

2019 Annual Status Report

Long Term 2 Enhanced Surface Water Treatment Rule Watershed Control Program Plan

Queen Lane Drinking Water Treatment Plant
Schuylkill River, Philadelphia, PA

Prepared by the Philadelphia Water Department

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List of Acronyms

AEU	Animal Equivalent Unit
BCCD	Berks County Conservation District
BCWSA	Berks County Water and Sewer Association
BMP	Best Management Practice
CAC	Citizens Advisory Council
CAFO	Concentrated Animal Feeding Operation
CDC	Community Design Collaborative
CNMP	Comprehensive Nutrient Management Plan
CSO	Combined Sewer Overflow
CREP	Conservation Reserve Enhancement Program
DRBC	Delaware River Basin Commission
DRWI	Delaware River Watershed Initiative
EPA	United States Environmental Protection Agency
EWS	Early Warning System (Delaware Valley)
FWWIC	Fairmount Water Works Interpretive Center
GCCW	<i>Green City, Clean Waters</i>
LTCPU	Long Term Control Plan Update
LT2	Long Term 2 Enhanced Surface Water Treatment Rule
MS4	Municipal Separate Storm Sewer System
NLCD	National Land Cover Database
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
PADEP	Pennsylvania Department of Environmental Protection
PDE	Partnership for the Delaware Estuary
PEC	Pennsylvania Environmental Council
PHS	Pennsylvania Horticultural Society
PWD	Philadelphia Water Department
SAN	Schuylkill Action Network
SAS	Schuylkill Action Students
SRDC	Schuylkill River Development Corporation
SRG NHA	Schuylkill River Greenways National Heritage Area
SRRF	Schuylkill River Restoration Fund
SWA	Source Water Assessment
SWPP	Source Water Protection Plan
WCP	Watershed Control Plan
WSS	Watershed Sanitary Survey
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

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USDA United States Department of Agriculture

1.0 Executive Summary

In 2019, the Philadelphia Water Department (PWD) completed its Watershed Control Program Plan (WCP) for the Queen Lane intake in the Schuylkill River Watershed in compliance with the Long Term 2 Enhanced Surface Water Treatment Rule (LT2). The plan reduces *Cryptosporidium* loadings in the Schuylkill River watershed from priority sources such as wastewater effluent, agriculture, animal vectors, and urban stormwater runoff. Source water protection initiatives as well as structural control measures were identified and implemented as part of the WCP to achieve a target *Cryptosporidium* load reduction. Completion of WCP objectives is summarized below by priority sources along with highlights from the first seven years of the WCP.

Priority Source: Wastewater Effluent

The UV installation projects upstream of the PWD Queen Lane intake, at Upper Gwynedd Wastewater Treatment Plant (WWTP) and Fleetwood WWTP, are fully operational and effective at inactivating *Cryptosporidium* oocysts and reducing the public health risk. In 2018, PWD completed its first triennial update to the Schuylkill Watershed Sanitary Survey (WSS), a comprehensive report detailing the status of wastewater treatment technologies and sewage system planning efforts throughout the Schuylkill River watershed. PWD continues to track developments in the watershed related to Act 537 sewage facility planning through the Schuylkill Action Network (SAN) Pathogen and Point Source Workgroup and updates the WSS accordingly. Additionally, PWD engages wastewater utilities through its continued participation in the SAN Pathogen and Point Source workgroup and as the owner of the Early Warning System for the lower Delaware River watershed. In 2019, the SAN Pathogen and Point Source Workgroup strengthened communication between and provided educational resources to wastewater and drinking water utilities to improve source water protection efforts. The group also facilitated data and information sharing to document wastewater treatment technologies and improvements, and investigated evolving source water issues – including unregulated contaminants.

Priority Source: Agriculture

During the first seven years of the WCP, PWD has supported the construction of either manure storage basins or vegetated buffers at 11 separate agricultural operations in the watershed through its participation and annual contribution to the Schuylkill River Restoration Fund (SRRF). In 2019, \$35,949 from PWD's annual contribution of ~\$100,000 to the SRRF funded a large watershed protection project on an agricultural property in the Schuylkill River watershed. This priority project was selected for the implementation of agricultural best management practices to support WCP *Cryptosporidium* control objectives. The Love Farm property, a 78-acre property in the Hay Creek Watershed in Berks County, received a \$71,898 SRRF grant, matched by several partner organizations to construct a 6-month capacity manure storage basin and waste transfer system, install rain gutters and lined outlets, water pipeline to pasture diversions, and animal walkways.

PWD continues to be an active participant in the SAN Agricultural Workgroup to coordinate efforts among watershed partners with similar environmental protection objectives. Through the SAN, education and outreach materials were developed and additional stakeholders were engaged to promote the implementation of agricultural best management practices and nutrient management plans throughout the watershed. In 2019, SAN partners continued to help develop and implement Comprehensive Nutrient Management Plans (CNMP) for agricultural properties across the Schuylkill River watershed.

Priority Source: Animal Vectors

At Fairmount Park properties and PWD facilities, Canada geese—known mechanical vectors of *Cryptosporidium*—were removed and nests and eggs treated through a partnership with the US Department of Agriculture (USDA) during each year of the WCP. During 2019, a total of 41 Canada goose eggs were removed and 18,678 geese were harassed or removed from the Fairmount Park properties. As of January 2020, PWD is awaiting USDA's Q4 report for Fairmount Park properties and the full 2019 report for PWD facilities. In 2019 PWD also continued monitoring and analysis of *Cryptosporidium* occurrence and animal sources in the watershed through a research contract with Lehigh University.

Priority Source: Urban Stormwater

Stormwater best management practices (BMPs) were not directly included in the scope of the WCP. Stormwater projects are already implemented through a variety of other programs, including stormwater ordinances and MS4 permits. Stormwater management practices are implemented throughout the City of Philadelphia as part of PWD's *Green City, Clean Waters* (GCCW) program, a 25-year plan to reduce stormwater pollution through the installation of green infrastructure. Since the inception of GCCW in June 2011, PWD and private developers have implemented 676 green stormwater projects within the City of Philadelphia, achieving over 1400 greened acres. Additionally, through the Rain Check program residents of Philadelphia learn about the benefits of green stormwater infrastructure and how to select the best options for their property. In FY2019, a total of 77 workshops were held with 1,355 participants. As a result of the FY2019 program, residential properties in Philadelphia have installed a variety of stormwater management tools including 7 depaving projects and 65 installations of permeable pavers to allow for better infiltration of stormwater, 162 downspout planters, 6 rain garden plantings, and 738 rain barrels.

Through the SAN, a number of riparian buffer plantings and education and outreach events have occurred throughout the watershed. The SAN Stormwater and Education & Outreach Workgroups have engaged students in managing stormwater on school campuses to benefit MS4 communities through the Schuylkill Action Students (SAS) program. In 2019, the Stormwater Workgroup created a new logo and brochure for the SAS program. The SAS program continues to provide technical assistance to schools with projects ranging from rain

gardens to master planning and implementation. In 2019 the SAN Stormwater Workgroup hosted the *Funding for MS4 Projects Workshop* at Ursinus College, with more than 80 attendees from municipalities and water agencies. PWD plans to continue its participation in the SAN Stormwater Workgroup into the future years of the WCP.

Estimated Cryptosporidium Reductions from WCP Projects

The WCP was developed with the objective of reducing the *Cryptosporidium* load to the Queen Lane intake on the Schuylkill River by 2.7% or an estimated range of 2.1E+11 to 3.8E+13 oocysts per year. The annual removal of *Cryptosporidium* from Queen Lane source water due to the installation of 11 agricultural best management practices implemented over the first 7 years of the WCP is estimated to be in the range of 2.87E+10 to 4.31E+13 oocysts per year, or 13.6-112% of the targeted reduction. Including the installation of UV disinfection at upstream WWTPs, the estimated reduction of viable *Cryptosporidium* is in the range of 2.89E+10 to 6.45E+13 oocysts per year or 13.7-168% of the targeted reduction. Targeted reduction estimates serve as a preliminary step in developing a quantitative assessment of Schuylkill River watershed *Cryptosporidium* loading reduction, and uncertainties in the method emphasize the need for further research.

The Future of the WCP

The second round of LT2 compliance sampling ended in March 2017. Each PWD intake on the Schuylkill and Delaware Rivers was sampled bimonthly for a period of 2 years. *Cryptosporidium* results from the Queen Lane Water Treatment Plant achieved an average result less than the 'Bin 1' threshold value of 0.075 oocysts per liter; however, the Queen Lane Water Treatment Plant remains classified as 'Bin 2' due to sampling results obtained from the first round of LT2 monitoring. The Queen Lane Water Treatment Plant will continue to achieve individual and combined filter effluent performance requirements as approved by PADEP to maintain compliance with the first round of LT2 sampling. The resulting round of monitoring placed the Baxter Water Treatment plant on the Delaware River in Bin 2. The same microbial toolbox options selected for Queen Lane were selected for Baxter to ensure that PWD maintains compliance with the LT2 regulation. PWD will continue ongoing initiatives outlined in the WCP through its existing Source Water Protection Program framework and plans to submit an updated WCP in October 2020 that expands WCP efforts into the Delaware River watershed.

2.0 Introduction

In April 2011, the Philadelphia Water Department (PWD) completed a Watershed Control Plan (WCP), and after receiving approval from the Pennsylvania Department of Environmental Protection (PADEP) the WCP went into effect December 2012. The WCP presents a comprehensive source water protection approach to reducing levels of infectious *Cryptosporidium* in finished drinking water (US EPA, 2006). The elements of the WCP were achieved through previously established and ongoing efforts of the PWD Source Water Protection Program and through WCP actions aimed to specifically reduce levels of *Cryptosporidium* in the Schuylkill River watershed, a PWD drinking water source. The following report documents PWD completion of WCP initiatives during 2019. Despite completion of WCP goals, the existing framework of the plan and its underlying initiatives will continue to be maintained and developed to further reduce sources of pathogens, nutrients, and sediment into area waters.

3.0 Background

The US Environmental Protection Agency (EPA) published the first source water quality-based drinking water regulation on January 5, 2006. The Long Term 2 Enhanced Surface Water Treatment Rule (LT2), a series of amendments to the Safe Drinking Water Act, serves to protect the public from waterborne illness caused by *Cryptosporidium* and other microbial pathogens in drinking water. In the United States, *Cryptosporidium* has been the cause of several outbreaks of Cryptosporidiosis, a gastrointestinal disease particularly dangerous for immunocompromised individuals. The LT2 requires public drinking water systems with surface water sources, or groundwater sources influenced by surface water, to monitor monthly for *Cryptosporidium* at each supply intake for two years. The observed *Cryptosporidium* concentrations categorize each intake into one of four 'Bins.' Public water systems placed in Bin 1 indicate the lowest concentrations of *Cryptosporidium* and require no additional treatment. Public water systems placed in Bins 2, 3 and 4 require 4-log, 5-log and 5.5-log removals, respectively. Public water systems using conventional treatment processes, coagulation, flocculation, sedimentation, filtration, are assumed to achieve a 3-log removal. Therefore, additional 1-log, 2-log or 2.5-log treatment credit(s) is required of a conventional treatment facility if placed in Bins 2 through 4. The EPA provides a "microbial toolbox" describing options to earn additional treatment credits including source water protection and management programs, pre-filtration processes, treatment performance programs, additional filtration components and inactivation technologies.

PWD *Cryptosporidium* monitoring data categorized each of Philadelphia's three drinking water treatment plants (WTPs) into Bins. During the first round of LT2 compliance sampling, Baxter and Belmont achieved Bin 1 status with average oocyst concentrations less than 0.075 per liter. However, Queen Lane data resulted in an average oocyst concentration of 0.076 per liter, falling into Bin 2. Since Queen Lane uses conventional treatment processes and automatically receives a 3-log removal credit, an additional 1-log removal credit was required. PWD selected to use the

combined filter effluent for 0.5-log credits, the individual filter effluent for 0.5-log credits, and the development and implementation of a WCP for 0.5-log back up credits. PWD submitted a WCP to the PADEP in April 2011 and received approval in December 2012. A timeline of critical LT2 events is shown in Table 3-1.

Table 3-1: LT2 WCP Timeline

Action	Reporting	Due Date
Notification to State of intent to submit WCP		April 2010
WCP submitted to State		April 2011
State approved WCP		December 2012
	Presentation of 2013 Annual Status Report to State	January 2014
	2013 Annual Status Report due to State	January 2014/ Approved May 2014
Sampling Plan for 2nd round of monitoring due		January 2015
2014 Annual Status Report due to State	2014 Annual Status Report due to State	January 2015/ Approved February 2015
Second round of <i>Cryptosporidium</i> sampling scheduled to begin		April 2015
	Watershed Sanitary Survey due to State	December 2015
	2015 Annual Status Report due to State	January 2016
	2016 Annual Status Report due to State	January 2017
Second round of <i>Cryptosporidium</i> sampling scheduled to end		March 2017
Bin classification and supporting data from 2nd round of monitoring due to State		October 2017
	2017 Annual Status Report due to State	January 2018
	2018 Annual Status Report due to State	January 2019
	2019 Annual Status Report due to State	January 2020

Note: Shading indicates milestones that have been completed at the time of the report's preparation.

4.0 Source Water Protection Program Initiatives

After recognizing the need for a watershed-wide effort to improve and promote the health of the Schuylkill River watershed, PWD, EPA, PADEP, Delaware River Basin Commission (DRBC), and Partnership for the Delaware Estuary (PDE) formed the Schuylkill Action Network (SAN) in 2003. The SAN is comprised of workgroups to address several watershed issues: abandoned mine drainage, agricultural runoff, stormwater runoff, pathogens and compliance, land protection, and education and outreach. PWD participates in many projects led by these

workgroups, but because the Schuylkill River watershed is a diverse watershed affected by a range of pollution sources, PWD looks to the expertise of SAN partners to achieve certain watershed protection goals and WCP objectives. The SAN Agriculture and SAN Pathogens and Point Sources Workgroups are particularly important to the WCP because they address potential sources of *Cryptosporidium* in the watershed. To further support this effort, PWD continues to contribute funding to the administration of SAN through a contract with PDE to support the SAN coordinator position and SAN workgroup leadership.

In the WCP, PWD outlines ongoing and proposed initiatives from the Schuylkill River watershed Source Water Protection Plan (SWPP) that are relevant to the control of *Cryptosporidium* upstream of the Queen Lane intake. In the WCP, PWD identifies four categories of source water protection initiatives. The four categories include mitigation of *Cryptosporidium* from wastewater treatment plant (WWTP) effluent, agricultural runoff, animal vectors, and education and outreach in the City and watershed. This section discusses the contribution PWD has made toward each of the ongoing and proposed initiatives by category.

4.1 Wastewater Discharge/Compliance

Effluent from WWTPs upstream of the Queen Lane intake is a source of *Cryptosporidium* in the watershed (PWD, 2002; PWD, 2011). Although only 2% of the Schuylkill River watershed is in Philadelphia, PWD plays leading or supporting roles in multiple initiatives outside of the city. These initiatives aim to reduce the risk of *Cryptosporidium* contamination from treated WWTP effluent and minimize the occurrence of raw sewage discharge. Ongoing and proposed initiatives in Philadelphia and in the Schuylkill River watershed are detailed in Table 4-1 and Table 4-2, both reproduced from the WCP. Contributions made toward these initiatives is summarized in this section.

