMID$(2), HUC0
If Status$(2) = "Unassessed" Then UseCategory$(2) = "Unassessed"
If IsFirst = 1 Then LastCOMID$ = COMID$(2): LastUseCategory$ = UseCate
'Print "LastCOMID$="; LastCOMID$; ", COMID$(2)="; COMID$(2); ", LastUs
'Input Temp$
If LastCOMID$ = COMID$(2) And LastUseCategory$ = UseCategory$(2) Then
CS = CS + 1
CauseSource$(1, CS) = Cause$
CauseSource$(2, CS) = Source$
IsFirst = 0
Else
Print #2, UseCategory$(1); ", "; Status$(1); ", "; StreamName$(1); "
Print #2, MuniType$(1); ", "; Zip$(1); ", "; DesUse$(1); ", ";
For CS = 1 To 10
Print #2, CauseSource$(1, CS); ", "; CauseSource$(2, CS); ", ";
CauseSource$(1, CS) = "": CauseSource$(2, CS) = ""
Next CS
Print #2, CauseSource$(1, 11); ", "; CauseSource$(2, 11)
CauseSource$(1, 11) = "": CauseSource$(2, 11) = ""
CauseSource$(1, 1) = Cause$: CauseSource$(2, 1) = Source$
    
```

Big Beaver Creek (Upper) - Upstream Portions (7 NHD Segments, 5.3 Miles)	
Agricultural Sources	Habitat Modification Sources
Nutrients	Habitat Alterations
Siltation	Siltation

Big Beaver Creek (Upper) - Downstream Portions (6 NHD Segments, 2.0 Miles)	
Agricultural Sources	Habitat Modification Sources
Nutrients	Habitat Alterations
Siltation	pH

A variety of impairments are found in the Upper Big Beaver Creek Basin. The primary source of these impairments is agriculture followed by habitat modifications. Despite these impairments, IBI scores are relatively high (ranging between 48.5 and 51.8). These values verge on the attainment level for trout stocked fisheries (score of 50). Secondary criteria, (e.g. Bock's Index scores) lag somewhat farther behind, while other (e.g. Percent Sensitive Individuals score) can be found both above and below the minimum threshold (25%). All told, this speaks to a watershed with a realistic opportunity for near-term delisting, particularly in the upper portions of the watershed.

Best Management Practices



A decent amount of agricultural BMPs are found throughout the watershed, particularly in the downstream portions presenting the biggest challenge to delisting. Unfortunately, three key BMPs (riparian buffers, streambank fencing, and bank stabilization) are missing, providing both a threat and an opportunity. A goal approaching universal implementation of cover crops and improved tillage practices would certainly help relieve sedimentation concerns.

Stream Health & Impairments



Lutheyan Run - Upstream Portions (3 NHD Segment, 1.6 Miles)	
Agricultural Sources	Habitat Modification Sources
Unimpaired	Unimpaired

Lutheyan Run - Downstream Portions (11 NHD Segments, 6.0 Miles)	
Agricultural Sources	Habitat Modification Sources
Nutrients	Habitat Alterations
Siltation	Siltation
Organic Enrichment/Low Dissolved Oxygen	

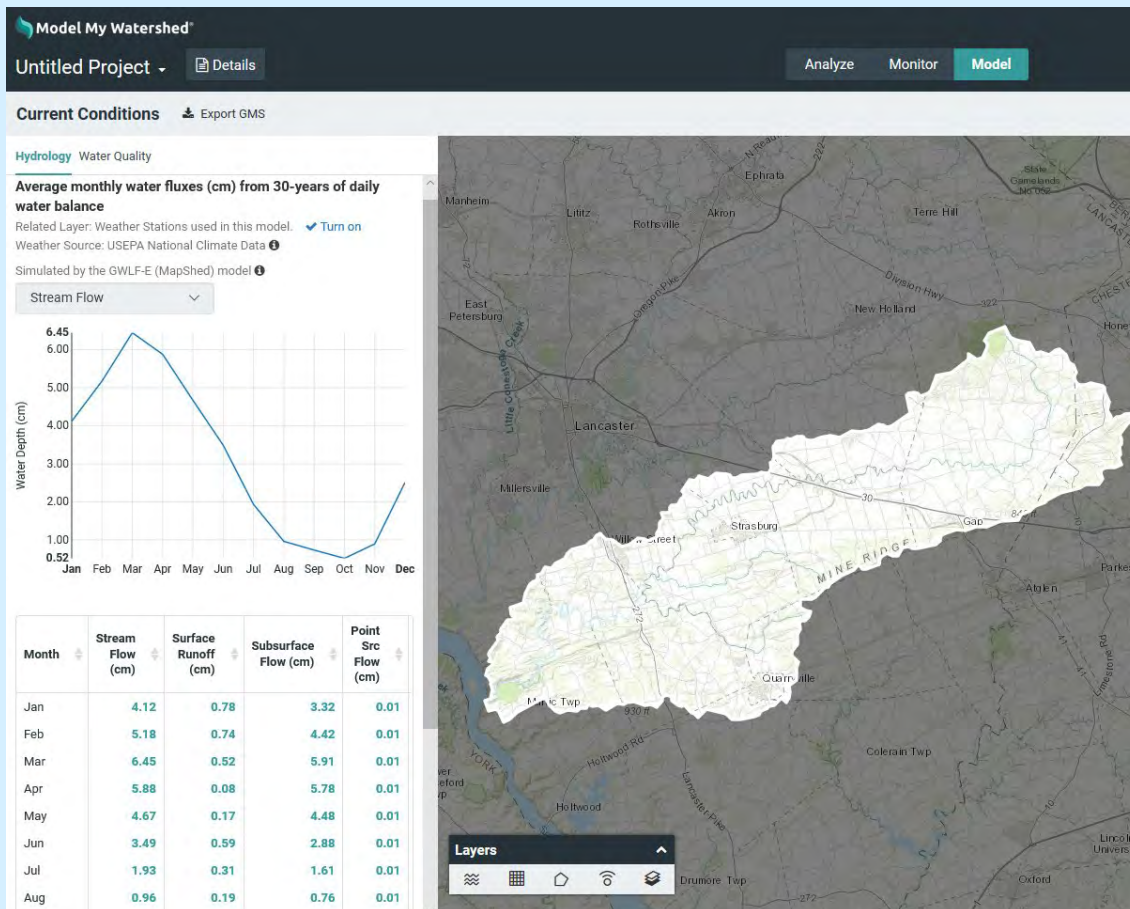
Londonland Run - Entire Watershed (13 NHD Segments, 9.3 Miles)	
Agricultural Sources	Habitat Modification Sources
Nutrients	Habitat Alterations
Siltation	Siltation
Organic Enrichment/Low Dissolved Oxygen	

As noted, below the headwaters, the streams in these two watersheds are severely impaired. The IBI score of 24.3 near their confluence is emblematic of this. Though the entirety of the Londonland Run Watershed is listed as being impaired, headwaters are barely in attainment, obscured by the fact that entire tributaries are represented by a single stream segment for analysis. (This is especially probable for the unassessed tributary to Londonland Run). This will need to be examined in greater detail in assessing the impacts of restoration activities. Targeting specific tributaries and focusing on their complete delisting may, however, render this moot. Interestingly, despite their degraded status, all streams in these watersheds are classified as CWF under Chapter 93.



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Pollution Causes + Sources



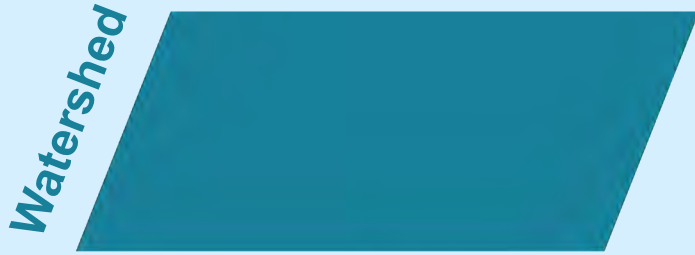
Land Cover

Landcover Preset Land Use/Cover 2019 (NLCD19) ▾

Hay / Pasture (ha)	5948.9
Cropland (ha)	17542.1
Wooded Areas (ha)	9462
Wetlands (ha)	91.8
Open Land (ha)	98.5
Barren Areas (ha)	68.1
Low-Density Mixed (ha)	2235.7
Medium-Density Mixed (ha)	874.1
High-Density Mixed (ha)	222.6
Low-Density Open Space (ha)	3525.7
Total: 40,069.5 ha	

Cancel Save





- Methodology developed in collaboration with David Arscott (Stroud Center) and Barry Evans (Penn State)
- Divided the watershed into smaller subbasins to identify “hotspots” for N, P, and sediment loading





Baseline (0%)



Existing (40%)



Buildout (100%)



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Management Measures to
Reduce Load

Baseline (0%)

Sources	Sediment	Total Nitrogen	Total Phosphorus
Total Loads (kg)	7,305,158.3	278,115.6	18,458.0
Loading Rates (kg/ha)	1,027.84	39.13	2.60
Mean Annual Concentration (mg/L)	280.02	10.66	0.71
Mean Low-Flow Concentration (mg/L)	1,291.39	15.24	2.96

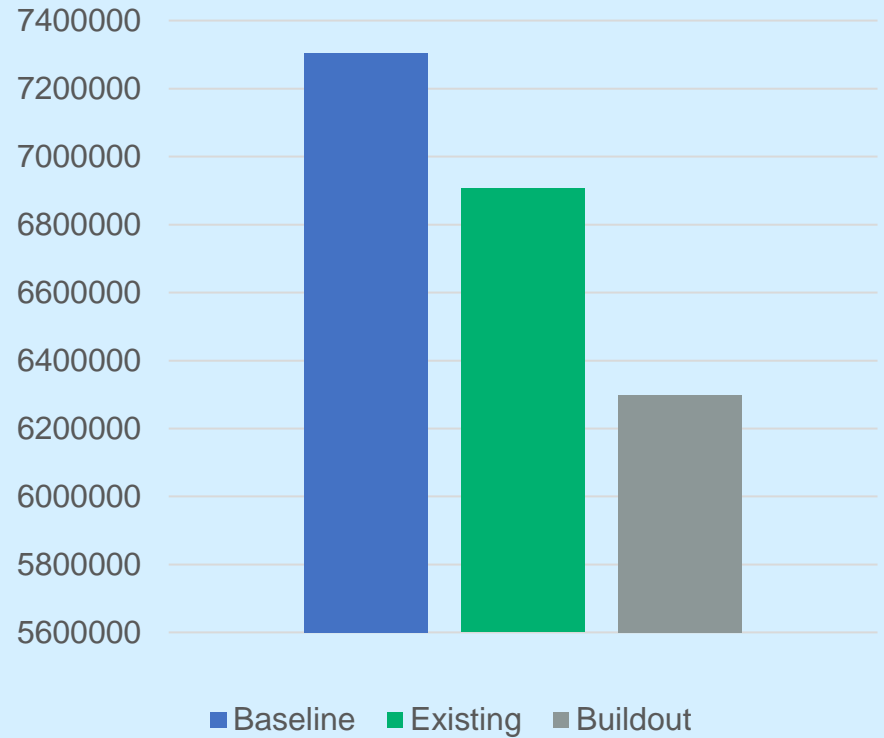
Existing (40%)

Sources	Sediment	Total Nitrogen	Total Phosphorus
Total Loads (kg)	6,905,924.4	278,382.8	17,941.2
Loading Rates (kg/ha)	971.67	39.17	2.52
Mean Annual Concentration (mg/L)	264.84	10.68	0.69
Mean Low-Flow Concentration (mg/L)	1,309.58	15.48	2.99

Buildout (100%)

Sources	Sediment	Total Nitrogen	Total Phosphorus
Total Loads (kg)	6,299,798.8	278,327.4	17,217.1
Loading Rates (kg/ha)	886.38	39.16	2.42
Mean Annual Concentration (mg/L)	241.70	10.68	0.66
Mean Low-Flow Concentration (mg/L)	1,322.13	15.69	3.01

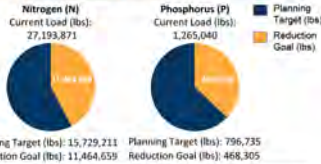
Sediment Loads



Lancaster County, Pennsylvania

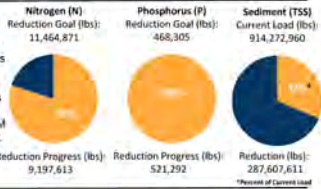
Current Conditions

Lancaster County is the highest loading county in Pennsylvania's Chesapeake Bay Watershed. Current loading rates are 27,194 lbs of nitrogen and 1,274 lbs of phosphorus annually. By 2025 Lancaster County needs to reduce 11,464 lbs of nitrogen and 0.47M lbs of phosphorus.