Table 4-1: Ongoing Wastewater Discharge/Compliance SWPP Initiatives

Project Location	Project Overview
Philadelphia	<p>4.1.1 Philadelphia's Act 537 Plan Continue to regularly review and update Philadelphia’s Act 537 Plan. The plan was last updated on February 27th, 2009.</p>
	<p>4.1.2 Combined Sewer Overflow (CSO) and Municipal Separate Storm Sewer System (MS4) National Pollutant Elimination System (NPDES) Permit Annual Report Continue to implement the initiatives outlined in the annual Combined Sewer Management and Stormwater Management Plans in order to fulfill the City’s Stormwater and CSO permits. Ongoing initiatives include monitoring as part of the Defective Lateral Detection and Abatement Program and completion of the Main and Shurs Elimination project.</p>
	<p>4.1.3 Early Warning System Continue to maximize usage for the Early Warning System while maintaining the system’s ongoing operations and maintenance needs.</p>
Schuylkill River Watershed	<p>4.1.3 Provide Project Support for the Lehigh University <i>Cryptosporidium</i> Study Continue to support Lehigh University’s <i>Cryptosporidium</i> source tracking study by providing support in terms of sampling, elution, and project management and oversight.</p>
	<p>4.1.5 SAN Pathogens and Point Source Workgroup Continue to support efforts of the SAN Pathogens and Point Source Workgroup. The strategies for the 2019 SAN Pathogens and Point Source Work Plan are as follows:</p> <ol style="list-style-type: none"> 1) Strengthen communication between and provide educational resources to wastewater and drinking water utilities to improve source water protection efforts. 2) Facilitate data and information sharing to document wastewater treatment technologies, improvements, and other pertinent source water protection information. 3) Investigate evolving source water issues, such as unregulated contaminants, and develop a better understanding of what these issues mean for water suppliers source water protection strategies. 4) Promote pathogen successes and understanding of pathogen water quality issues and solutions to target audiences in the watershed.
	<p>4.1.6 Abate Wildcat Sewers Continue to support SAN in its efforts to identify and abate wildcat sewers throughout the Schuylkill River watershed.</p>

Table 4-2: Proposed Wastewater Discharge/Compliance SWPP Initiatives

Project Location	Project Overview
Phila- delphia	<p>4.1.7 PWD Schuylkill River Watershed 10-Year Review</p> <p>Develop a Source Water Assessment (SWA) update for the Schuylkill River by revisiting priorities established in the 2002 assessment and updating water quality analyses with recent data.</p>
Schuylkill River Watershed	<p>4.1.8 Support <i>Cryptosporidium</i> Monitoring at Major WWTPs and Inclusion in NPDES Permits</p> <p>Support/help develop an effluent monitoring plan for <i>Cryptosporidium</i> at major WWTPs in the Schuylkill River watershed. In conjunction with this effort, should <i>Cryptosporidium</i> monitoring be considered for incorporation into NPDES permits, PWD will support such an effort. However, in regard to <i>Cryptosporidium</i> monitoring, it is very important to PWD that the EPA promulgate an analytical method that takes into account critical factors such as recovery rates and sample variability. Track the progress of these initiatives by continuing to attend SAN Pathogens/Compliance workgroup meetings.</p>
	<p>4.1.9 Track Wastewater Related Changes in the Watershed</p> <p>Through continued participation in the SAN Pathogens/Compliance workgroup, help ensure that high-priority areas requiring regulatory enforcement action are identified and addressed. Areas of concern may be identified using the following measures to track wastewater related changes in the watershed.</p> <ul style="list-style-type: none"> o Assist the workgroup in identifying high-priority municipalities in need of updated Act 537 Plans in the Schuylkill River watershed. Municipalities with outdated plans located in Zones A and B of the area of influence are especially relevant. o Assist the workgroup at continuing to align sewage facilities planning, or Act 537, enforcement with the wasteload management reports filed under Chapter 94. o In addition to the above two measures, track WWTP upgrades, new facilities and community sewer improvement projects (such as the sewerage of new areas) by reviewing Part II Permits. o Track projects funded under government loan programs, such as PennVest.
	<p>4.1.10 Wet Weather and High Flow Management Education for WWTP Operators</p> <p>Coordinate with SAN to provide wet weather and high flow management education to WWTP operators in a workshop format. Include overview of information that should be included in I & I abatement and high-flow maintenance plans.</p>
	<p>4.1.11 Research on WWTP Effluent and <i>Cryptosporidium</i> in Surface Waters</p> <p>Support future research initiatives surrounding the impact of WWTP effluent on <i>Cryptosporidium</i> surface water concentrations by partnering with research organizations and/or academic institutions</p>

4.1.1 Philadelphia's Act 537 Plan

Act 537 is the Pennsylvania Sewage Facilities Act. The program addresses existing sewage disposal needs and future disposal needs through proper planning, permitting and design of sewage facilities. The Philadelphia Act 537 Plan was last updated in 2009.

4.1.2 Combined Sewer Overflow (CSO) and Municipal Separate Storm Sewer System (MS4) National Pollutant Elimination System (NPDES) Permit Annual Report

Each year, PWD submits a report to PADEP summarizing activities and programs pertaining to the management of stormwater in combined and separate sewers in accordance with the CSO and MS4 NPDES permits. A major component of PWD CSO NPDES permit requirements is the implementation of the Long-Term Control Plan Update (LTCPU), also called the *Green City, Clean Waters* program. *Green City, Clean Waters* is a 25-year program that includes a green stormwater infrastructure-based approach to reduce pollutants discharged by the combined sewer system. The 2019 annual report is available on <http://water.phila.gov/reporting/>.

4.1.3 Early Warning System

The Delaware Valley Early Warning System (EWS) is designed to improve the safety of the drinking water supply by providing real time water quality monitoring results and event notification to regional users. Features include a notification system, a time of travel model, the Spill Model Analysis Tool, real-time water quality data and a central website where users can access event information, analysis tools, and data. As of 2019, the EWS user base consists of more than 450 registered users from 55 organizations.

PWD continues to develop and enhance the EWS Tidal Spill Trajectory Tool. The Tidal Spill Trajectory Tool was developed using a \$295,000 grant awarded to PWD by the Maritime Exchange for the Delaware River and Bay. The tool was launched in 2014 and expanded EWS capabilities to include predicting a contaminant spill path and contaminant plume arrival times at tidal intakes in the lower Delaware River. In 2015, the EWS was honored with the Governor's Award for Environmental Excellence due to the integration of the advanced spill modeling capabilities.

In September 2016, EWS was nationally recognized by EPA Water Security Division as a case study published in *Online Source Water Quality Monitoring for Water Quality Surveillance and Response System*. The EWS was also featured as part of the Philadelphia Water Department case study in the 2017 publication of the American Water Works Association (AWWA) entitled *Operational Guide to AWWA Standard G300: Source Water Protection*, 2nd Edition. Planned system upgrades for 2020 include continuing efforts toward a newly designed user interface to facilitate event reporting and information gathering.

In 2020, PWD will be implementing significant updates to the EWS user interface. Notable updates include full mobile device (smartphone) functionality for the EWS web site and

improved mapping and notification features. These updates will be presented to EWS users through a series of regional trainings and conferences.

4.1.4 Provide Project Support for the Lehigh University *Cryptosporidium* Study

For more than a decade, Lehigh University has been contracted by PWD to support continuing research on *Cryptosporidium* in Philadelphia source water. PWD and Lehigh University collaborate to develop sampling programs to better understand the occurrence, sources and vectors of *Cryptosporidium* in the Schuylkill River watershed. Sampling programs are designed to answer research questions and improve and expand methods for field sample collection and laboratory analysis of *Cryptosporidium*. PWD contributes field sample collection support, project management and oversight. PWD regularly communicates with project partners at Lehigh to create solutions for issues encountered in the field and lab, incorporate improvements, and expand the project. For more information, refer to Sections 4.1.11, 4.2.6, and 4.3.3.

Throughout the first half of 2019, PWD collaborated with Lehigh researchers to better understand fate and transport of *Cryptosporidium* in soils. Strides made to improve laboratory detection methods to maximize the recovery rate of *Cryptosporidium* oocysts in environmental soil samples – efforts towards which began in 2018 – were detailed in a comprehensive report and literature review. PWD priority source water samples were tested for *Cryptosporidium* presence using the biofilm collection methods throughout 2019 and will continue to be during 2020. A manuscript detailing the outcomes of research collaboration will be submitted for publication in early 2020.

4.1.5 SAN Pathogens and Point Source Workgroup

The SAN Pathogens/Compliance Workgroup was renamed the SAN Pathogens and Point Source Workgroup during the 2016-2020 strategic planning process. The new strategic goal of the SAN Pathogens and Point Source Workgroup is to facilitate and strengthen communication and coordination among regulatory agencies, downstream water users, and basin stakeholders regarding Clean Water Act and Safe Drinking Water Act goals. The workgroup identifies 10 strategies to address this goal. The objectives and strategies can be reviewed in the 2016-2020 SAN Strategic Plan available at schuylkillwaters.org and in Appendix A. A new round of strategic planning for the SAN's next 5 years commenced in 2019. PWD regularly attends quarterly SAN Pathogens and Point Source Workgroup meetings and serves as a workgroup co-chair. A quarterly e-newsletter was established in 2019. The minutes for the meetings in 2019 are included in Appendix B.

4.1.6 Abate Wildcat Sewers and Cross-Connections

Wildcat sewers are sewer systems that discharge sewage directly into creeks and streams without any treatment at a wastewater treatment facility. These systems discharge pathogens into the Schuylkill River watershed and can be a source of *Cryptosporidium*. In 1990, EPA identified communities in the Schuylkill River watershed with wildcat sewers. After the

formation of the SAN, the formerly named SAN Pathogens/Compliance workgroup led efforts addressing issues in many of the listed communities (PWD, 2011). PWD supports the SAN in efforts to identify and abate wildcat sewers through participation in the SAN Pathogens and Point Source Workgroup. In 2015, PWD completed a Watershed Sanitary Survey (WSS), required under LT2 to maintain the WCP credit. As part of the WSS, PWD compiled available information from the PENNVEST database, news sources, community announcements, and personal communication with a contracted engineering firm on projects addressing wildcat sewers in the Schuylkill River watershed. The wildcat sewer project update serves as a working document and is included in the 2018 Triennial Update to the Schuylkill River Watershed Sanitary Survey as well as on the SAN Workgroup Hub as a standalone worksheet. The document with 2019 updates is also included in Appendix C.

A sewer cross-connection occurs when two sewers or pipelines with distinct purposes (e.g. potable, storm, sanitary) are temporarily or permanently connected. A cross-connection can contaminate potable water in the event of a backflow or can lead to wastewater being discharged along with sanitary stormwater flow into waterways at stormwater outfalls. In 2019, PWD continued working with Penn State Abington to develop best methods to detect illicit cross-connections. Once such connections are identified, they can be corrected to limit the discharge of wastewater into the watershed's natural waterways.

4.1.7 PWD Schuylkill River Watershed 15-Year Review

The Source Water Protection Program 15-Year Review focuses on the objectives defined in the SWPP and highlights program achievements towards these objectives. The 15-Year Review describes PWD SWPP capabilities and responses to unplanned source water events. Water quality data from PWD's WTP intakes on the Schuylkill River from the last decade are included and observed for changing trends. Additionally, Schuylkill River watershed water quality data provided by other water utilities and sources is used to observe spatial trends in pH, temperature, TDS and iron and manganese. PWD continues to monitor water quality trends in the Schuylkill River observed at PWD intakes and at watershed sampling locations.

4.1.8 Support *Cryptosporidium* Monitoring at Major WWTPs

PWD regularly attends and co-chairs the quarterly SAN Pathogens and Point Source Workgroup meetings. Through this involvement, PWD supports the development of research and monitoring for *Cryptosporidium* at major WWTPs. Although the feasibility of such efforts is still being determined, PWD remains an active participant of the workgroup and related activities and shares with the workgroup pertinent updates regarding PWD monitoring and research efforts in the watershed.

4.1.9 Track Wastewater Related Changes in the Watershed

Through the SAN Pathogens and Point Source Workgroup, PWD and the PADEP Southeast Regional Office initiated a data compilation effort in 2013. The project compiled information submitted in Chapter 94 reports to three PADEP regional offices by WWTPs in the Schuylkill

River watershed upstream of Philadelphia. In 2014, PWD collected information from Chapter 94 annual reports from the PADEP southeast regional office and from the Reading District Office for WWTPs in the south central region. In 2015, PWD staff reviewed Chapter 94 reports from the northeast region. The data includes WWTP location, receiving stream, average and permitted discharge flow rates, overload conditions, treatment technologies and more. The intended purpose of the project is as follows:

- To promote a holistic view of WWTP discharge in the Schuylkill River watershed
- To serve as a quick reference to SAN Pathogen workgroup members when WWTP discharge related events are reported on EWS
- To encourage the sharing of specific WWTP related events and news in the watershed
- To provide an informational tool for water utilities assessing source water protection planning strategies related to upstream point sources.

PWD used this information to inform the Watershed Sanitary Survey submitted to PADEP in December 2015. A map of the WWTPs in the Schuylkill River watershed upstream of Philadelphia is presented in Figure 4-1. The map shows WWTP locations and relative average flows and incorporates data from the Chapter 94 reports and the EPA Permit Compliance System and Integrated Compliance Information System (PCS-ICIS).

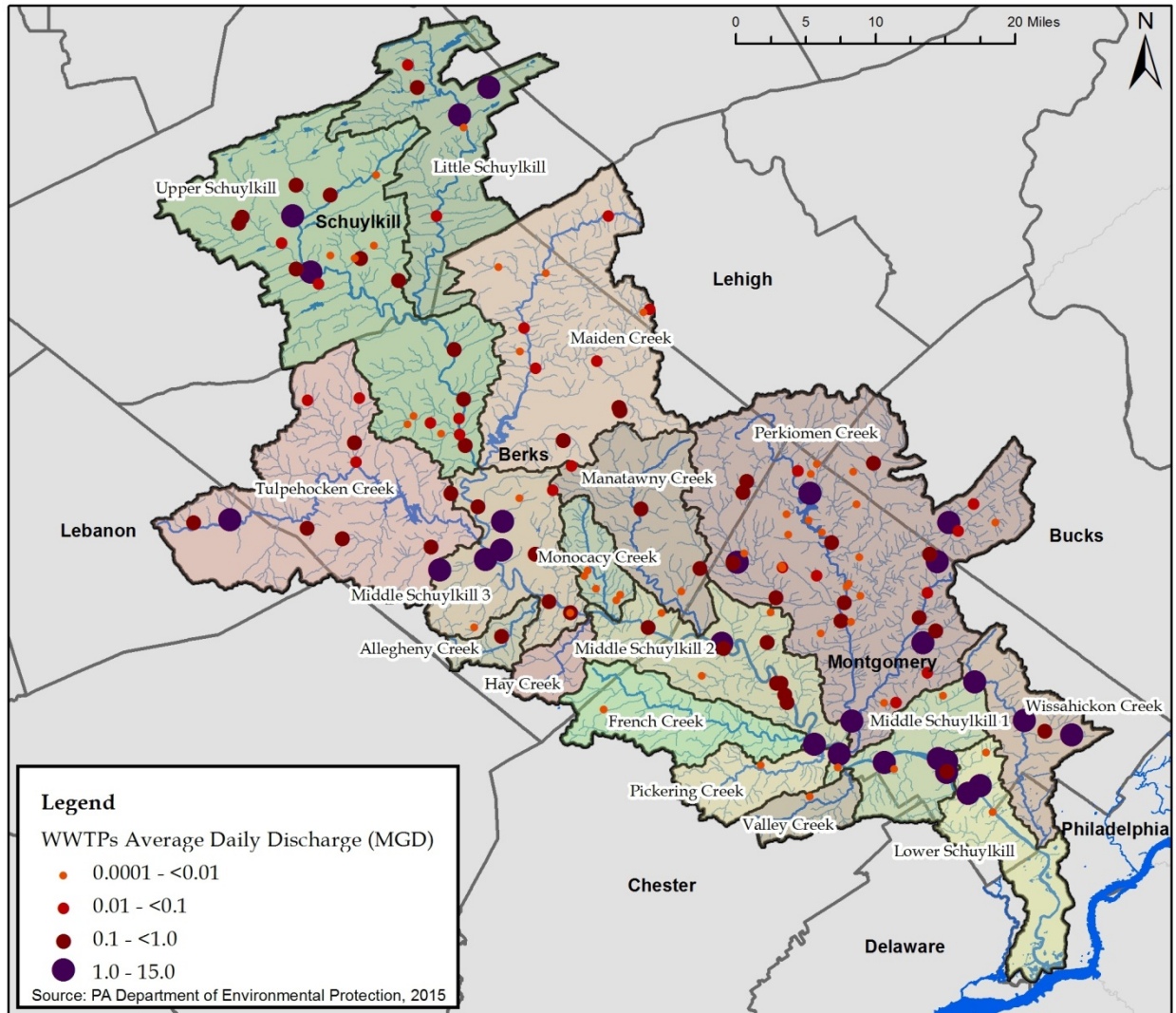


Figure 4-1: Wastewater Treatment Plants in the Schuylkill River Watershed by Average Daily Discharge (MGD) and Subwatershed (PCS-ICIS, 2015; PWD, 2015b)

4.1.10 Wet Weather and High Flow Management Education for WWTP Operators

Providing a wet weather and high flow management workshop to WWTP operators and potentially reducing wastewater overflows in the Schuylkill River watershed during wet weather has been a long-term goal of the SAN Pathogen and Point Source Workgroup. The Eastern Pennsylvania Water Pollution Control Operators Association hosted this workshop in 2017, which was available to take for PADEP continuing education hours toward the renewal of their operator certification. In 2017, the Pathogens and Point Source workgroup aimed to provide further assistance to wastewater utilities. An educational pamphlet, “What Not to Put Down the Drain” was developed to assist WWTPs with public messaging. The resource is available through the SAN website, and wastewater treatment plants can purchase copies to print as mailers or rack cards. In 2019, the SAN Pathogens and Point Source Workgroup

continued to promote educational opportunities, training resources, and grant opportunities for WWTPs.