Pollutant Reduction Progress

By 2025, Lancaster County needs to reduce 11,464 lbs of nitrogen and 0.47M lbs of phosphorus. Lancaster County has developed a plan to reduce 9,20M lbs (80%) of the nitrogen goal and 0.52M lbs (100%) of the phosphorous goal. There is no planning target for sediment, but Lancaster County's plan reduced 287.61M lbs of sediment (32%) of the current load.



Priority Initiative Progress

Lancaster County has identified 5 priority initiatives within the planning template: Agriculture, Stormwater, Stream Restoration, Buffers, and Land Use. Agriculture has identified practices that result in a reduction of 8,344M lbs of nitrogen. Stormwater has identified practices that reduce 30,77K lbs of nitrogen. Stream Restoration has identified practices that reduce 30,77K lbs of nitrogen. Buffers have identified practices to reduce 868,600 lbs of nitrogen. Land Use has identified practices that result in a reduction of 31,72K lbs of nitrogen. These priority initiatives result in a total reduction of 9,20M lbs of nitrogen.

Initiative	Nitrogen (lbs)	Phosphorus (lbs)
Agriculture	8,343,241	505,468
Stormwater	30,771	931
Stream Restoration	8,364	3,220
Buffers	868,600	12,683
Land Use	31,718	23
PRPs*	67,751	5,732
Total Reductions	9,197,613	521,292

*PRPs are not included in the Lancaster County Templates, but are a part of the reductions for Lancaster County.

Eshleman Run BMPs	Additional Amount Proposed	Sediment	Reductions (Tons)	
			Phosphorus	Nitrogen
Cover Crops	394.1 Acres	80%	145.2	0.5
No Tillage	495.7 Acres	50%	198.0	-0.2
Nutrient Management	645.6 Acres	75%	0.0	4.8
Animal Waste Management	2.4 Miles	60%	0.0	0.2
Forested Buffers	2.3 Miles	40%	179.4	0.1
Stream Fencing	2.3 Miles	35%	20.1	0.1
Streambank Stabilization	0.4 Miles	5%	48.0	0.1
Legacy Sediment	0.10 Miles	1%	169.2	0.2
Scenarios			Loading (Tons)	
Total Proposed Reduction			760.0	9.3
Current Loading			1,068.3	3.2
Proposed Loading			308.3	1.7
Loading Goal			309.3	1.5
Percent Above/Below Goal			0%	-16%

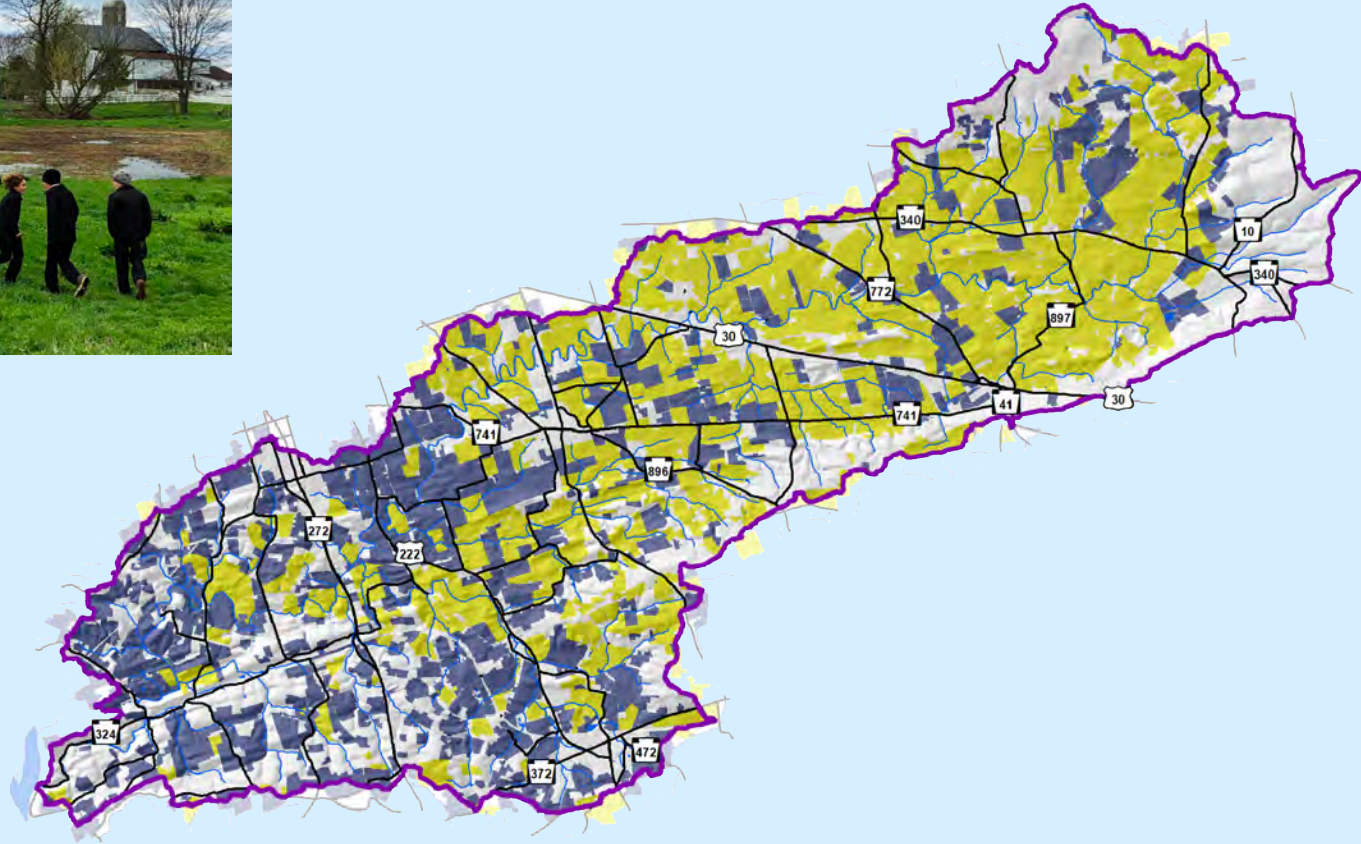
Eshleman Run BMPs	Proposed	Cost per Unit	Years	Total Cost	Cost / Pound / Year		
					S	P	N
Cover Crops	394.1 Acres	\$47.35/ac/yr	10	\$186,588	\$0.06	\$19.93	\$377.84
No Tillage	495.7 Acres	\$19.21/ac/yr	10	\$95,226	\$0.02	\$31.88	-
Nutrient Management	645.6 Acres	\$22.31/ac/yr	10	\$144,049	-	\$33.43	\$1.50
Planning	-	\$17.73/ac	1	\$11,446	-	-	-
Maintenance	-	\$20.54/au/yr	10	\$132,603	-	-	-
Animal Waste Management	1,137 AUs	\$117.07/au/yr	10	\$1,331,066	-	\$388.35	\$69.56
Planning	-	\$901.09/au	1	\$1,024,487	-	-	-
Maintenance	-	\$26.96/au/yr	10	\$306,519	-	-	-
Forested Buffers	2.4 Miles	\$10,985/mi/yr	10	\$259,692	\$0.07	\$127.43	\$4.13
Planning	-	\$49,241/mi	1	\$116,413	-	-	-
Maintenance	-	\$6,061/mi/yr	10	\$143,280	-	-	-
Stream Fencing	2.3 Miles	\$19,958/mi	1	\$45,124	\$0.11	\$21.58	\$14.23
Streambank Stabilization	0.4 Miles	\$1,995,840/mi	1	\$734,382	\$0.77	\$694.63	\$249.19
Legacy Sediment	0.10 Miles	\$1,848,000/mi	1	\$184,800	\$0.05	\$47.51	\$37.77
Total	-	\$298,087/yr	10	\$2,980,868	\$0.24	\$85.57	\$3.28



Londonland Run BMPs	Additional Amount Proposed	Sediment	Reductions (Tons)	
			Phosphorus	Nitrogen
Cover Crops	348.8 Acres	80%	128.4	0.3
No Tillage	475.6 Acres	50%	132.9	0.1
Nutrient Management	388.9 Acres	75%	0.0	0.1
Animal Waste Management	1,184 AUs	60%	0.0	0.2
Forested Buffers	2.8 Miles	35%	129.5	0.1
Stream Fencing	2.7 Miles	35%	27.7	0.1
Streambank Stabilization	0.5 Miles	5%	40.8	0.0
Legacy Sediment	0.10 Miles	1%	169.2	0.2
Scenarios			Loading (Tons)	
Total Proposed Reduction			628.4	1.1
Current Loading			943.6	3.4
Proposed Loading			315.2	2.3
Loading Goal			379.2	1.9
Percent Above/Below Goal			17%	-19%

Londonland Run BMPs	Proposed	Cost per Unit	Years	Total Cost	Cost / Pound / Year		
					S	P	N
Cover Crops	348.8 Acres	\$47.35/ac/yr	10	\$165,145	\$0.06	\$26.57	\$98.88
No Tillage	475.6 Acres	\$19.21/ac/yr	10	\$91,370	\$0.03	\$37.25	-
Nutrient Management	388.9 Acres	\$22.31/ac/yr	10	\$86,773	-	\$30.28	\$1.52
Planning	-	\$17.73/ac	1	\$6,895	-	-	-
Maintenance	-	\$20.54/au/yr	10	\$79,878	-	-	-
Animal Waste Management	1,124 AUs	\$117.07/au/yr	10	\$1,315,620	-	\$420.72	\$69.58
Planning	-	\$901.09/au	1	\$1,012,644	-	-	-
Maintenance	-	\$26.96/au/yr	10	\$302,976	-	-	-
Forested Buffers	2.8 Miles	\$10,985/mi/yr	10	\$309,842	\$0.12	\$209.69	\$4.73
Planning	-	\$49,241/mi	1	\$138,893	-	-	-
Maintenance	-	\$6,061/mi/yr	10	\$170,949	-	-	-
Stream Fencing	2.7 Miles	\$19,958/mi	1	\$54,746	\$0.10	\$28.57	\$14.89
Streambank Stabilization	0.5 Miles	\$1,995,840/mi	1	\$952,710	\$1.17	\$1,193.93	\$435.87
Legacy Sediment	0.10 Miles	\$1,848,000/mi	1	\$184,800	\$0.05	\$47.51	\$37.77
Total	-	\$316,101/yr	10	\$3,161,005	\$0.28	\$69.84	\$3.12





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Management Measures to Reduce Load

Collective Action for Clean Water: A Partners & Resources Inventory, Analysis, and Recommended Integrated Funding Delivery Strategy for Lancaster County



Penn State Agriculture & Environment Center

March 2021

TECHNICAL & FINANCIAL ASSISTANCE



A wide range of funding and expertise will be required to implement the recommendations in this plan. And though approval of this plan will make grants available through the EPA's 319 Program, the scope and scale of restoration work in the Pequea far exceeds resources available from this one source. For this plan's goals to become realities, numerous programs and partnerships will need to be leveraged.