4.1.11 Research on WWTP Effluent and *Cryptosporidium* in Surface Waters

In collaboration with Lehigh University, PWD funds and conducts research investigating sources of *Cryptosporidium* in the source water. In 2015, PWD and Lehigh expanded their research project goals and began collecting samples in October 2015 at five sites in the Schuylkill River watershed. Sampling continued through March 2017, aligning with the timeline for Round 2 LT2 *Cryptosporidium* monitoring. Sample collection sites include the Wissahickon Creek, the Schuylkill River near the USGS Norristown and Berne gage stations, the Tulpehocken Creek and Lake Ontelaunee (Figure 4-2). PWD partnered with two other water suppliers: Western Berks Water Authority and Reading Area Water Authority. Samples were analyzed at Lehigh University to determine the species of any *Cryptosporidium* detected and assist in source tracking. The project also documented watershed conditions including rainfall, streamflow and, as available from PADEP, WWTP overflow events to correlate with *Cryptosporidium* sample results. PWD expanded existing *Cryptosporidium* research in 2018 to include how fate and transport of *Cryptosporidium* in soils may affect surface waters. Throughout 2018, PWD collaborated with Lehigh researchers to better understand fate and transport of *Cryptosporidium* in soils. While detection in soils proved more difficult than in water samples, progress made toward improving detection methods to maximize the recovery rate of *Cryptosporidium* oocysts in environmental samples will be documented in a scientific review. Throughout 2019, Lehigh tested PWD priority source water samples collected from two biofilm samplers deployed in tributaries to the Wissahickon and Pennypack Creeks. These sites were selected due to their potential influence from upstream and adjacent farming operations, respectively, as well as to the suspected influence of dry weather discharge feeding Gorgas Run's flow to the Wissahickon Creek. Sampling at these sites will continue in 2020.

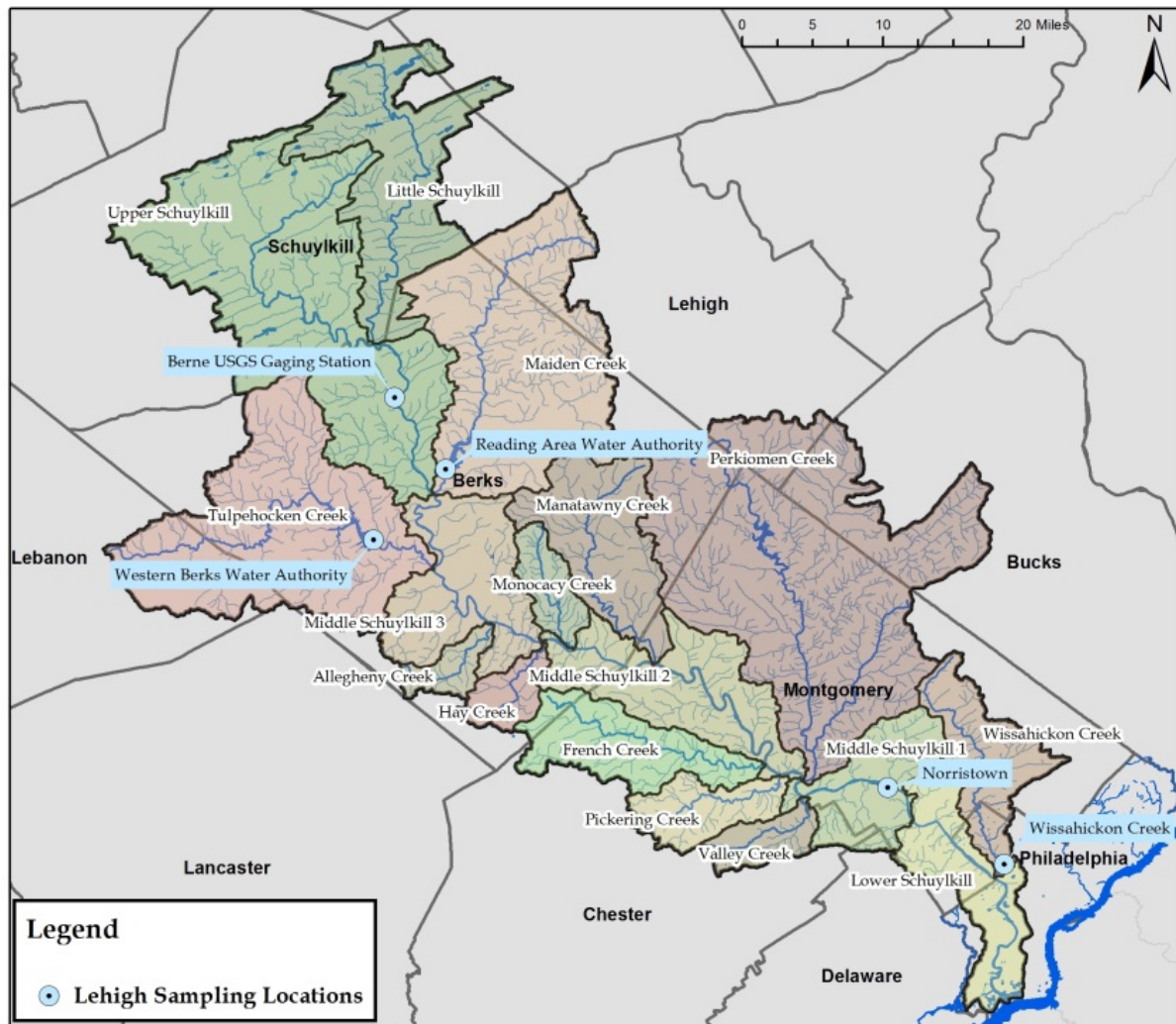


Figure 4-2: Lehigh Study Sampling Locations for October 2015 through March 2017

4.2 Agricultural Land Use and Runoff

Stormwater runoff containing manure from agricultural land is a source of *Cryptosporidium* and pathogens in the Schuylkill River watershed (PWD, 2002; PWD, 2011). PWD efforts to address agricultural runoff occur upstream of Philadelphia because the agricultural land within the city and upstream of the intakes is minimal and best management practices (BMPs) have previously been installed at Northwestern Stables, Belmont Stables, Courtesy Stables, Monastery Stables and W.B Saul High School (PWD, 2011). Table 4-3 and Table 4-4 outline the ongoing and proposed SWPP initiatives that aim to reduce the impact of agricultural activities on water quality in the Schuylkill River watershed. This section explains the ongoing work performed in 2019 in relation to each initiative listed.

Table 4-3: Ongoing Agricultural Land Use and Runoff SWPP Initiatives

Project Location	Project Overview
Phila- delphia	<i>BMPs have been implemented at all agricultural sites within the City.</i>
Schuylkill River Watershed	4.2.1 SAN Agriculture Workgroup
	<p>Continue to be an active participant in the SAN Agriculture Workgroup and support future efforts. The strategies for the 2019 SAN Agriculture Workgroup plan are as follows:</p> <ol style="list-style-type: none"> 1) <i>BMP Implementation</i>: Support and implement agricultural best management practice (BMP) with funding, information, expertise, and collaborative problem solving. 2) <i>Communication</i>: Provide a forum for partner and agency communication and coordination around agricultural projects and issues and the formulation of creative new approaches for solving agricultural related problems. 3) <i>Monitoring</i>: Monitor the impacts of agricultural BMP installations on stream water quality.

Table 4-4: Proposed Agricultural Land Use and Runoff SWPP Initiatives

Project Location	Project Overview
Philadelphia	<p>4.2.2 PWD In-City Agricultural BMPs</p> <p>Develop a maintenance plan for PWD’s in-city agricultural BMPs, which include Northwestern Stables, Belmont Stables, Courtesy Stables, Monastery Stables and the WB Saul High School project.</p>
	<p>4.2.3 Natural Lands and Erdenheim Farm</p> <p>Natural Lands (formerly Natural Lands Trust) is currently performing stream restoration on a tract of land on Erdenheim Farm, located in the Wissahickon Creek watershed. The land is currently not being used for grazing, but may be used for this purpose in the future. PWD will consider future coordination with Natural Lands and the Erdenheim Farm Foundation to install additional agricultural BMPs at the farm.</p>

	<p>4.2.4 Land Use in the Schuylkill River Watershed</p> <p>As part of the SWA update process, PWD plans to re-assess land use in the Schuylkill River watershed. To complete this update, the 2011 National Land Use Database will be used, along with more current information from the 2010 Census.</p>
<p>Schuylkill River Watershed</p>	<p>4.2.5 Visual Assessments for the Agriculture BMP Projects</p> <p>Coordinate with SAN to develop a maintenance and monitoring plan for the agricultural BMPs installed as a result of the parcel prioritization process. The maintenance plan may be centered on regular visual assessments to identify any problems or repair needs.</p>
	<p>4.2.6 Agricultural BMP Monitoring for <i>Cryptosporidium</i></p> <p>PWD will explore the possibility of partnering with academic institutions on <i>Cryptosporidium</i>-related research. Relevant research may include monitoring to assess the efficacy of different agricultural BMPs at removing pathogens from runoff. PWD will also identify priority research needs that may be fulfilled in collaboration with Lehigh University.</p>
	<p>4.2.7 Promotion of SAN Agriculture Projects</p> <p>Through involvement in the SAN Agriculture Workgroup, PWD will continue to work with partners, state and federal agency representatives to identify priority projects and available funding sources. For funding programs that already exist within the watershed, such as the United States Department of Agriculture (USDA) – Natural Resource Conservation Service (NRCS) conservation programs outlined in the 2008 Farm Bill, PWD will help promote drinking water protection and <i>Cryptosporidium</i> contamination reduction as a high-priority water quality improvement goal that requires adequate funding.</p>
	<p>4.2.8 CAFO Identification in the Watershed</p> <p>Through the SAN Agriculture Workgroup, PWD will work with partners to identify CAFOs located in the Schuylkill River watershed and identify opportunities to reduce agricultural runoff.</p>
	<p>4.2.9 Schuylkill River Restoration Fund (SRRF) Grants for Agriculture BMP Projects</p> <p>Starting in 2012, PWD has committed SRRF dollars to be directed toward priority agricultural BMPs addressing pathogen-contaminated stormwater runoff from livestock operations. These projects will be selected on an annual basis through the established project selection processes. PWD commitments to the SRRF will address priority stormwater and pathogen concerns while promoting the importance of watershed partnerships.</p>

4.2.1 SAN Agriculture Workgroup

The strategic goal of the SAN Agriculture Workgroup is to maximize reduction and/or prevention of agricultural impacts to water quality. The workgroup identifies 11 strategies to address this goal. The objectives and strategies can be reviewed in the 2016-2020 SAN Strategic Plan available at schuylkillwaters.org. PWD regularly attended quarterly SAN Agriculture Workgroup meetings. The minutes for the meetings in 2019 are included in Appendix B.

4.2.2 PWD In-City Agricultural BMPs

In 2015, the Community Design Collaborative (CDC) completed a master plan for Saul High School. PWD served on the Saul Task Force for the (CDC) with community members and other stakeholders to participate in development of the master plan. Additionally, the Natural Resource Conservation Service (NRCS) performed an Engineering Inventory and Evaluation Report for the agricultural portion of the Saul campus. The report details nutrient and sediment management and stormwater issues on the site by area (dairy facility, equine facility, sheep and swine facility, beef operation, composting facility and community supported agriculture (CSA) area), and one or two optional solutions to address each issue. Master planning efforts allowed Saul to apply for and win grant funding for green infrastructure implementation. Throughout 2016 and 2017, CH2M engineers and Nature Conservancy scientists worked directly with students and faculty to design and construct a rain garden on campus to address stormwater quality concerns. The rain garden was completed in June 2017.

PWD continues to coordinate internally to determine resources available to support projects to manage stormwater and protect source water on the Saul Agricultural High School campus. In 2019, construction of a swale and culvert diverting runoff from the adjacent Henry Avenue was completed. The diversion system is connecting to a highway inlet at the top of the Saul High School access drive and conveys diverted flow below pastureland adjacent to the Wissahickon Valley Park. PWD will continue efforts to implement additional BMPs at Saul High School during 2020.

Through the SRRF, PWD also contributed \$50,000 toward stormwater management projects at Northwestern Stables within the Wissahickon Valley. The property on which the non-profit stables sit drains into a small tributary of the nearby Wissahickon Creek, which then discharges into the Schuylkill River. Following recommendations from the NRCS, Northwestern Stables will be implementing various BMPs, including: diverting street runoff through a newly constructed trench drain; roof gutter installation and repairs; construction of a stormwater swale; and ground stabilization of primary paddock areas.

4.2.3 Natural Lands and Erdenheim Farm

Erdenheim Farm is located in Lafayette Hill along the Wissahickon Creek. The section of the Wissahickon Creek that enters and exits the Erdenheim property is surrounded by preserved

forests, the Fort Washington State Park to the north of the property and parcels of Wissahickon Valley Park to the south of the property. In cooperation with Natural Lands (formerly the Natural Lands Trust) and the Whitemarsh Foundation, the entire property has been protected by conservation easements since 2009. Projects previously implemented at Erdenheim Farm include the planting of a 14-acre native meadow, the stabilization of a meandering channel, and construction of a shallow stormwater basin and forebay, a basin constructed to allow sediment from incoming stormwater to settle before reaching the main stormwater basin. These projects intend to reduce erosion of Erdenheim Farm and detain stormwater prior to discharging to the Wissahickon Creek.

4.2.4 Land Use in the Schuylkill River Watershed

USGS released the 2016 National Land Cover Dataset (NLCD) during 2019. As part of the 2015 Watershed Sanitary Survey (WSS), PWD completed an updated analysis on land cover and land cover changes since 2001 in the Schuylkill River watershed. Notable changes within the Schuylkill River watershed since the 2011 NLCD release include a transition of many pasture/hay areas in the upper and middle of the watershed towards cultivated crops, and an increase in development intensity at the bottom of the watershed – especially in the greater Phoenixville, Norristown, and Philadelphia metro areas. A map of the Schuylkill River watershed overlain by the 2016 NLCD is shown in Figure 4-3.

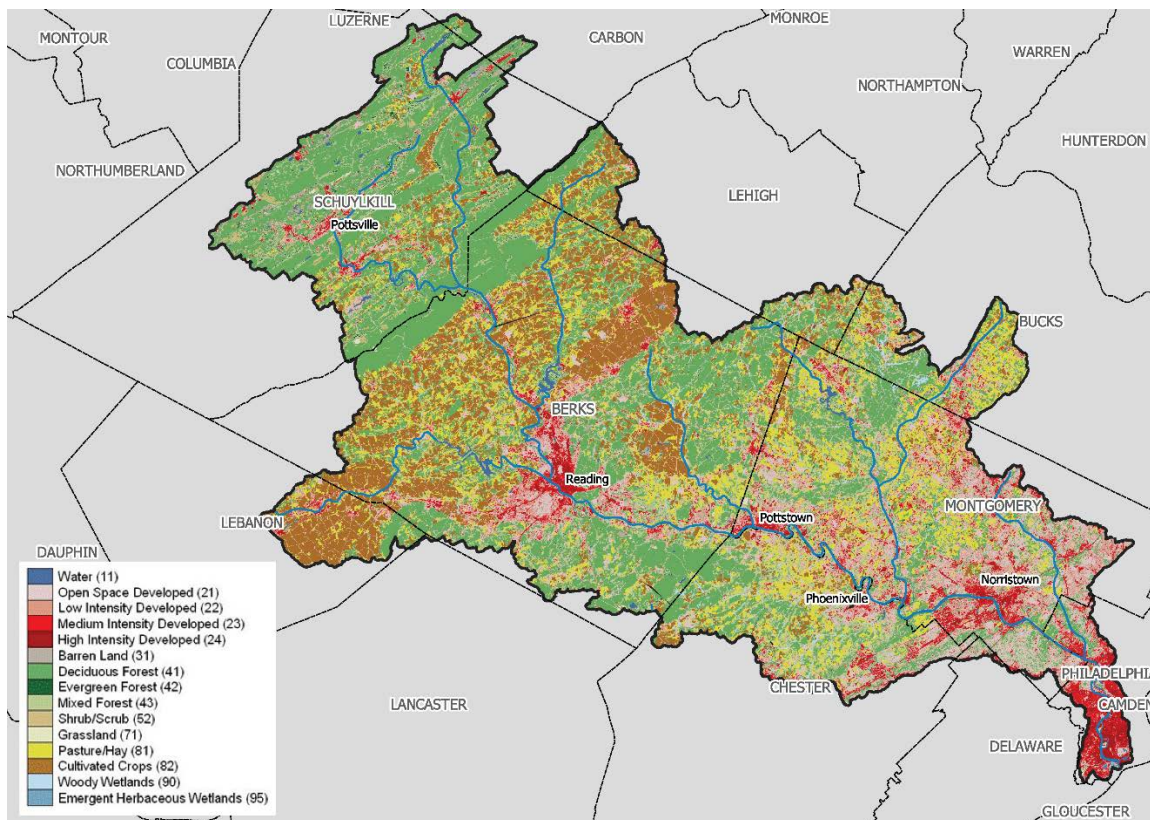


Figure 4-3: Land Cover Type in the Schuylkill River Watershed (USGS, 2016)

4.2.5 Visual Assessments for Agriculture BMP Projects

PWD developed a field visual monitoring form, which was shared with the SAN Agriculture Workgroup in 2013. The field visual monitoring assessment serves as a tool available to SAN Agriculture Workgroup members implementing and tracking projects on the ground. Beginning in 2015, portions of the field visual monitoring form were incorporated into required monitoring strategies for a number of projects receiving grants through the Delaware River Watershed Initiative (DRWI). The DRWI is a multi-year investment by the William Penn Foundation to protect and restore watersheds that provide a critical drinking water source.

Additionally, PWD annually visits agricultural BMP projects funded by the SRRF during or after construction to assess project progress, take photos, and document BMPs installed.

4.2.6 Agricultural BMP Monitoring for *Cryptosporidium*

Beginning in October 2015 and continuing through March 2017, PWD and Lehigh University began a new *Cryptosporidium* source tracking research project. There were five sampling locations throughout the Schuylkill River watershed. *Cryptosporidium* samples collected at each site were genotyped. Although this project did not specifically focus on monitoring for BMPs, two of the sampling locations were in sub-watersheds heavily influenced by agriculture: the Tulpehocken and the Maiden Creek watersheds. These watersheds are approximately 50% agricultural land cover, including cultivated crops and pasture/hay designated by the National Land Cover Database (NLCD) (PWD, 2015). PWD and Lehigh University are currently using biofilm samplers to monitor *Cryptosporidium* downstream of prospective agricultural BMP sites in Philadelphia. These efforts commenced in early 2019 and will continue into 2020.

4.2.7 Promotion of SAN Agriculture Projects

PWD and PDE completed a BMP guide for agricultural properties in the Schuylkill River watershed in 2014. The guide, entitled *A Farmer's Guide for Healthy Communities*, includes the importance of managing runoff on agricultural properties, sample stormwater projects, spotlight farms with projects completed through the SAN and watershed partners, and funding resources for farmers interested in implementing projects on their own properties. The SAN continues to distribute *A Farmer's Guide for Healthy Communities* to farmers, SAN members and other interested stakeholders. The guide is available on the SAN website at www.schuylkillwaters.org/projects.cfm.

In November 2019, PWD organized a site visit of the most recent Schuylkill River Restoration Fund (SRRF) grant recipient project in Berks County with watershed partners. The site visit was attended by representatives from the Partnership for the Delaware Estuary, Berks Nature, and PWD. The visit to the project site at Love Farm included a tour of the surrounding woodland and wetlands areas newly designated for protection.

4.2.8 CAFO Identification in the Watershed

Concentrated animal feeding operations (CAFOs) are agricultural operations where animals are confined in small land areas. CAFOs have the potential to contribute *Cryptosporidium* contaminated runoff to the Schuylkill River watershed. In 2019, PWD received updated CAFO data from PADEP including number of animal equivalent units and primary animal for each operation. As of October 2019, a total of 36 CAFOs exist in the Schuylkill River watershed representing more than 25,200 animal equivalent units (AEUs, 1 AEU = 1,000 lbs of animal weight). These totals mark only a slight increase from 2018 data, during which 32 CAFOs representing more than 22,700 AEUs existed in the Schuylkill River watershed. A map depicting 2019 data is shown in Figure 4-4.

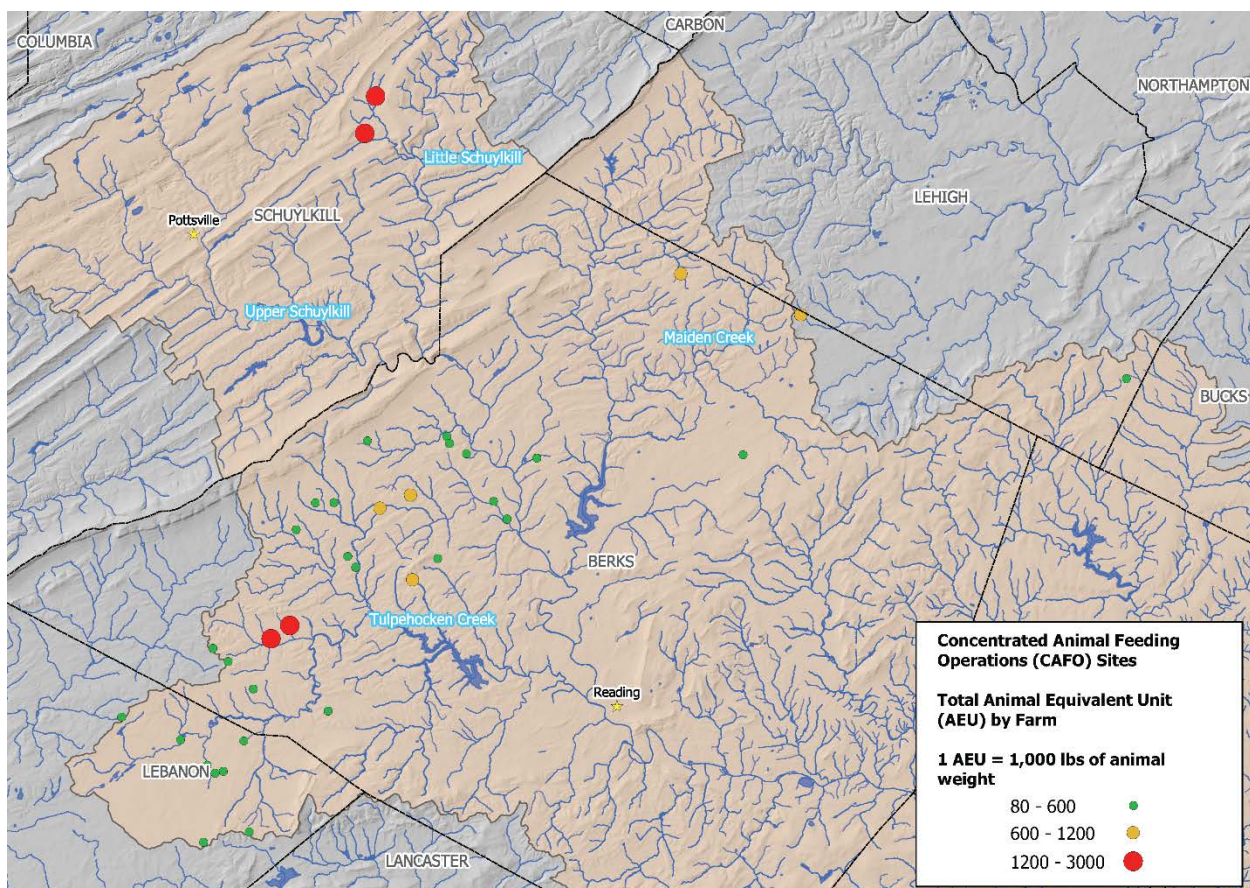


Figure 4-4: Concentrated Animal Feeding Operations in the Schuylkill River Watershed by Total Animal Equivalent Units (AEUs) (PADEP 2019)

4.2.9 Schuylkill River Restoration Fund Grants for Agriculture BMP Projects

PWD contributes financial support and participates in the SRRF grant selection process. PWD identifies and advocates for high priority projects. In 2019, PWD supported the selection of a large agricultural and land protection project to receive SRRF grants for stormwater management projects: the Love Farm property. BMPs to be implemented at the farm include

dry-roofed manure storage area, the installation of a 100 foot riparian buffer with stream bank and wetland exclusion fencing, construction of a raised stream crossing, establishment of in-field water supply stations, rain gutter improvements, and other on-site stormwater controls. The Love Farm SRRF project is discussed in more detail in Section 4.4. PWD also supported the selection of an in-city stables project for the 2019 SRRF grant round. Improvements to be implemented at Northwestern Stables along the Wissahickon Creek are detailed in Section 4.2.2.

4.3 Animal Vectors

Animals in the Schuylkill River watershed serve as mechanical vectors of *Cryptosporidium*, transferring viable oocysts from original hosts. Geese are particularly effective vectors, as identified in PWD and Lehigh University source tracking studies (Jellison et al., 2009; Jellison, 2010a). Table 4-5 and Table 4-6 outline the SWPP ongoing and proposed initiatives that aim to reduce the impact of animal vectors near the PWD Queen Lane and Belmont intakes and expand implementation of animal vector control in the Schuylkill River watershed. This section explains the progress made in 2019 toward each initiative listed.

Table 4-5: Ongoing Animal Vectors SWPP Initiatives

Project Location	Project Overview
Philadelphia	<p>4.3.1 Belmont Meadow Extension and Intake Project</p> <p>Continue to maintain plantings at the site of the Belmont Meadow Extension/Intake project. Continue to monitor goose activity around the Belmont intake.</p>
	<p>4.3.2 Education and Outreach on Threat of Animal Vectors in the City</p> <p>Continue education/outreach efforts concerning the threat of animal vectors and the role they play in the cycle of pathogen contamination. These efforts may include working with Fairmount Park to expand existing programs, such as the dog waste program, and developing new programs that focus on the relationship between geese and drinking water quality.</p>
Schuylkill River Watershed	<p>4.3.3 Lehigh University <i>Cryptosporidium</i> Source Tracking</p> <p>Continue to support Lehigh University source tracking research to further identify and understand the animals that serve as mechanical vectors of <i>Cryptosporidium</i> in the watershed.</p>

Table 4-6: Proposed Animal Vectors SWPP Initiatives

Project Location	Project Overview
Philadelphia	<p>4.3.4 Goose Measures at Fairmount Park Properties</p> <p>Continue to implement appropriate goose control measures at Fairmount Park properties, including Peter’s Island, and incorporate educational signage in these areas.</p>
	<p>4.3.5 Waterfowl Management at PWD Facilities</p> <p>Continue to implement the USDA waterfowl management program at the Queen Lane WTP, Belmont WTP and Baxter WTP as well as the three PWD WWTPs.</p>
Schuylkill River Watershed	<p>4.3.6 Animal Vector Education and Outreach in the Watershed</p> <p>As part of the Source Water Protection Program education and outreach efforts, raise awareness of the threat animal vectors pose to drinking water supplies. These efforts may focus on supporting Lehigh University efforts to publish scientific journal articles.</p>

4.3.1 Belmont Meadow Extension and Intake Project

The goal of the Belmont meadow project is to deter non-native Canada geese, vectors for *Cryptosporidium*, from dwelling and feeding around the Belmont intake. This was achieved by installing fencing along Peter's Island, installing educational signage shown in Figure 4-5(b), and planting trees, shrubs, and two meadows. The project began in 1999 with the implementation of the Phase I meadow, and was completed in 2004 with the Phase II extension meadow. The plants create an inhospitable environment by obstructing the sight of the geese and increasing their fear of predators (PWD, 2011). In 2019, the Belmont meadow and intake plantings were maintained by Philadelphia Parks and Recreation to continue deterring geese from the area.

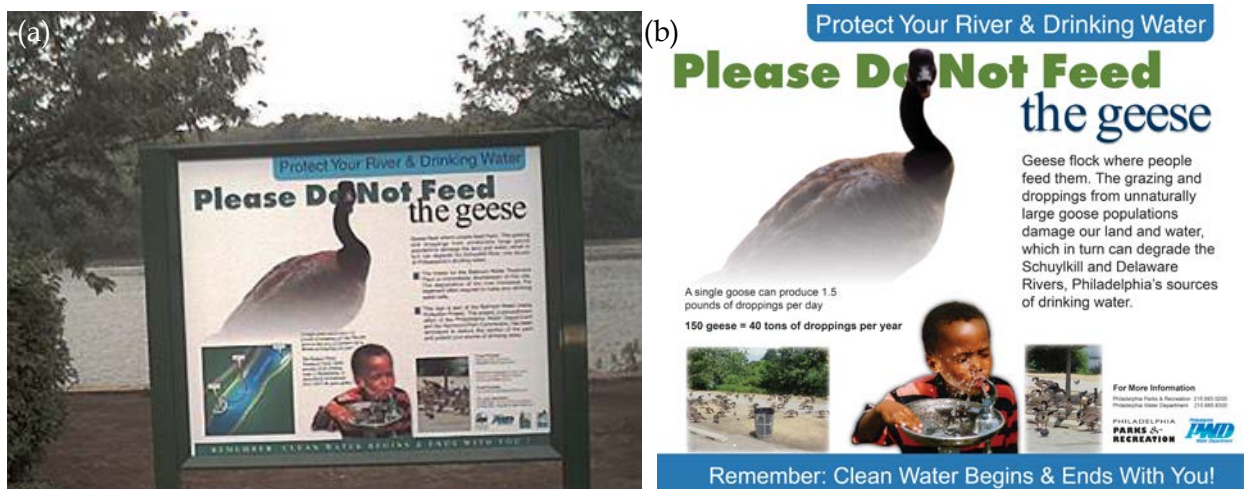


Figure 4-5: Belmont Goose Meadow (a) Educational Signage (b) Accompanying Educational Flyer

4.3.2 Education and Outreach on Threat of Animal Vectors in the City

PWD provides education and outreach efforts concerning the management of animal vectors in the Schuylkill River watershed. In partnership with PDE, PWD hosts the Philly's Best Friend Spokesdog Competition where two dogs are selected to be the Philly's Spokesdog and serve for one year as ambassadors educating dog owners on the importance of picking up pet waste. The most recent competition was held in 2019 at the Cobbs Creek Environmental Center.

Additionally, Penn Praxis, Philadelphia Parks and Recreation, Fairmount Park Conservancy and University of Pennsylvania Project for Civil Engagement collaborated on "The New Fairmount Park," a community vision and improvement plan for Fairmount Park in Philadelphia. The plan was completed in 2014, and progress has been made toward some of the priority projects identified. PWD will continue to follow the plan status and look for opportunities to align source water goals with the plan, such as including educational signage on geese as vectors of pathogens in Fairmount Park.

4.3.3 Lehigh University *Cryptosporidium* Source Tracking

PWD continues to support Lehigh University research on the prevalence of *Cryptosporidium* in the Schuylkill River watershed. Lehigh University has the capability to genotype *Cryptosporidium* species in field samples and assists PWD in tracking sources of *Cryptosporidium*. In October 2015, PWD and Lehigh University began sampling for *Cryptosporidium* at five sites in the Schuylkill River watershed: the Schuylkill River at Berne and Norristown USGS gaging stations, the Wissahickon Creek, the Tulpehocken Creek downstream of Blue Marsh Reservoir and Lake Ontelaunee in the Maiden Creek sub-watershed, see Figure 4-2. *Cryptosporidium* samples collected at each site were genotyped. Additionally, Lehigh University and PWD collected watershed data including streamflow, rainfall and WWTP discharge data as available to correlate with *Cryptosporidium* sample results. Sampling coincided with LT2 Round 2 monitoring and ended in March 2017. PWD expanded existing *Cryptosporidium* research in 2018 to include how *Cryptosporidium* in soils may contaminate surface waters. Throughout 2018, PWD collaborated with Lehigh researchers to better understand fate and transport of *Cryptosporidium* in soils. A review of strides made toward improving detection of *Cryptosporidium* oocysts in environmental samples should be submitted for publication in 2020. Beginning in 2019, PWD deployed two biofilm samplers at priority source water locations downstream of active agricultural sites within Philadelphia. Collected samples are being genotyped and sampling will continue into 2020.



Figure 4-6: Lehigh Sampling Locations on the Schuylkill River near USGS gage stations at (a) Norristown and (b) Berne

4.3.4 Waterfowl Management at Fairmount Park and PWD Properties

To address animal vectors of *Cryptosporidium*, PWD is committed to geese management through the WCP. PWD has active contracts with the United States Department of Agriculture (USDA) for geese management at Fairmount Park properties and PWD facilities. Geese management is conducted at Fairmount Park properties including Peter’s Island, Pleasant Hill Park, Concourse and Centennial Park and FDR Park and Golf Course. Geese management is also conducted at

PWD facilities including the Belmont WTP, Queen Lane WTP, Baxter WTP, Southeast WWTP, Southwest WWTP, Northeast WWTP, and Oak Lane Reservoir.

On Fairmount Park properties and PWD facilities, the geese are harassed and dispersed or removed from the site. Geese are dispersed using a range of harassment techniques including physical harassment, electronic harassment devices, pyrotechnics, lasers and paintball guns. At all locations, any nests and eggs are treated with 100% food grade corn oil that stops embryo development by preventing air from passing through the shell.

In 2019, under a PWD contract with the USDA, goose control measures were maintained at several Fairmount Park locations, including Pleasant Hill Park, FDR Park and Golf Course, Concourse and Centennial Park, and Peter’s Island. Under this contract, geese are harassed or removed from the site and eggs and nests are treated to reduce the population.

Also in 2019, under a PWD contract with the USDA, goose control measures were maintained at the three drinking WTPs, three WWTPs and Oak Lane Reservoir. Under this contract, geese are harassed or removed from the site and eggs and nests are treated to reduce the population. Additional measures are taken to control other wildlife populations at PWD facilities.

The numbers of Canada geese removed and dispersed and eggs treated January 2019 through December 2019 at Fairmount Park properties are shown in Figure 4-7. A total of 41 eggs were removed, 7 nests removed, 148 geese removed during roundups, and more than 18,000 geese were harassed and dispersed from the Fairmount Park properties. As of January 2020, PWD is still awaiting the 2019 Q4 report from USDA.