To aid in implementation of the Lancaster CAP, as well as achieving the Lancaster Clean Water Partners' goal of "clean and clear local streams by 2040," the Pennsylvania State University did a comprehensive funding and resource analysis for projects and BMPs in local watersheds. Their report detailed both funding and technical resources currently being utilized, as well as a comprehensive list of additional opportunities. This chapter contains an abridged list from the report, with more detailed information found in the complete report, included in the plan appendix. (See "Collective Action for Clean Water: A Partners & Resources Inventory, Analysis, and Recommended Integrated Funding Delivery Strategy for Lancaster County," Penn State Agriculture & Environment Center, March 2021.)

Currently Utilized Technical Assistance & Funding Resources

Partners (Staff Capacity)

- Lancaster Clean Water Partners
- Lancaster Farmland Trust
- Chesapeake Bay Foundation
- Chesapeake Conservancy
- Alliance for the Chesapeake Bay
- Pequea Creek Watershed Assoc.
- Lancaster County Conservation District
- TeamAg
- Red Barn
- Stroud Water Research Center
- Salisbury Township
- Other Pequea municipalities
- Lancaster Conservancy
- Donegal TU
- US Fish & Wildlife Service

Funding Programs

- USDA Natural Resource Conservation Service Programs (NRCS)
 - Environmental Quality Incentives Program (EQIP)
 - Conservation Stewardship Program (CSP)
 - Wetland Reserve Easement Program (WRE)
- USDA Farm Service Agency Conservation Service Programs
 - Conservation Reserve Enhancement Program
 - DCMR Lancaster County Buffers Partnership
 - Lancaster County Buffer Bonus (Growing Greener)
 - Multifunctional Buffers (PACD)
- CBF Keystone Ten Million Trees (K10) Partnership
- Ag Planning Reimbursement
- PA Infrastructure Investment Authority (PENNVEST)
- Resource Enhancement and Protection Program (REAP)
- Dirt & Gravel Road Program
- Conservation Excellence Grants
- PA Soil Health Coalition (National Fish & Wildlife Federation)
- Subsurface Application of Manure
- Lancaster Farmland Trust (LFT) Farm Conservation Grants
- Farm Stewardship Program (FSP) Buffer Programs (Stroud)
- EPA Most Effective Basin Funding
- Capital Resource Conservation & Protection Grazing Program
- CBF Accelerating Buffers (National Fish & Wildlife Federation)



Photo Credit: Lancaster Newspapers

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Potential Technical Assistance & Funding Resources Resources for Agricultural Best Management Practices

Partners (Staff Capacity)

- USDA NRCS
- USDA FSA
- US EPA
- PA DEP
- State Conservation Commission
- PENNVEST
- Lancaster County Conservation District
- Lancaster Farmland Trust
- Alliance for the Chesapeake Bay
- Chesapeake Bay Foundation
- Stroud Water Research Center
- Penn State University
- TeamAg, Inc.
- Red Barn Consulting

Funding Programs

- NRCS Environmental Quality Incentives Program (EQIP)
- NRCS Conservation Innovation Grants (CIG)
- NRCS Conservation Stewardship Program (CSP)
- Section 319 Program
- EPA Chesapeake Bay Program Funds (CBIG & CBRAF)
- Clean Water State Revolving Loan Fund
- EPA Most Effective Basin Funding
- EPA's SWG and INSR grants (currently administered by NFWF)
- Growing Greener
- Ag Planning Reimbursement Program (APRP)
- REAP
- PENNVEST
- Act 13 Watershed Restoration and Protection Program
- Exelon Habitat Improvement Project Program (PFBC)
- Exelon Habitat Improvement Project Program (LCCD)
- Conservation Excellence Grants (CEG)
- Susquehanna Riverlands Mini Grants (Lancaster Conservancy)
- Lancaster Clean Water Fund
- Campbell Foundation Grants



Funding from Programmatic Grants

- PA Soil Health Coalition (Stroud NFWF GG Grants)
- Capital RC&D Grazing Management Program (RC&D NFWF)
- Lancaster County Buffer Bonus Program (ACB GG Grant)
- Farm Stewardship Program (Stroud NFWF Grant)
- LFT Farm Conservation Grants (LFT various funding sources)
- Subsurface Application of Manure (LCCD Campbell Grant)
- Turkey Hill Clean Water Partnership

Resources for Stormwater Best Management Practices

Funding Programs

- Section 319 Program
- EPA Chesapeake Bay Program Funds (CBIG & CBRAF)
- EPA's SWG and INSR grants (currently administered by NFWF)
- Clean Water State Revolving Loan Fund
- Community Development Block Grants
- Growing Greener
- TreeVitalize
- DCMR C2P2
- PENNVEST
- Act 13 Watershed Restoration and Protection Program
- Dirt & Gravel/Low Volume Road Program
- Smart Growth Transportation Program
- LCCWC Stormwater Mini Grants
- Susquehanna Riverlands Mini Grants (Lancaster Conservancy)
- Lancaster Clean Water Fund

Partners (Staff Capacity)

- US EPA
- PA DEP
- PA DCMR
- PENNVEST
- PA DCED
- Lancaster County Conservation District
- Lancaster County Planning Department
- Lancaster County Clean Water Consortium
- Lancaster Conservancy
- Alliance for the Chesapeake Bay
- Chesapeake Bay Foundation
- Penn State University
- LandStudies, Inc.