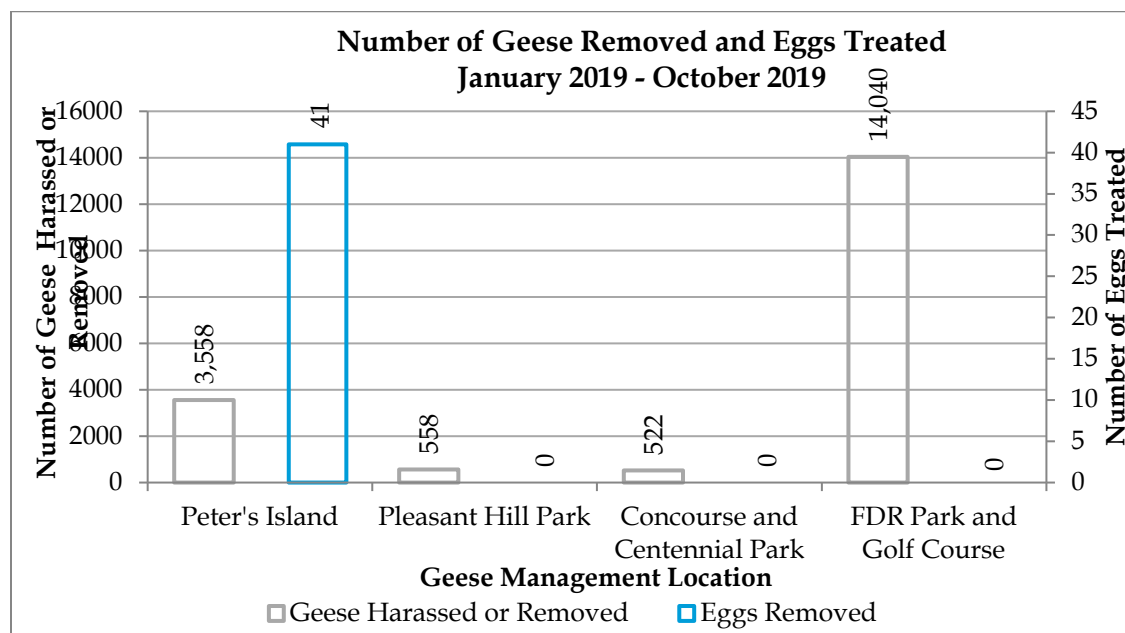


Figure 4-7: A total of 41 Canada goose eggs were removed and 18,678 geese were harassed or removed from the Fairmount Park properties during 2019.

As of January 2020, PWD is still awaiting receipt of USDA’s 2019 Annual Report for wildlife management metrics at PWD properties. For reference, the numbers of Canada geese removed and dispersed and eggs treated during 2018 at PWD properties are shown in Figure 4-8. A total of 49 eggs were treated, 11 nests removed, 75 geese removed during roundups, and more than 5,000 geese were harassed and dispersed from the PWD properties.

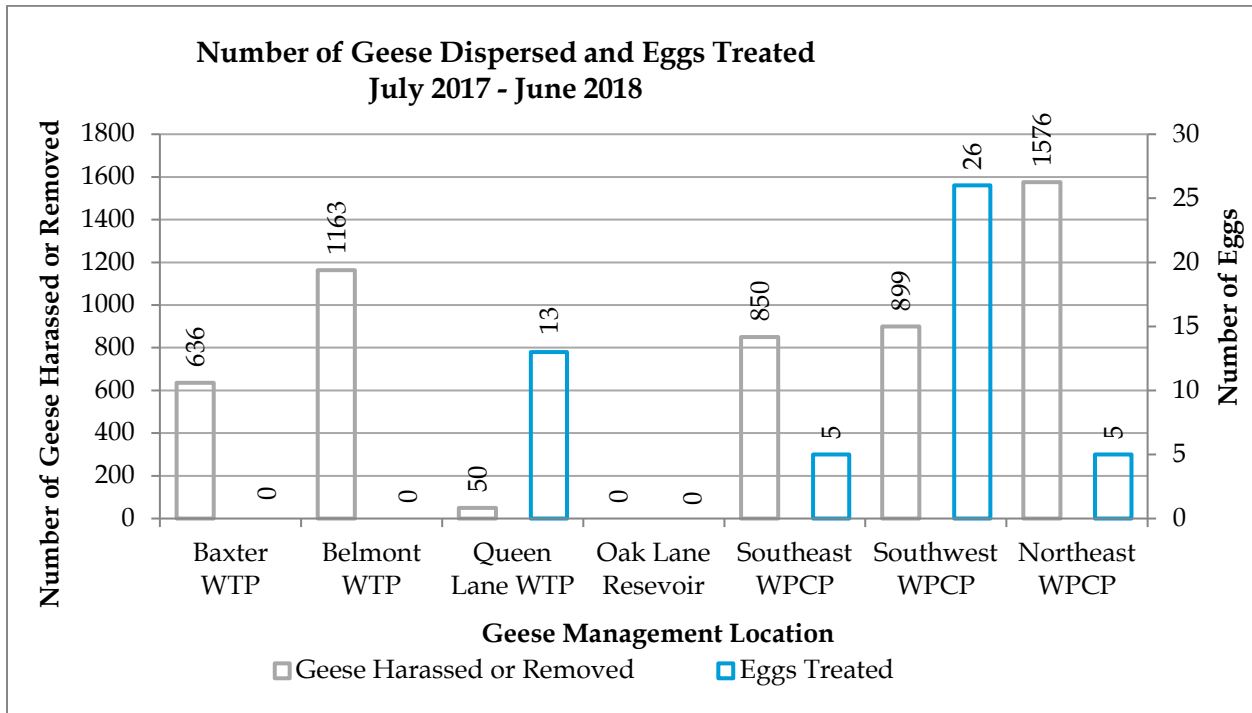


Figure 4-8: During 2018, a total of 49 Canada goose eggs were treated, 75 geese were removed, and 5,099 were harassed and dispersed from PWD facilities.

The data collected between 2011 and 2019 is encouraging and suggests that the geese management strategies implemented by PWD through contracts with the USDA are impacting geese populations. These impacts are particularly evident at Peter’s Island and the surrounding park area. Peter’s Island is located directly upstream of Belmont WTP intake and offers breeding habitat for geese. In the past five years, PWD has observed a decrease in the number of eggs treated during the nesting season at this site. In 2011, 2012 and 2013, the numbers of eggs treated were 499, 535 and 353, respectively. In 2014, 2015, 2016, 2017, 2018, and 2019, 55, 58, 66, 61, 35, and 41 eggs were treated, respectively. The number of geese removed and harassed is more challenging to compare from year to year. This data may be affected by specific site conditions and the number of times USDA staff visited the sites to conduct harassment and round ups.

4.3.5 Animal Vector Education and Outreach in the Watershed

PWD continues to support Lehigh University efforts in *Cryptosporidium* related research and the publishing of scientific articles by incorporating PWD source water protection goals into Lehigh University research goals. PWD shares Lehigh University literature and research findings on deer and geese as vectors of human-infectious *Cryptosporidium* with upstream water utilities and SAN partners to support the implementation of animal vector control techniques.

4.4 Education and Outreach

Education and outreach initiatives are a critical component of PWD SWPP because point and nonpoint source discharges and land management throughout the Schuylkill River watershed influence water quality at the Queen Lane and Belmont intakes. Many education and outreach initiatives are implemented through PWD watershed partnerships, which are maintained by various programs within PWD. Table 4-7 and Table 4-8 outline the SWPP ongoing and proposed initiatives that maintain watershed partnerships and continue to promote the importance of source water protection. This section explains the progress made in 2019 toward each initiative listed.

Table 4-7: Ongoing Education and Outreach SWPP Initiatives

Project Location	Project Overview
Philadelphia	<p>4.4.1 Watershed Partnerships in the City Remain an active participant in watershed partnerships and begin integrating drinking water issues into the scope of work for the Wissahickon Watershed Partnership.</p>
	<p>4.4.2 Annual Water Quality Report Continue to submit a comprehensive annual water quality report that emphasizes critical source water issues and, in particular, educate customers as to the research initiatives and implementation strategies PWD is using to reduce the risk of <i>Cryptosporidium</i> contamination.</p>
	<p>4.4.3 Water Quality Committee Continue to convene PWD’s Water Quality Committee (WQC) to address water quality issues on a holistic basis. Utilize the committee as a forum for providing feedback to strengthen the WCP.</p>
	<p>4.4.4 Improve Environmental Quality of Philadelphia Fairmount Park System Continue to work with Fairmount Park to improve the environmental quality of City parks and streams through land management practices and BMP implementation.</p>
	<p>4.4.5 Maintain Fairmount Water Works Interpretive Center Continue to maintain the FWWIC and promote source water protection through FWWIC exhibits and learning programs.</p>
	<p>4.4.6 Philly RiverCast Continue to operate Philly RiverCast and promote the web-based recreational warning system.</p>
Schuylkill River Watershed	<p>4.4.7 Active Members of SAN Pathogen and Point Sources and Agriculture Workgroups Continue to be an active member of the SAN Pathogens and Point Sources and Agriculture workgroups and support initiatives outlined in the annual work plans.</p>
	<p>4.4.8 Collaboration with Partnership for the Delaware Estuary Continue to collaborate with PDE on various education and outreach initiatives, including the publication of guidance materials and organization of public programs and meetings surrounding water quality concerns.</p>
	<p>4.4.9 Schuylkill River Restoration Fund Continue to support the SRRF to achieve implementation of BMPs at high-priority sites in the watershed.</p>

Table 4-8: Proposed Education and Outreach SWPP Initiatives

Project Location	Project Overview
Philadelphia	<p>4.4.10 Implement In-City Source Water Programs in East Falls, Roxborough and Manayunk</p> <p>Implement in-city source water projects in the East Falls, Roxborough, and Manayunk neighborhoods along the Schuylkill River. These projects will involve the implementation of stormwater management practices, storm drain labels and a dog waste control program. Through these initiatives, communities will become more involved in protecting their waterways as they develop a better understanding of the impacts of daily activities on their drinking water source.</p>

4.4.1 Watershed Partnerships in the City

PWD supports a contract with the Pennsylvania Environmental Council (PEC) for the coordination of watershed partnerships for the City of Philadelphia. PEC coordinates the Watershed Alliance of Southeastern Pennsylvania. This involves facilitating meetings for the Watershed Alliance and for the five individual watershed partnerships in the city, conducting a needs assessment for the Watershed Alliance members, promoting multi-municipal collaboration, identifying stormwater financing programs, and maintaining the Watershed Alliance newsletter. PEC conducts outreach to upstream landowners on projects proposed in the Integrated Watershed Management and Act 167 Stormwater Management Plans (available at water.phila.gov/reporting) and coordinates this effort with the William Penn Foundation Upstream Suburban Cluster. PEC also facilitates the *Green City, Clean Waters* advisory committee meetings and e-newsletter.

PWD and PEC collaborated to coordinate a community-based maintenance program, Soak It Up Adoption. The Adoption program provides grants to civic organizations in exchange for help with aesthetic maintenance on green stormwater infrastructure in their community. This hands-on approach reinforces community acceptance of infrastructure completed under the *Green City, Clean Waters* initiative and provides ongoing opportunities for public engagement on stormwater. In 2017, PWD expanded PEC's role to include engagement in the MS4 sewershed. Drawing on their experience as a regional facilitator, PEC is engaging community leaders on stormwater management and helping to further refine PWD public education programs on non-point source pollution.

In 2019, PWD continued to help Philadelphia residents manage stormwater and beautify their homes through the Rain Check program, a collaborative effort with the Pennsylvania Horticultural Society (PHS) and the Sustainable Business Network. As part of the program, residents attend a workshop to learn about stormwater tools and how to select the most appropriate management tools for the property (see example project in Figure 4-9). Once the property owner identifies the most suitable stormwater management practices, PWD and PHS will help connect them with a contractor to assist with the installation, and Rain Check provides a portion of the project cost. In FY2019, Rain Check held a total of 77 workshops throughout Philadelphia with a total of 1,355 participants. Stormwater controls installed are itemized in Table 4-9.



Figure 4-9: Photo of Rain Check Depaving Project (a) Before and (b) After Installation

Table 4-9: Rain Check Program Progress in FY2019

Stormwater Management Practice	Total FY2019 Installations	Cumulative Total (Fall 2014 - July 2019)
Depaving	7	40
Permeable pavers	65	267
Downspout planters	162	474
Rain gardens	6	65
Rain barrels	738	3,071

Source: J. Waldowski, personal communication, September 12, 2019.

4.4.2 Annual Water Quality Report

PWD annually distributes source water protection information to customers in the annual Drinking Water Quality Report. The most recent [report](#) published in 2019 shares 2018 water quality data and information on the Schuylkill and Delaware River SWPPs, pharmaceuticals and *Cryptosporidium* source tracking. The report also includes sources for additional information on source water protection issues. PWD takes a proactive approach to customer education and goes beyond reporting requirements by including robust overviews of source water and watershed protection efforts.

4.4.3 Water Quality Council

In 2001, the Stormwater and Drinking Water Quality Citizen Advisory Councils (CACs) merged to form the Water Quality Council. The Water Quality Council was facilitated by PDE and took a holistic approach to water quality issues (PWD, 2011). The Water Quality Council no longer convenes, but citizens take an active role addressing stormwater and water quality issues

through PDE programs (Section 3.4.8) and watershed partnership groups in the City (Section 3.4.1).

4.4.4 Improve Environmental Quality of Philadelphia Fairmount Park System

As described earlier in Section 3.3, Penn Praxis, Philadelphia Parks and Recreation, Fairmount Park Conservancy and University of Pennsylvania Project for Civil Engagement collaborated on “The New Fairmount Park.” The community-driven revitalization plan was completed in 2014. The Fairmount Park Conservancy has begun the design phase of a new recreational space along Parkside Avenue that will better connect residents of West Parkside to the park and increase park use between the Please Touch Museum and the Philadelphia Zoo. The East Park Coalition of more than 30 organizations was created to better serve the larger community. The coalition is leading efforts to improve the Mander Recreation Center and has begun to establish a half mile trail along Randolph Creek connecting the Schuylkill River Trail to the Strawberry Mansion Community. PWD will continue to follow the implementation of the plan and look for opportunities to align source water protection goals with the plan.

4.4.5 Maintain Fairmount Water Works Interpretive Center

The Fairmount Water Works Interpretive Center (FWWIC) is a PWD educational center that presents the history of the Schuylkill River and the influence of human activities on water quality and quantity through innovative exhibits and interactive educational programs. Fairmount Water Works, PWD, Academy of Natural Sciences and PDE have partnered to develop a Freshwater Mussel Recovery Program. Freshwater mussels filter water and improve water quality. The goal of the program is to rebuild populations of native mussels through hatchery propagation to improve water quality in the Schuylkill and Delaware River watersheds. Additional program information is available online at delawareestuary.org. The project includes the development and construction of a freshwater mussel hatchery and an aquatic field station at the FWWIC. The goal of the hatchery is to propagate new mussels to increase the population in the Delaware River watershed. Installation of the demonstration hatchery at the FWWIC was completed in 2017 and the hatchery is now open to the public. Over the course of 2018 and 2019, several thousand individual mussels, consisting of five distinct species, were successfully propagated. Efforts will continue in 2020 alongside research focusing on maximizing propagation rates and increasing the efficiency of mussel recovery protocols.

4.4.6 Philly RiverCast

PWD continues to promote and maintain Philly RiverCast. The website has received more than 1.3 million visits since its launch in 2005. In 2019, PWD assisted individuals and recreational groups in interpreting RiverCast ratings. In the past, organizers of the Philadelphia TriRock triathlon had reached out to PWD for assistance interpreting the RiverCast ratings and referenced the tool to assess race day conditions alongside their own pre-race water quality testing. In 2016, PWD updated some aesthetic components of the RiverCast interface. In 2019, PWD analyzed the data communicated by RiverCast as it compared to laboratory-tested data

from PWD routine sampling over the past three years. This analysis showed that even more than a decade after RiverCast has been implemented, the program continues to protect public health by providing accurate characterizations of ambient bacteria river conditions. The Source Water Protection Program and Public Affairs at PWD are developing a communication plan for RiverCast, including strategies to make the tool more user-friendly.

4.4.7 Active Members of SAN Pathogens and Point Source and Agriculture Workgroups

PWD regularly attends quarterly SAN Pathogens and Point Source and Agriculture Workgroup meetings. The 2019 meeting minutes for both workgroups are included in Appendix B. In 2015, the SAN began planning for a SAN website upgrade and redesign. SAN worked with PWD on creative solutions to include priority website functions and minimize cost. The newly designed website was launched in 2018.

To support education and outreach in 2019, the SAN Agriculture Workgroup continued to promote and distribute *A Farmer's Guide for Healthy Communities*, detailed in Section 3.2.7. The guide and additional complimentary outreach materials including a PowerPoint and photos from the guide are available on the SAN website www.Schuylkillwaters.org. Additionally, the Saucony Creek Brewing Company continues to contribute a portion of each sale of its Stonefly India Pale Ale to the Berks Watershed Restoration Fund to support agricultural BMP projects in Berks County in the Schuylkill River watershed.

Several SAN Pathogens and Point Source Workgroup members are a part of the Berks County Water and Sewer Association (BCWSA). In 2016, the BCWSA and the Berks County Planning Commission developed a county-wide program to combine source water protection and stormwater management practices, which allows for assistance to cross watershed and municipal boundaries. In July 2019, the BCWSA held its 7th annual conference, which brought together regional drinking water suppliers, wastewater operators, and related organizations to discuss common concerns and issues.

4.4.8 Collaboration with Partnership for the Delaware Estuary

In 2019, PWD continued to contribute financial resources toward collaboration efforts with Partnership for the Delaware Estuary (PDE) on several education and outreach initiatives. Initiatives include engaging Philadelphia residents in the prevention of stormwater pollution to the Schuylkill and Delaware Rivers and facilitating coordinated action, communication and projects for the Schuylkill Action Network (SAN). In 2019, PDE organized its annual Green City, Clean Waters art contest for Philadelphia students grades K to 12, receiving 910 entries from 29 schools. The four first-place winners from each age group have his or her artwork used as temporary street art stickers promoting clean water, and all 12 winners' artwork were featured in an annual printed calendar.

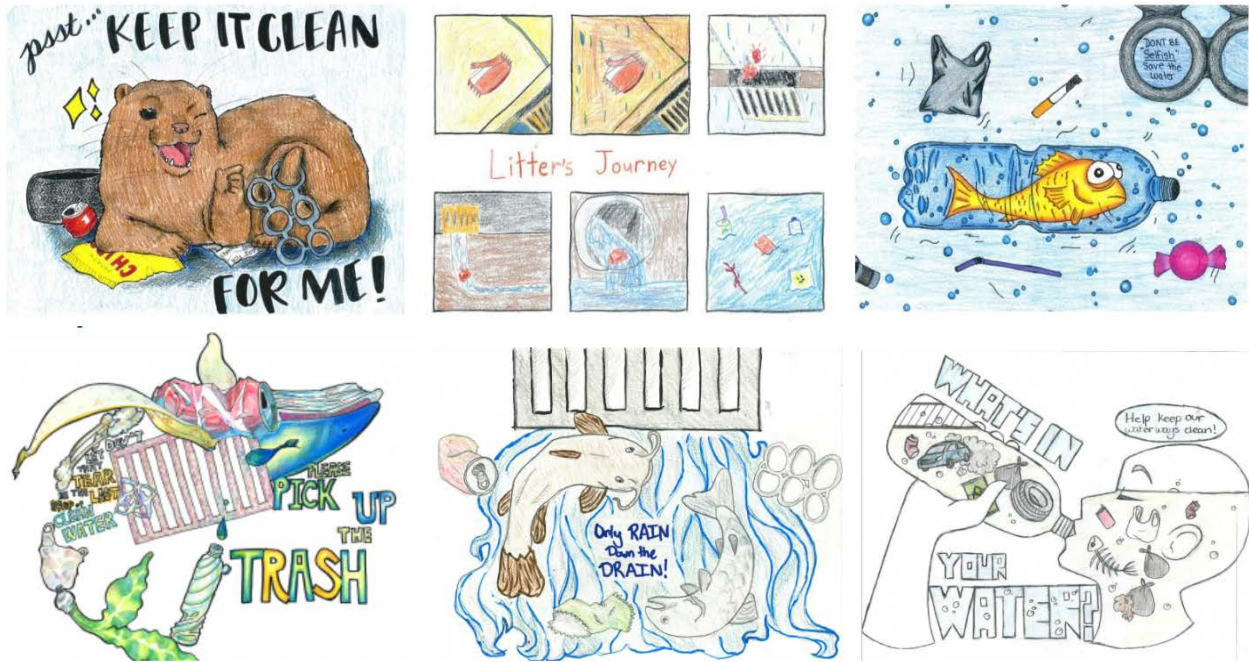


Figure 4-10: Green City, Clean Waters Street Art Stickers featuring Student Artwork (PDE 2019)

PDE hosted what was formally known as the annual Pennsylvania Coast Day at Penn’s Landing in Philadelphia, with a new name of the Delaware River Festival for 2019. This celebration of the Delaware River included partners and activities across the river in Camden, NJ. An estimated 5,000 people attended this event, with more than 2,000 taking advantage of free on-the-water experiences. Additionally, PDE helped to coordinate the annual Schuylkill Scrub initiative, which takes place from March through May alongside Keep Pennsylvania Beautiful. The 2019 Schuylkill Scrub included more than 400 cleanup events that engaged 28,433 volunteers. In this three-month time period, volunteers removed an estimated 1,107,506 pounds of litter and bulk waste from the watershed, as well as 727 tires.

The SAN also sponsored a Sojourn Steward, Julia Aguilar, to participate in the 2019 Schuylkill River Sojourn. Prior to the 112-mile kayak journey, Julia researched the influences of historic industries that shaped the Schuylkill River. While on the trip, Julia shared her research with Sojourn participants, comparing past and current industry and its impact on the watershed.



Figure 4-11: 2019 Schuylkill River Sojourn

Additionally, PWD, PDE, Academy of Natural Sciences, and FWWIC partnered to install a freshwater mussel hatchery demonstration project at FWWIC that was opened to the public on February 16, 2017. The hatchery is now being used for mussel propagation and research, as well as serving education and outreach purposes. See Section 4.4.5 for more detail.

4.4.9 Schuylkill River Restoration Fund

PWD continues to support the SRRF. In 2019, PWD contributed \$100,000 to the SRRF, and staff participated in the review of grant applications and the selection of the recipients.

In the WCP, PWD outlines several actions to reduce *Cryptosporidium* in the Schuylkill River watershed from agricultural runoff. These include the installation of agricultural BMPs, including manure storage basins and vegetated buffers, on select farms in the Schuylkill River watershed. PWD contributions to the Schuylkill River Restoration Fund (SRRF) and involvement in the SAN Agriculture Workgroup are the main vehicles for identifying projects and implementing them. Projects funded by the SRRF and the SAN partners are described in the following sections.

4.4.10 Schuylkill River Restoration Fund Farms

In 2006, Exelon, SAN, and the Schuylkill River Greenways National Heritage Area (SRG NHA) established the Exelon Restoration Fund, now the SRRF. The SRRF provides grants to support

projects that improve and protect water quality in the Schuylkill River watershed. Initially, Exelon provided all the funding to fulfill a requirement in their DRBC docket for the Wadesville Mine Demonstration Project. Beginning in 2009, PWD became the second annual contributor to the SRRF. Partnership for the Delaware Estuary (PDE) became a member and contributor in 2010 and Aqua PA followed in 2012. Additionally, MOM's Organic Market contributed to the SRRF 2014 through 2016, and Coca-Cola contributed in 2015. Members of the SAN serve as technical experts in the grant selection process to support the review of project applications for their benefit to the Schuylkill River watershed. SRG NHA oversees the SRRF and distributes grant money.

PWD has been part of the grant recipient selection process since the creation of the SRRF. Since 2009, PWD has contributed \$100,000 annually to the SRRF. As a contributor to the SRRF, a select few applications per year are deemed high priority to PWD. These projects are advocated for by PWD in grant award deliberations.

In 2019, one large farm and its surrounding property received funding from the SRRF. This high priority project for PWD included the installation of agricultural best management practices (BMPs) at Love Farm and the designation of farm-adjacent woodlands and wetlands as protected areas. Farms receiving SRRF grants also receive match funding and project support from other SAN and watershed partners, including Natural Resource Conservation Service (NRCS), Berks Nature (formerly Berks Conservancy), Berks County Conservation District (BCCD), National Fish and Wildlife Foundation (NFWF), William Penn Foundation, and local townships and water suppliers. The 2019 SRRF Love Farm project is described below in detail. Updates for farms receiving SRRF grants in prior years are also provided.

4.4.10.1 Love Farm

During the 2019 round of SRRF grants, PWD recognized the Love Farm property as a high priority project. The Love Farm property encompasses more than 75 acres and its operation focuses on maintaining approximately one dozen steer and three dozen sheep. The farmstead sits just downstream of a wetland area fed by a nearby natural spring. From the farmstead, the spring water forms a stream that flows past the Love Farm barn and through pasture land, eventually feeding into Beaver Run and subsequently Hay Creek. The farm's steer and sheep had direct access to the stream, as shown in Figure 4-12.



Figure 4-12: Love Farm Prior to BMP Implementation (Fall 2018)

The Love Farm SRRF project implements 24 practices on site, including: construction of a roofed stack pad; installation of a water pump and pipeline feeding remote watering stations in the farm's pastures; retrofitting of the current barn with gutters and roof runoff structures; planting of a 100-foot riparian buffer along the barn and pasture-adjacent length; installation of a stream bank fence; and construction of a raised, erosion-protected livestock stream crossing.

A November visit to Love Farm demonstrated tremendous progress. The pipeline for remote water stations had been dug and installed, and construction of the roofed stack pad and protected stream crossing were well underway. The streamside area designated for riparian buffer planting had also been delineated and prepared. Due to approaching winter weather, cement work was being prioritized at the time. The below Figure 4-13, Figure 4-14, and Figure 4-15 show the progress that had already been accomplished.



Figure 4-13: Love Farm During BMP Construction (Fall 2019)



Figure 4-14: Construction of Roofed Stackpad and Erosion Control Measures (Fall 2019)



Figure 4-15: Protected Stream Crossing during BMP Construction (Fall 2019)

In addition to the BMPs being implemented on site, portions of the Love Farm property adjacent to the farmstead and pasture lands were designated as protected areas to prevent future use or degradation. A total of over 45 acres including woodland areas, wetlands areas, and the site of the farm's natural spring were designated as High Protection Areas. A further 30 acres were designated for Standard Protection.

4.4.10.2 Burkholder Farm

The A. Burkholder Farm property was recognized by PWD as one of its highest priority projects during the 2018 round of SRRF grants. The Burkholder Farm operation includes several properties totaling 60 acres in the Saucony Creek Watershed in Berks County. The farm focuses on maintaining steer, including approximately 60 cattle and calves, and the production of organic vegetables. The Burkholder Farm property is situated upon a porous limestone formation which acts as a conduit for groundwater contamination. Berks Nature has been working with the Burkholder family for 4 years to implement best management practices on their farm operation to minimize such effects.

The A. Burkholder Farm project includes the construction of a dry roofed manure storage area, a waste transfer system, a water pipeline to the pasture, roof-leading rain gutters, and other barnyard stormwater controls. PWD awarded the Burkholder farm a \$50,000 SRRF grant, which is matched by contributions from both the Natural Resource Conservation Service (NRCS) under the US Department of Agriculture and the National Fish and Wildlife Fund as part of the

William Penn Delaware River Watershed Initiative. These grants cover a total project cost of over \$168,700. Other project partners include Berks Nature, Berks County Conservation District, and the SAN.

As of November 2018, a visit to the A. Burkholder Farm demonstrates that construction of the BMPs is nearly complete. The dry-roofed manure storage area shown in Figure 4-16 is designed to store manure over the nongrowing season so that it can be applied to pasture at an appropriate time in the following growing season. Without this storage area, manure is often applied to pasture prior to the growing season and is then prone to runoff during precipitation events. The rain gutters shown in Figure 4-17 are designed to capture and divert stormwater away from the storage area to prevent manure runoff. A water pipeline will soon be installed to provide water for the cattle in pasture.



Figure 4-16: Cement Dry-Roofed Manure Storage Area at A. Burkholder Farm (November 2018)



Figure 4-17: Manure Storage Area Rain Gutters at A. Burkholder Farm (November 2018)

4.4.10.3 Brown Farm

In 2018, the Brown Farm was also considered by PWD to be a high-priority project. The Brown Farm focuses on steer and sheep grazing, maintaining approximately 100 cattle and calves and 90 sheep. The farm is situated on the main stem of Manor Creek in the Maiden Creek Watershed in Albany Township, Berks County. The Brown Farm consists of more than 511 acres of owned and leased land, and its approved Conservation and Nutrient Management Plan covers the entire property.

BMP projects at the Brown Farm include the construction of a dry-roofed feeding and manure storage area, the installation of stream bank and wetland exclusion fencing, a water supply well establishment, the installation of an automatic drinker, rain gutter improvements, and other on-site stormwater controls. This project was awarded \$90,000 in 2018 SRRF funds, of which \$22,067 was specifically awarded by PWD. The cash match was \$216,439, with in-kind contributions of \$18,643 for a total project cost of \$325,073. Other project partners include Berks Nature, Berks County Conservation District, and the SAN.

As of November 2019, BMP construction on the Brown Farm had been completed. Cattle no longer have direct access to the streams and wetlands on this property, where they previously had acted as a vector of contamination and erosion. Exclusion fencing has been installed throughout the riparian and wetland-adjacent portions of the property to prevent cattle from accessing these waterways. A groundwater well has been established to provide water for the

cattle via automatic drinker stations located throughout pasture. Figure 4-18 shows sloped hillsides on the property where manure-contaminated runoff entered an adjacent stream during precipitation events prior to BMP construction. A concrete and dry-roofed manure storage area has been installed to improve manure containment on the property, and rain gutter improvements now divert stormwater to prevent manure runoff. Construction of the dry-roofed feeding area limits cattle access to pasture over the nongrowing season, improving soil health and better limiting erosion.



Figure 4-18: Brown Farm Prior to BMP Construction (November 2018)

4.4.10.4 Youse Farm

The Youse dairy operation includes several properties totaling 325 acres in the Manatawny Creek Watershed in Berks County. Portions of the farm are located at the headwaters of an unnamed tributary to the Little Manatawny Creek and include approximately 50 milking cows and 50 calves and heifers. The 2017 SRRF grant project included the construction of a liquid manure storage basin, installation of rain gutters, and other barnyard stormwater controls.

The manure storage basin shown in Figure 4-19 is designed to hold six months' worth of manure generated by the farm's dairy cows. The manure is collected in an underground septic

tank that pumps the liquid manure into the cement pit. The storage allows the farmer to spray the slurry on crops when nutrients are needed to grow, preventing the application of manure outside of the growing season when it is likely to be washed away by precipitation and runoff into nearby waterways.



Figure 4-19: Liquid Manure Storage at Youse Farm

Repair of the rain gutters allows stormwater to be collected from the roof on both sides of the barn where it is gravity fed to an underground pipe into a wetland on the property, shown in Figure 4-20. Grading of the cement surrounding the barnyard allows runoff to enter the drain system via gravity, as shown in Figure 4-21.



Figure 4-20: Youse Farm Wetland



Figure 4-21: Youse Farm (a) Pitched Feeding Area (b) Stormwater Drainage collection at the corner of the barn (c) Drain to Collect Stormwater Runoff with Screen to Capture Large Debris

The cemented area alongside the barn shown in Figure 4-21 is a heavy use area designed for cows to travel without impacting farmland. As shown by the presence of tire marks, farm vehicles also use this space to bring feed to the milk cows. The heavy use area is fenced to prevent cow access to an adjacent stream as shown in Figure 4-22. With this area now cemented, soil erosion is prevented and the water quality of stormwater runoff is improved - ultimately improving water quality of the nearby stream. The heavy use area leads to a fenced alley that will lead to pasture, with the alley constructed using geotextiles to reduce erosion. The wetlands, shown in Figure 4-20, have exclusion fencing. Dirt areas adjacent to the septic tank will be matted to avoid the creation of sediment rich runoff, as shown in Figure 4-23.



Figure 4-22: Youse Farm Cemented Heavy Use Area (June 2018)



Figure 4-23: Youse Farm Cemented Heavy Use Area with Exclusion Fencing and Stormwater Runoff Collection Drain (June 2018)

4.4.10.5 Irish Creek Streambank Stabilization

During the 2017 SRRF grant round, PWD also considered streambank stabilization at Irish Creek to be a high priority project. Approximately 70% of the Irish Creek watershed is agricultural land. Thirty-one miles of Irish Creek are listed as impaired by the PADEP for sediment from agriculture runoff and erosion from derelict land. The 21.7 acre J. Madenford property in Berks County, shown in Figure 4-24, is adjacent to impaired segments of the Irish Creek. The property was once leased to a beef operation where years of livestock overgrazing and uncontrolled access to the creek has led to eroded stream banks, Figure 4-25.



Figure 4-24: Google Imagery of Madenford Property on Irish Creek (April 2017)



Figure 4-25: Irish Creek Streambank Erosion - (a) Upstream View of the Left Bank where Stormwater Drains into the Creek (b) Right Stream Bank

The project included 350 feet of streambank restoration and vegetation and was implemented with the protection of 1.4 acres of forested riparian buffer and 1.3 acres of marginal pastureland wildlife habitat buffer through the USDA Conservation Reserve Enhancement Program (CREP), and 700 feet of livestock exclusion fencing. Approximately 28 beef feeder cows (800-1000 lbs. each) were removed from the property as 3.0 acres of pasture was removed from grazing production. About 1.5 acres of riparian forest buffer and 1.5 acres of wetland protection takes its place. A conjoined property of about 11 acres was also planted as part of CREP, as seen in Figure 4-25.

The left bank was graded to a slope of 3:1 and a total of five rock structures measuring 500 square feet each (called “barbs”) were installed, as shown in Figure 4-26. The deflectors stabilize the streambank, prevent erosion, and create fish habitat for the warm water fish stream. As runoff flows over the left bank and into the creek, the rock captures sediment and helps to rebuild streambank.



Figure 4-26: Irish Creek Project (October 2018) - Barbs Installed to Stabilize Left Bank

Since the CREP planting in 2017, the riparian buffer has become more established and ecologically mature, as shown in Figure 4-27. A stream crossing, shown in Figure 4-28, was installed to give the property owner access to the opposite bank while maintaining the integrity of the riparian buffer. On the adjacent property, the right bank will be backfilled with rock toe.