- RETTEW
- C.S. Davidson
- David Miller/Associates
- Earthbound Artisan

Funding from Programmatic Grants

- Lancaster County Buffer Bonus Program (ACB GG Grant)

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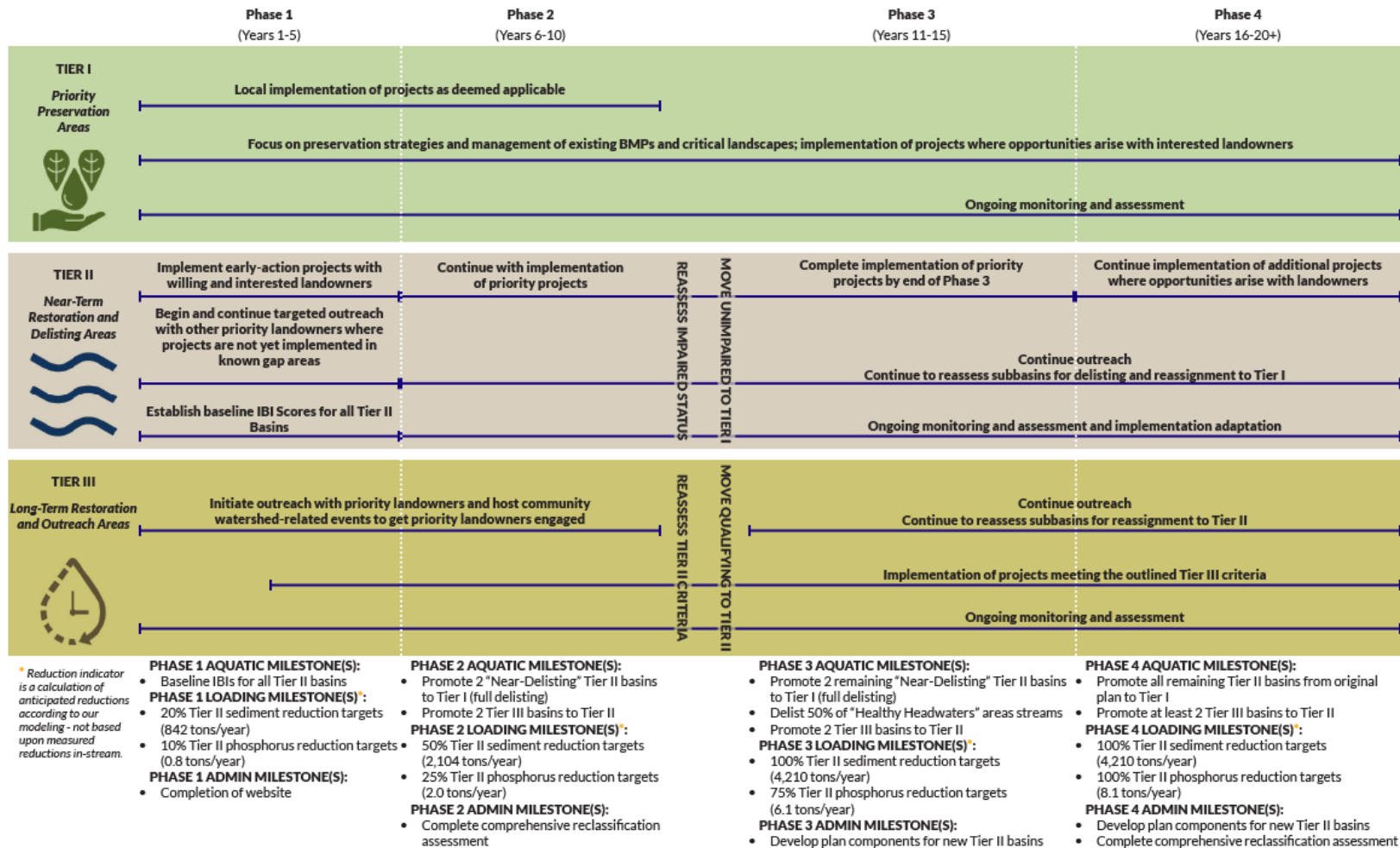
Implementation Assistance



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Information/Education Component

PRIORITIZED IMPLEMENTATION TIMELINE





Minimum Mean IBI Score		
Category	Tier III to Tier II	Tier II to Tier I
Warm Water Fishery	≥ 40	≥ 50
Other Designations	≥ 50	≥ 65
All Designations	Two Tier II Criteria Met (One If Near-Term Delisting Met)	≥ 50% Proposed BMP Implementation or Complete Delisting



Criteria 1: Near Delisting Areas (15% Annual Improvement)																	
		Year															
		Initial	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
IBI Score	20	23	26	30	35	40	46	53	61	65+	65+	65+	65+	65+	65+	65+	65+
	30	35	40	46	52	60	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+
	40	46	53	61	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+
	50	58	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+
	60	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+

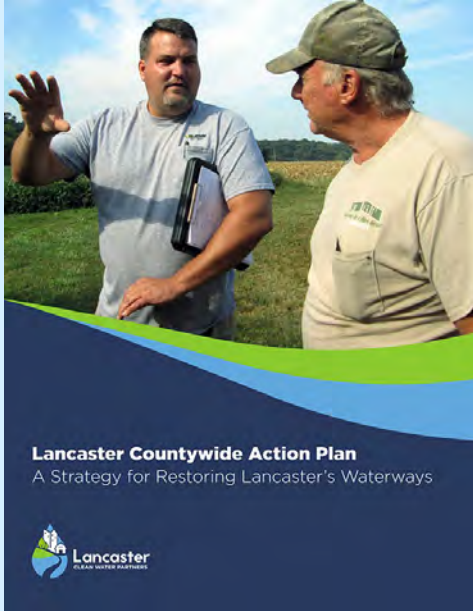
Criteria 2: Healthy Headwaters Areas (10% Annual Improvement)																	
		Year															
		Initial	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
IBI Score	20	22	24	27	29	32	35	39	43	47	52	57	63	65+	65+	65+	
	30	33	36	40	44	48	53	58	64	65+	65+	65+	65+	65+	65+	65+	
	40	44	48	53	59	64	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	
	50	55	61	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	
	60	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	

Criteria 3: Existing Initiative Areas (5% Annual Improvement)																	
		Year															
		Initial	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
IBI Score	20	21	22	23	24	26	27	28	30	31	33	34	36	38	40	42	
	30	32	33	35	36	38	40	42	44	47	49	51	54	57	59	62	
	40	42	44	46	49	51	54	56	59	62	65+	65+	65+	65+	65+	65+	
	50	53	55	58	61	64	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	
	60	63	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	65+	



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Indicators to Measure Progress



Lancaster Clean Water Partners

Collaborative Watershed Mapping Tool

Data driven restoration and conservation

This tool was created for the Lancaster Clean Water Partners by the Chesapeake Conservancy with assistance from the Watershed Action Team. The layers within the Data Viewer provide spatial information and landscape context to support planning efforts of restoration and conservation professionals in Lancaster County, Pennsylvania. To protect the privacy of the Lancaster County community, parcel information is only accessible through a password-protected version of this tool. Please attend a future meeting of the Watersheds Action Team to learn more about gaining access to parcel data.