Figure 4-27: Irish Creek CREP Buffer Planting (a) November 2017 (b) October 2018



Figure 4-28: Irish Creek Project (October 2018) Stream Crossing

4.4.11 Implement In-City Source Water Protection Programs in East Falls, Roxborough and Manayunk

First steps to implement source water protection programs in East Falls, Roxborough and Manayunk neighborhoods are in progress. North Light Community Center, in Manayunk, received a grant from the SRRF in 2016 to remove impervious playground surface and install a stormwater management system with a rain garden and native plants. The project has been completed and serves as a demonstration and outdoor learning space for students and the community. AMY Northwest middle school, located in the Roxborough neighborhood, is also developing plans for a greener schoolyard. In 2016, Saul High School created a 501(c)(3) as a mechanism to acquire funding for projects identified in the school master plan as detailed in Section 4.2.2. PWD began collaborating with Saul and other stakeholders in 2018 to facilitate the implementation of BMPs to reduce sediment, pathogen, and nutrient loading in the Schuylkill watershed. Construction of BMPs at Saul began in 2019 and will continue into 2020. These schools and community spaces in Manayunk and Roxborough will serve as demonstrations of source water protection and stormwater management for the students and surrounding community.

Progress has also been made in the Roxborough neighborhood to implement green stormwater infrastructure to control the quantity and improve the quality of stormwater draining into the Wissahickon Creek. Initial concepts for Roxborough's Pocket Park project resulted from the Roxborough 2020 Initiative, a comprehensive stakeholder engagement and strategic planning process led by the Roxborough Development Corporation (RDC). The project transformed an unused asphalt parking lot on Ridge Avenue into a multi-purpose green space with social, economic, and environmental benefits. The remediation of impermeable pavement and the installation of a green stormwater infrastructure system works to improve stormwater runoff quality entering the Wissahickon Creek and ultimately the Schuylkill River. In 2016 the first phase of the project was completed with the installation of 14 evergreen and deciduous trees, 33 shrubs, and mulch for planting beds. In 2017 the second phase of the project began, which included site preparation activities such as excavating and grading the site for the installation of permeable pavers, plantings, rain gardens, and flower beds. In 2017, PWD worked with the Roxborough Development Corporation (RDC) and Mural Arts Program to commission artist and Roxborough native, Paul Santoleri, to develop a water and history themed mural at the site. The project was completed in 2018 and a ribbon-cutting ceremony was held to celebrate the space's addition to the Roxborough community.

In 2019, PWD awarded \$13,551 through the SRRF toward a depaving project at the Cook-Wissahickon School. A K-8 public school in northwest Philadelphia, the Cook-Wissahickon School is about one quarter mile upstream of the confluence of the Wissahickon Creek and Schuylkill River. The depaving project includes a total area of 9,000 square feet around and under play equipment, with installation of porous playground surfaces. Trees will also be planted along the fence line, a butterfly garden with native plants will be installed, as will

educational signage. The project also includes development of environmental education lesson plans and printed materials for an annual public outreach event.

4.5 Additional 2019 Highlights

4.5.1 Outreach to Watershed Community

On September 13, 2019, PWD and the Schuylkill Action Network (SAN) hosted a tour of Philadelphia-area green stormwater infrastructure projects in the Schuylkill River watershed. The tour included stops at green stormwater management projects throughout Montgomery County, including several stormwater retention basins and rain gardens.

PWD participated in the SAN Annual Meeting on December 10, 2019. The meeting drew approximately 80 watershed partners to participate in a day of presentations and discussion, focused largely on accomplishments achieved over the course of the past year. Attendees also participated in an hour-long group strategic planning session. See Appendix D for presentations from the annual meeting.

4.5.2 Ecological Restoration Group

The Ecological Restoration Group at PWD has implemented several projects that manage stormwater and restore stream banks throughout the Wissahickon Creek Watershed, upstream of the Queen Lane WTP intake on the Schuylkill River. Most recently, a stream channel improvement project was implemented at Gorgas Run, a tributary to the Wissahickon Creek. This project will stabilize the stream banks, reduce erosion and prevent large amounts of sediment from being carried downstream. Additional projects include the development of conceptual plans for stormwater wetland sites, similar to those implemented at Wisers Mill Run and Saylor Grove.

5.0 2019 Watershed Control Plan

5.1 Watershed Control Plan Project Summary

PWD continues to be a part of many projects and partnerships that support the WCP. Below is a summary of the action items PWD committed to as WCP deliverables and the progress made. The UV installation projects upstream of the Queen Lane intake at Upper Gwynedd WWTP and Fleetwood WWTP, which PWD has followed through publicly available information, are both fully operational, as previously noted within Annual Status Reports. PWD contributed to the SRRF, which awarded grants to support both the designation of protected areas and construction of best management practices at a 78-acre farm property in the Schuylkill River Watershed in 2019. Geese were removed and nests and eggs treated at Fairmount Park properties and PWD facilities. The WCP accomplishments in 2019 are summarized in Table 6-1.

Table 6-1: WCP Project Progress Summary

WCP Project Type		Project Description	Status
2013	WWTP Upgrade	UV installation at Upper Gwynedd WWTP	Complete
	WWTP Upgrade	UV installation at Fleetwood WWTP	Complete
	Farm BMP	Manure storage basin at Havens Farm	Complete
	Farm BMP	Manure storage basin at Leid Farm	Complete
	Nutrient Management Plans	4 Comprehensive Nutrient Management Plans	Complete
	Riparian Buffer Planting	Shawmont Waterfront Restoration Project	Complete
	Waterfowl management	Geese removed and eggs treated at Fairmount Park properties and PWD facilities 2013	Complete/ Ongoing
2014	Farm BMP	Manure storage basin at Martin Farm	Complete
	Farm BMP	Manure storage basin at A. Zimmerman Farm	Complete
	Nutrient Management Plans	1 Comprehensive Nutrient Management Plan	Complete
	Riparian Buffer Planting	--	Complete
	Waterfowl management	Geese removed and eggs treated at Fairmount Park properties and PWD facilities 2014	Complete/ Ongoing
2015	Farm BMP	Manure storage basin at Donald Rice Farm	Complete
	Farm BMP	Manure storage basin at Dalton Biehl Farm	Complete
	Nutrient Management Plans	12 Comprehensive Nutrient Management Plans	Complete
	Riparian Buffer Planting	--	Complete
	Waterfowl management	Geese removed and eggs treated at Fairmount Park properties and PWD facilities 2015	Complete/ Ongoing
2016	Farm BMP	Manure storage basin at Zettlemoyer Farm	Complete
	Farm BMP	Manure storage basin at Durkin Farm	Complete
	Nutrient Management Plans	29 Comprehensive Nutrient Management Plans	Complete
	Riparian Buffer Planting	--	Complete
	Waterfowl management	Geese removed and eggs treated at Fairmount Park properties and PWD facilities 2016	Complete / Ongoing
2017	Farm BMP	Manure storage basin at Youse Farm	Complete
	Farm BMP	Riparian buffer plantings at Irish Creek property	Complete
	Nutrient Management Plans	36 Comprehensive Nutrient Management Plans	Complete
	Riparian Buffer Planting	---	Complete
	Waterfowl management	Geese removed and eggs treated at Fairmount Park properties and PWD facilities 2017	Complete/ Ongoing
2018 WCP Completion Requirement Check	WWTP Upgrades	Track UV Installation at 2 plants	Complete
	Farm BMPs	2 Sites encompassing several BMPs	Complete/ Ongoing
	Nutrient Management Plans	Nutrient Management Plans - 8	Complete
	Riparian Buffer Planting	Sites - 1	Complete
	Waterfowl management	Years - 6	Complete/ Ongoing
2019 WCP Completion	WWTP Upgrades	Track UV Installation at 2 plants	Complete
	Farm BMPs	2 Sites encompassing several BMPs	Complete/ Ongoing

Nutrient Management Plans	Nutrient Management Plans - 8	Complete
Riparian Buffer Planting	Sites - 1	Complete
Waterfowl management	Years - 7	Complete/ Ongoing

* There is an alteration to the original PADEP-approved timeline. In the first three years of the WCP implementation, PWD decided to contribute to a second manure storage basin project instead of a vegetated buffer at a farm.

In 2016, PWD received approval from the PADEP to support the implementation of a manure storage basin or a riparian buffer at 10 different farms in the watershed. This was an adjustment from the initial WCP, which required five manure storage basins and five riparian buffers at a total of 10 different farms. The letter requesting the adjustment and the approval letter are included in Appendix F.

The SRRF is the primary vehicle through which PWD can support projects on farms with the needed expertise and matching funds from partners. The partners, NRCS, Berks Nature and the Berks County Conservation District, take a holistic approach when implementing BMPs to control animal waste and stormwater on a farm choosing a combination of BMPs that address all nutrient and stormwater management issues. The BMPs typically include manure storage solutions, stormwater management, a riparian buffer for stream reaches on the property, and other best management practices. Many of the farms entering into contracts for BMP projects do not have streams and riparian corridors directly on the property. However, this does not make manure and stormwater management less important on the site. With earthen lagoons as manure storage basins, the stormwater and groundwater are at risk of contamination. If groundwater on the site becomes contaminated, the karst and limestone geology in the Berks County area, which allows groundwater to move quickly underground, makes nearby surface waters vulnerable to contamination. PWD considers both manure storage basins and riparian buffers on farms in Berks County essentially equal in benefit to the watershed and will support the BMPs recommended by the expertise of SAN partners. To date, manure storage has been most critical at the priority farms identified for funding by SAN partners.

6.0 Expectations for 2020

Although the second round of LT2 compliance sampling resulted in an average *Cryptosporidium* concentration within 'Bin 1' range, the Queen Lane intake will remain a 'Bin 2' facility based on the results from the first round of compliance sampling as mandated by PADEP regulations. The PWD Queen Lane Water Treatment Plant will continue to employ options from the 'Microbial Toolbox' including achieving individual and combined filter effluent performance requirements to maintain in compliance with LT2 regulations. Additionally, PWD will continue ongoing initiatives outlined in the WCP through its existing Source Water Protection Program framework.

In 2020, PWD will continue to maintain programs and activities that allowed it to accomplish its LT2 goals as outlined in the WCP. These include continuing to address WWTP effluent, agricultural land runoff, and animal vectors as priority sources of *Cryptosporidium*, as well as expanding education and outreach in the watershed through SWPP initiatives. It also includes completing WCP actions that specifically reduce *Cryptosporidium* the watershed. Specific focus will continue to be on the following:

- Continued partnership with SAN and PDE for project facilitation and collaboration
- Continued support for research surrounding *Cryptosporidium* in Philadelphia source water and collaboration with Lehigh University.
- Continued funding toward SAN administration and the SAN Coordinator position
- A \$100,000 contribution to SRRF for 2020 project grants
- Involvement with the SAN Pathogens and Point Source Workgroup to track wastewater discharge related changes in the watershed
- Involvement with the SAN Agriculture Workgroup to identify and contribute to agricultural BMP and CNMP implementation in the watershed
- Geese management at Fairmount Park properties and PWD facilities

PWD also intends to expand Watershed Control Program Plan efforts into the Delaware River watershed and formalize these efforts in the forthcoming 2020 Watershed Control Program Plan Update.

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Appendix A: 2016-2020 SAN Strategic Plan



Schuylkill Action Network
Strategic Plan
2016-2020

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SAN Drinking Water Protection History

Following the passage of the Clean Water Act and the Safe Drinking Water Act in the early 1970s¹, we started to think very differently about our rivers and streams and how they impact our daily lives. The Schuylkill River, which was once seen as a place to dispose waste, is now a vital resource for our quality of life. As the largest single tributary and source of fresh water to the Delaware River, the Schuylkill River is also an important component of the Delaware Estuary. The river provides opportunities for recreation, helps to meet our energy needs, and is a major source of freshwater to the Delaware Estuary, a major economic driver for the region. However, one of its most important benefits is something we all rely on every day, drinking water.

More than 2 million people get their drinking water from the river and streams in the Schuylkill watershed, making protecting it a very important goal for water suppliers. Over a decade ago, the Philadelphia Water Department (PWD) embarked on a very ambitious effort to identify and prioritize all of the potential pollution threats to the Schuylkill River, which provides about half of the city's drinking water. This process led to the creation of a protection plan for the river, laying out a roadmap for addressing these threats. One of the primary goals of this plan was to create a mechanism for regional coordination across geographic, regulatory, and jurisdictional boundaries. The Schuylkill Action Network (SAN) was created shortly thereafter to help accomplish this goal. The SAN takes a watershed-wide approach to protecting drinking water sources by partnering with upstream communities, other regional water suppliers, businesses, governments, and watershed protection groups.

Strategic Plan Background

Since its inception, the SAN has regularly produced a Strategic Plan to help guide the network's future growth and direction. The SAN 2016-2020 Strategic Plan (the "Plan") was developed through an effort of the SAN Planning Committee to serve as a guide for the next five years. The Plan was informed by the SAN's original goals and purposes, past priorities and long-term agenda items, as well as the current and ongoing work of its various workgroups, committees, and partners.

¹ The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The basis of the CWA was enacted in 1948 and was called the Federal Water Pollution Control Act, but the Act was significantly reorganized and expanded in 1972. "Clean Water Act" became the Act's common name with amendments in 1972. <http://www.epa.gov/laws-regulations/summary-clean-water-act>.

The Safe Drinking Water Act (SDWA) was established in 1974 to protect the quality of drinking water in the U.S. This law focuses on all waters actually or potentially designed for drinking use, whether from above ground or underground sources. <http://www.epa.gov/laws-regulations/summary-safe-drinking-water-act>

The SAN facilitated a variety of processes for gathering new input from partners and watershed stakeholders during the strategic planning update process. Early in 2015, the Planning Committee and Executive Steering Committee (ESC) initiated the planning process by identifying key themes for the new plan. During the summer of 2015, the Planning Committee held regional strategic planning listening sessions in Reading and Philadelphia and engaged members online through a webinar meeting. Several online surveys developed for water suppliers, recreational users, and the general public were distributed throughout the watershed to garner additional input. In total, over 300 SAN partners and stakeholders provided responses. All solicited feedback was organized by the SAN Planning Committee and incorporated into new strategies and objectives which are reflected in the Plan below.

The Plan is a tool crafted to guide and coordinate the SAN’s work over the next five years and to communicate the SAN’s intentions to the surrounding community of partners, potential partners, and funders. Planning is a fluid process and this plan was designed to be regularly revisited – and revised – as needed as part of the work planning process. The Plan is supported and further detailed by the yearly workplans for each SAN workgroup/committee.

The SAN is a voluntary partnership dedicated to meeting its mission and vision for the Schuylkill River. The deadlines, actions, and commitments of this Plan are subject to the availability of sufficient resources and funding to carry them out. The SAN leadership will periodically review the progress of the Plan, make adjustments as needed to reflect the latest priorities, needs and available resources, and continue to work toward the vision and mission of the SAN at an efficient and feasible pace.

Overview of SAN Strategic Goals

Strategic Goal	Workgroup / Committee Responsible
<p>To advance drinking water and watershed protection for the Schuylkill River and its tributaries by facilitating communication and decision making on a regional, state, and federal level.</p> <p>Work collaboratively to ensure the availability of resources, expertise, and commitments to support the work.</p>	Executive Steering Committee
<p>Focus efforts on improving watershed management, especially activities that will enhance the quality and flow of Schuylkill waters for the protection of public health and aquatic resources.</p> <p>Create and maintain an effective network that maximizes the resources of its membership to protect and restore the Schuylkill watershed.</p>	Planning Committee
<p>Maximize reduction and/or treatment of abandoned mine drainage discharges.</p>	Abandoned Mine Drainage (AMD) Workgroup
<p>Maximize reduction and/or prevention of agricultural impacts to water quality.</p>	Agricultural Workgroup
<p>Improve public support for watershed protection actions.</p>	Education & Outreach Workgroup

Engage recreational users of the watershed in activities that lead to increased awareness and advancement of watershed protection and restoration strategies.	Recreation Workgroup
Facilitate and strengthen communication and coordination among regulatory agencies, downstream water users, and basin stakeholders regarding point source compliance programs and drinking water protection strategies.	Pathogens/Compliance Workgroup
Maximize reduction and/or prevention of stormwater runoff pollution.	Stormwater Workgroup
Promote a sustainable landscape in the Schuylkill River watershed through strategic conservation and efficient land resource use to protect the integrity of water supplies for future generations.	Watershed Land Protection Collaborative Workgroup

Vision

The Schuylkill watershed is a healthy ecosystem and a foundation for a thriving network of communities in southeastern and central Pennsylvania. It is the largest source of fresh water to the Delaware River and an important natural resource of the Delaware Estuary. Residents recognize themselves as citizens of the watershed and they value its unique cultural and natural resources. Reflecting this common value, residents, businesses, non-profit organizations, and governments actively work to address current and past threats to drinking water sources and watershed health while working to protect these natural resources from new stress. Members of the Schuylkill Action Network share information, expertise, and technology to help each other achieve this shared vision of clean water and a healthy environment for the Schuylkill River and its tributaries. Management practices, restoration efforts, and protective measures are implemented using a sustainable source of funding to improve and protect the water resources and water quality of the Schuylkill River watershed.