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Monitoring Component

Casey Announces New Funding for Pequea Creek and Halfmoon Creek Watersheds in Appropriations Bill

AUGUST 10, 2021

Washington, D.C. - Today, U.S. Senator Bob Casey (D-PA) is announcing the inclusion of more than \$3 million for Pennsylvania watershed projects in the Senate Fiscal Year (FY) 2022 Agriculture, Rural Development, Food and Drug Administration and Related Agencies Appropriations Bill. The Pequea Creek Watershed will receive more than \$2 million in congressionally directed spending and the Halfmoon Creek Watershed will receive over \$1 million in congressionally directed spending. The Chesapeake Bay Foundation will receive the funding and is working with local partners on these projects.

"The Chesapeake Bay Foundation is doing critical work to clean up our waterways and reduce further pollution in the Chesapeake Bay," said **Senator Casey**. "Funding for these projects will help support Pennsylvania farmers develop practices to keep soil and nutrients out of waterways. This is an important step in ensuring our waterways are clean and we're working towards a more sustainable economy. I will continue to





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The Future



Conventional Tillage
<15% Residue



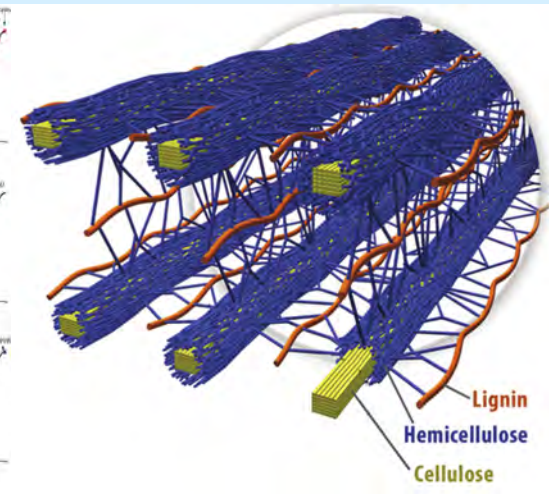
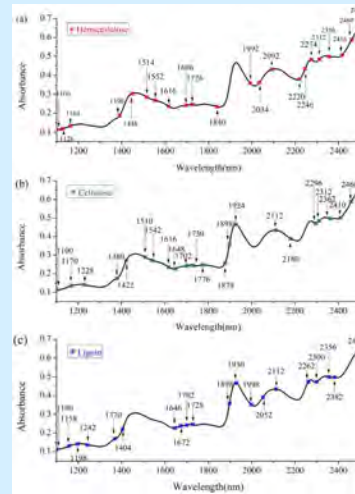
Reduced Tillage
15%-30% Residue



Conservation Tillage
30%-60% Residue

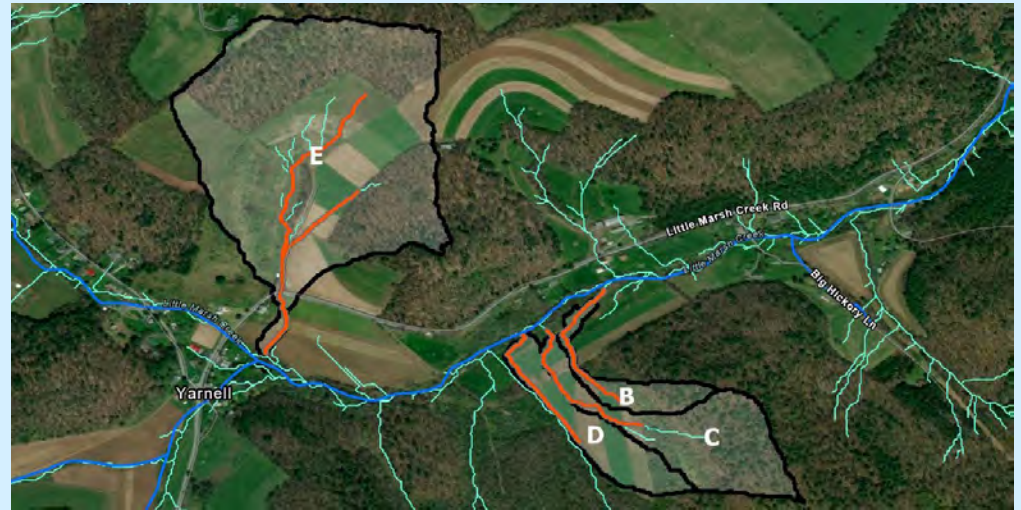
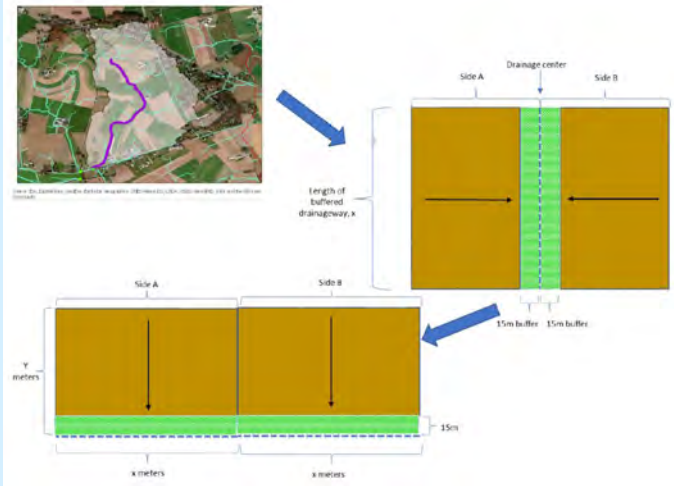


No Tillage
>60% Residue



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Remote Sensing



Analysis Courtesy of Michael Morris, PA DEP



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Precision Grass Buffers

SEDIMENT (Pounds per Acre)		TO											
		Initial Loading	Hay / Pasture	Cropland	Cropland with BMPs	Wooded Areas	Wetlands	Open Land	Barren Areas	Low-Density Mixed	Medium-Density Mixed	High-Density Mixed	Low-Density Open Space
FROM	Hay / Pasture	133	+0	+1,191	+244	-73	-74	-49	-21	+926	+1,405	+1,118	+883
	Cropland	1,324	-1,191	+0	-947	-1,264	-1,265	-1,240	-1,212	-265	+214	-73	-308
	Cropland with BMPs	377	-244	+947	+0	-317	-318	-293	-265	+682	+1,161	+874	+639
	Wooded Areas	60	+73	+1,264	+317	+0	-1	+24	+52	+999	+1,478	+1,191	+956
	Wetlands	59	+74	+1,265	+318	+1	+0	+25	+53	+1,000	+1,479	+1,192	+957
	Open Land	84	+49	+1,240	+293	-24	-25	+0	+28	+975	+1,454	+1,167	+932
	Barren Areas	112	+21	+1,212	+265	-52	-53	-28	+0	+947	+1,426	+1,139	+904
	Low-Density Mixed	1,059	-926	+265	-682	-999	-1,000	-975	-947	+0	+479	+192	-43
	Medium-Density Mixed	1,538	-1,405	-214	-1,161	-1,478	-1,479	-1,454	-1,426	-479	+0	-287	-522
	High-Density Mixed	1,251	-1,118	+73	-874	-1,191	-1,192	-1,167	-1,139	-192	+287	+0	-235
	Low-Density Open Space	1,016	-883	+308	-639	-956	-957	-932	-904	+43	+522	+235	+0

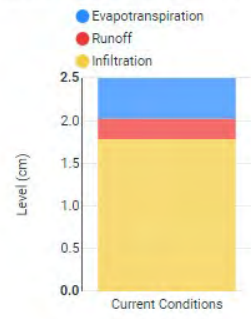


Current Conditions Precipitation

2.50 cm
 + Add changes to this area

Runoff Water Quality

24-hour hypothetical storm event
 Simulated by SLAMM and TR-55 model algorithms



Runoff Partition	Water Depth (cm)	Water Volume (m ³)
Runoff	0.243	2,433.22
Evapotranspiration	0.474	4,746.00
Infiltration	1.783	17,861.10

Explore how land use and soil determine runoff with our Runoff Simulation. Info and help at <http://wikiwatershed.org/model/>.

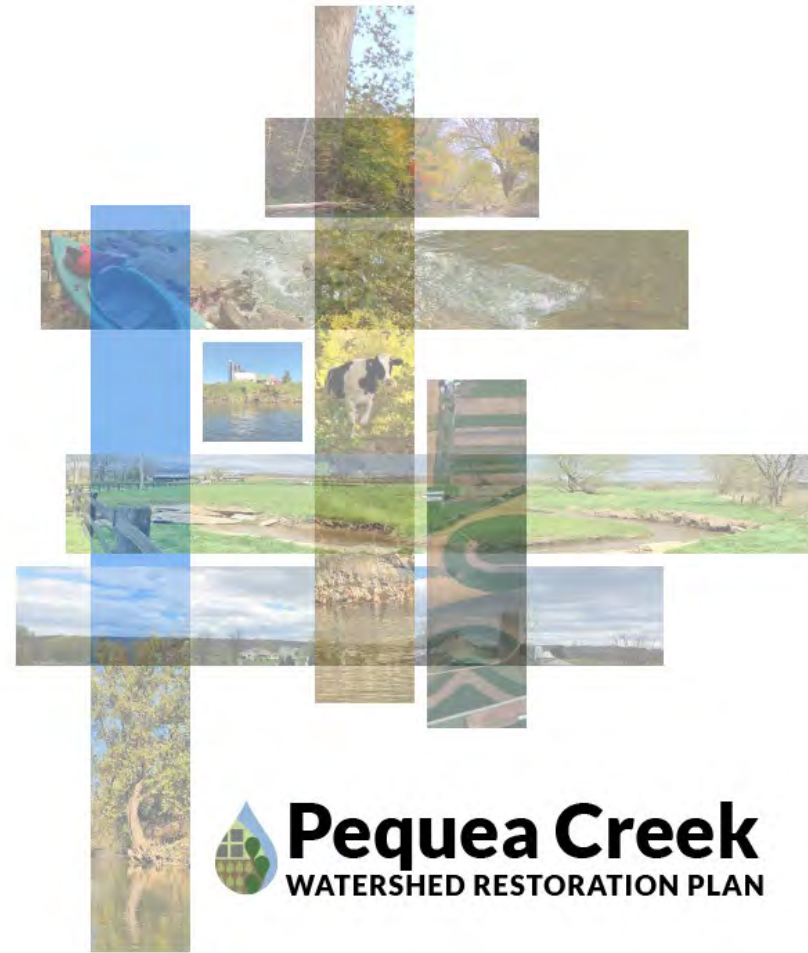
Download this data





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Recap



Pequea Creek

WATERSHED RESTORATION PLAN



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Thank You!