Mission

The mission of the Schuylkill Action Network is to improve water resources in the Schuylkill River watershed by working in partnership with local watershed organizations and land conservation organizations, businesses, academics, water suppliers, recreational communities, local governments, and regional, state, and federal agencies to transcend regulatory and jurisdictional boundaries in the strategic implementation of protection measures. The SAN seeks to achieve this mission through enhanced communication and collaboration and, more specifically, by working cooperatively with interested parties to:

- Support existing efforts and implement actions to restore and protect water quality in the Schuylkill River watershed;
- Promote the long-term coordinated stewardship and restoration of the watershed and educate others regarding their roles in protecting the watershed and water supplies;
- Transfer the experience and lessons learned to other communities; and
- Enhance intergovernmental communication and coordination by working together on the identification and resolution of environmental issues with shared regulatory responsibility.

SAN Objectives

To improve the quality of drinking water as indicated by:

- Reduction in annual pollutant loadings to source water due to drinking water protection efforts.
- Participation of Schuylkill River water suppliers in SAN workgroups and events directly supporting utility's Source Water Protection Plans and Source Water Protection Plan goals.

To improve watershed health as indicated by:

- Increased efforts to achieve healthy and resilient aquatic ecosystems.
- Promoting the restoration of impaired stream miles and continuing to further advance the protection of stream miles through the network's many collaborative efforts and watershed strategies.

To improve public value as indicated by:

- Significant improvement in public perception of the Schuylkill River as a vital regional natural resource that should be protected.
- A return to the river by the public for the purposes of recreation, sport, and enjoyment.

Key Strengths of the SAN

Overview

During the strategic planning process, SAN members were asked to describe the services provided by the SAN that they value most. These services should be maintained and/or improved by the SAN in order to achieve a shared vision for a clean and healthy Schuylkill watershed. The following themes represent this feedback and are incorporated throughout the goals, strategies, and objectives of the SAN leadership and workgroups.

Resource

The SAN provides valuable resources and information related to the Schuylkill watershed. This has been a primary objective of the SAN since its inception, and achieved by utilizing the SAN website as a clearinghouse of information on Schuylkill-related topics, documents, reports, guides, photos, and more. Maintaining this benefit of the SAN is important for the watershed community and is embedded as a key element of the strategies for the next 5 years. The SAN should also continue to look for additional opportunities to serve as a resource for its partners that will add value to the shared work throughout the watershed.

The SAN's key strengths as a resource include being:

- A leading source for information on watershed related issues or materials;
- Supportive, and possessing a high level of watershed knowledge and expertise;
- A resource for assisting partners in obtaining funding necessary to complete their priority projects. For example: partners submit many multi-organizational grant applications, focus on sub-award projects coordinated by the Partnership for the Delaware Estuary, and provide letters of support for SAN priority projects.

Networking and Collaboration

One of the primary goals of the SAN is to serve as a platform for individuals, organizations, agencies, utilities, schools, businesses, and others to come together to share resources, information, and strategies that improve the health of the watershed.

The SAN's key strengths in networking/collaboration include:

- Effective collaboration with partners;
- Welcoming and engaging members;
- Strategically planning events and meetings;
- Bringing together a variety of stakeholder groups. For example: environmental nonprofits, water utilities, and governments;
- Having geographical diversity among its partners;
- Continuously developing the SAN and including new members/partners;
- Providing professional connection and networking.

Issue-focused Action

The SAN is largely structured around issue-driven workgroups, tasked with addressing the most pressing problems in the watershed. This approach is valued by SAN partners in that it represents a prioritized approach and leads to high quality projects. In the strategic plan, strategies have been developed to ensure that issue-driven work continues and is expanded when possible.

The SAN's key strengths in maintaining issue-focused action include:

- The SAN's focus on many different aspects of water, while maintaining a central emphasis on watershed health and clean and safe drinking water;
- Linking together drinking water, waste water, recreation, societal issues, and economics;
- Defining clear objectives;
- Taking proven approaches to solving problems;
- Identifying tools to protect and restore the watershed.

Watershed Improvements

The SAN has positively impacted the environmental conditions of the watershed, as well as communities in the watershed, despite limited money, resources, and staff. This is especially highlighted in the Agricultural and Abandoned Mine Drainage workgroups where water quality improvements are very noticeable. Throughout this strategic plan, the SAN will focus on achieving watershed improvement results.

The SAN's key strengths in achieving watershed improvements include:

- Fostering positive environmental change;
- Positively impacting communities in the watershed;
- Clearly communicating what progress looks like to its members;
- Achieving goals despite limited money, resources, and staff;
- Identifying tools to protect and restore the watershed.

Education and Outreach

The SAN works to integrate education in many of its watershed restoration and protection goals. In addition to maintaining an Education and Outreach Workgroup, the SAN strives to implement actions that increase the understanding of and affinity for the Schuylkill Watershed across all of its work. Education and outreach is also a key focus in many of the SAN's partners' missions. When possible, education and outreach should be further embedded throughout SAN initiatives and projects with the goal of increasing public awareness and care for the watershed.

The SAN's key strengths in education and outreach include:

- Making the connection between upstream and downstream waters;
- Including strong, clear messages about clean water in outreach materials;
- Creating and managing the Schuylkill Action Students program.

Data and Monitoring²

In order to advance the restoration and protection efforts of the SAN, it is important to document the extent and impact of activities. This is largely accomplished through water quality monitoring efforts. Data collection and monitoring is a key element of many SAN workgroup strategies. The SAN will work to acquire resources for monitoring and to connect local monitoring activities with larger regional monitoring and data collection and modeling efforts. A primary goal of the SAN will be to provide a mechanism for sharing data among partners to

² In the previous strategic plan, data and monitoring was listed as a separate team. The SAN is now integrating basin-wide monitoring through the Delaware River Watershed Initiative.

assist in identifying priority areas for program implementation, reducing contamination, and protecting public health.

The SAN's key collaborative monitoring and data collection efforts include:

- Abandoned mine drainage monitoring efforts completed by the Schuylkill Headwaters Association, Schuylkill Conservation District, United States Geological Survey, and the Army Corps of Engineers.
- Agriculture monitoring efforts by the Delaware River Watershed Initiative (DRWI).
- Conservation monitoring efforts by the DRWI

Additional monitoring strategies of the SAN include:

- Provide guidance and support to workgroups for determining and measuring workgroup objectives.
- Provide guidance and support to the SAN partners for integrating watershed monitoring information into the SAN website and other outreach tools.
- Support the maintenance of key monitoring stations, such as the USGS gauge station at Norristown and other USGS gauge stations located upstream of drinking water intakes.
- Coordinate watershed monitoring and analysis needs with current or new initiatives through the Delaware River Watershed Initiative and with the Academy of Natural Sciences.
- Support water suppliers in their efforts to better coordinate and share water quality data and information.
- Encourage the involvement of colleges and universities in helping the meet additional monitoring needs in the Schuylkill River watershed.
- Identify opportunities and provide support for connecting data and monitoring activities of the Delaware Valley Early Warning System with SAN watershed outreach and planning efforts.

Water Suppliers

Since the inception of the SAN, the SAN has been actively involved in water suppliers' source water protection planning and implementation efforts.

The SAN should continue to:

- Maintain and update the water suppliers list on the SAN website.
- Share relevant information with the water suppliers listserv.
- Participate in water supplier source water protection meetings.

EXECUTIVE STEERING COMMITTEE

TO ADVANCE DRINKING WATER & WATERSHED PROTECTION FOR THE SCHUYLKILL RIVER & ITS TRIBUTARIES BY FACILITATING COMMUNICATION & DECISION MAKING ON A REGIONAL, STATE, & FEDERAL LEVEL;

&

BY WORKING COLLABORATIVELY TO ENSURE THE SAN HAS THE NECESSARY RESOURCES TO SUPPORT ITS WORK.

Objectives

1. *Leadership* - Provide leadership on issues, policies, and practices influencing drinking water and watershed protection.
2. *Visioning* - Increase the SAN's ability to advance a progressive agenda by communicating opportunities, challenges, and needs.
3. *Collaboration* - Facilitate collaboration among public and private interests in drinking water protection. Work to secure strategic partnerships with public and private entities to support restoration and protection efforts.
4. *Sustainable Operational Funding* - Support the investigation and acquisition of resources needed to meet the operational needs of the SAN.

Strategy

The SAN Executive Steering Committee (ESC) provides support, leadership, and oversight of the overall goals and objectives of the network, working to collaborate on strategies and practices that will advance the SAN's primary mission of drinking water protection while supporting efforts to connect this work to other water resource protection needs. The ESC provides direction to the SAN from a regional, state, federal, and utility perspective. The ESC is represented by members of Pennsylvania Department of Environmental Protection, U.S. Environmental Protection Agency, Delaware River Basin Commission, Philadelphia Water Department, the Partnership for the Delaware Estuary, and the Schuylkill River Heritage Area. The ESC will work together to prioritize and articulate strategies that encourage the above agencies and organizations to strengthen their commitment to the restoration and protection goals of the SAN for the Schuylkill River watershed. Over the next 5 years, the ESC will explore the engagement of 3-5 new strategic partners from among public and private entities to support the restoration and protection of the Schuylkill River. The ESC will assist with the facilitation of strategic planning and goal setting in for the SAN and approve updates to the SAN Strategic Plan on at least a 5-year cycle. The ESC will provide guidance on decision making and prioritization for investments of agency/organizational time to meet the objectives of the SAN and its Strategic Plan. The ESC will provide guidance to the SAN workgroups, when needed, to prioritize work and set goals for achieving its overall mission.

PLANNING COMMITTEE

FOCUS EFFORTS ON IMPROVING WATERSHED MANAGEMENT, ESPECIALLY ACTIVITIES THAT WILL ENHANCE THE QUALITY AND FLOW OF SCHUYLKILL WATERS FOR THE PROTECTION OF PUBLIC HEALTH AND AQUATIC RESOURCES.

&

CREATE AND MAINTAIN AN EFFECTIVE NETWORK THAT MAXIMIZES THE RESOURCES OF ITS MEMBERSHIP TO PROTECT AND RESTORE THE SCHUYLKILL WATERSHED.

Objectives

1. Secure funding of \$500,000 per year or more to support watershed restoration/protection and partnerships, with at least 50% coming from sustainable sources.
2. Increase the number of participants contributing to the Schuylkill River Restoration Fund each year.
3. Maintain operational funding necessary for the day to day operations of the SAN.
4. Redesign the SAN website to better serve the needs of workgroups, partners, and the general public.
5. Increase the participation and diversity of the SAN membership.
6. Oversee the development of a Recreation Workgroup and strategic plan element until it becomes established.
7. Serve as a facilitator for improving the processes that guide restoration and protection efforts in the Schuylkill River watershed.
8. Provide guidance and take action to remove barriers that impede watershed restoration and protection.

Strategy

In order for the SAN to achieve long-term success in restoring and protecting the health of the Schuylkill watershed, it is important that the Planning Committee continues its focus on maintaining the health of the network, providing guidance and resources to SAN partners for workgroup priorities. Since its creation in 2003, the SAN has successfully developed a system of prioritizing and implementing projects that advance drinking water protection in the watershed. In doing so, the SAN has been able to establish itself as a leader in the watershed and provide a forum for communicating and advancing discussions on activities that impact the watershed's natural resources. Over the next five years, the SAN must continue to secure resources for the watershed; create opportunities for networking and collaboration; maintain focus on the most pressing watershed issues; lead watershed outreach; and advance the goal of achieving watershed protection and improvements.

In order to maintain network health and promote a progressive drinking water protection agenda for the Schuylkill watershed, the SAN Planning Committee will work to secure resources, facilitate communication among its partners, and eliminate barriers to better watershed management. The Planning Committee will continue the goal of acquiring both sustainable funding for watershed implementation projects, as well as securing long-term funding to cover the operational expenses of the network. The Planning Committee will look for opportunities that will leverage resources and provide positive outcomes in priority watersheds that align with both the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA).

The Planning Committee will continue to create opportunities that engage watershed stakeholders and encourage the sharing of information and resources throughout the network. This includes working collaboratively with the Education and Outreach Workgroup to redesign the SAN website. Also, through the various SAN outreach channels, including the SAN website and social media sites, workgroup and network-wide meetings, and SAN publications, the Planning Committee will direct needs-driven information and resources to its members.

The Planning Committee will focus specifically on the following strategies:

1. Continue to strengthen the SAN communication infrastructure to maintain active communication among SAN members (website, social media, newsletters, and meetings) and provide more needs-focused support to SAN workgroups.
2. Implement elements of the SAN Fundraising Strategy, securing both public and private funding for SAN priority projects, with a goal of establishing an annual fund of \$500,000.
3. Investigate new fundraising strategies for the SRRF and operational SAN funding.
4. As needed, convene meetings of a Watershed Practices Implementation Committee with the goal of examining the processes and policies that guide watershed management and developing and presenting strategies that improve them (See Appendix C).
5. Support SAN partners as they continue their assessment of the impacts of climate change on the Schuylkill River watershed and Delaware Estuary and identify linkages between workgroup activities and climate change adaptation recommendations.
6. Provide support to SAN workgroups in projects that engage municipalities and water utilities in watershed restoration, protection, and planning.
7. Work cooperatively with SAN partners to encourage and support regional collaborative watershed planning efforts that integrate the Clean Water Act and Safe Drinking Water Act programs.
8. Support drinking water protection activities within the City of Philadelphia, including education and outreach projects, planning initiatives, and other relevant endeavors, and disseminate information to upstream communities.
9. Engage recreational users in the SAN through events, projects, and the establishment of a new Recreation Workgroup; increase awareness of need for protection efforts among the users of the River.
10. Continue to integrate SAN's connection with the Delaware River Watershed Initiative through both the Middle Schuylkill and Schuylkill Highland's clusters, as well as through watershed-wide efforts of this initiative.
11. Continue to support partners and leverage funding by providing letters of support.
12. Explore the feasibility of developing a *State of the Schuylkill* report to effectively communicate water quality improvements and conditions in the watershed.
13. Consider the relationship of flow and water quality as it relates to SAN Goals.
14. Coordinate with the Partnership for the Delaware Estuary (PDE) on its freshwater mussel recovery program.

ABANDONED MINE DRAINAGE (AMD)

MAXIMIZE REDUCTION AND/OR TREATMENT OF ABANDONED MINE DRAINAGE DISCHARGES.

Objectives

1. Reduce surface water infiltration into the Pine Knot mine-pool to lessen discharge.
2. Reduce legacy coal silt from streams.
3. Remediate AMD pollution for Pine Knot/Oak Hill mine pool complex.
4. Remove 92 tons of iron, 6 tons manganese, 7 tons aluminum annually from discharges and streams.
5. Improve the pH of mine discharges/streams to pH 6.0 or above as needed to support fisheries and aquatic life.
6. Convert 15 miles of streams to healthy habitat to support fisheries and aquatic life over the next 5 years.
7. Increase partner participation so at least two or more partners are actively involved in every AMD project.
8. Complete 5 AMD remediation projects over the next 5 years.
9. Maintain existing AMD projects so they continue to function properly in removing metals and improving pH.

Strategy

Abandoned Mine Drainage (AMD) is one of the primary sources of pollution in the headwaters of the Schuylkill River and the biggest source of metals downstream. It is responsible for 24% of water quality impairments in the watershed. AMD is created deep below the ground in abandoned mines where streams, groundwater and stormwater fill tunnels that were once kept dry by active pumping operations. Water and oxygen react with lingering iron sulfide (pyrite) producing metal-laden and sometimes highly acidic discharges that exit the tunnels in telltale orange and silver plumes, easily visible in regional surface waters. AMD interferes with vegetative growth and reproduction of aquatic animals by armoring the streambed with deposits of iron and other metals. Acidity and metals impair both surface and ground drinking water resources and quickly corrode pipes and industrial mechanisms. Legacy mining also causes sediment pollution as silt from coal refuse piles flows into nearby creeks and streams.

Over the next five years, the AMD Workgroup will continue to implement projects that reduce the impact of legacy mining practices on the water quality of the Schuylkill River. The workgroup will target priority discharges by designing and constructing AMD treatment systems with the most current treatment technologies; implementing projects that keep unpolluted water clean by reducing surface water infiltration into mine pools; and assisting with projects that utilize best practices for mine land reclamation, including programs that promote reclamation through reforestation. The workgroup will also work to direct new investments into their work, largely by securing resources from the PA Department of Environmental Protection's Title IV Set-Aside Program. The workgroup will explore options for utilizing this funding to construct a treatment system for the Oak Hill/Pine Knot discharge, the most pressing AMD issue in the Schuylkill watershed.

The workgroup will also improve stream habitat, which will result from AMD abatement work and in-stream habitat improvements. The workgroup will continue to assess the impact of their activities through project tracking, biological and chemical monitoring, and ongoing oversight of existing and future treatments systems. The workgroup will maintain and strengthen relationships with all stakeholders, including government agencies, landowners, mining operators, NGO's, and local governments.

The AMD Workgroup will focus specifically on the following strategies:

1. Implement elements of the West Branch Qualified Hydrologic Unit Plan (QHUP) and utilize Abandoned Mine Land (AML) set-aside funding and implement projects under this program.
2. Construct treatment system(s) to address metals and pH loading from the Oak Hill/Pine Knot Mine pool.
3. Investigate completion of additional QHUPs for additional stream reaches impacted by AMD.
4. Maintain focus on reducing surface water infiltration into the Pine Knot Mine pool, working with partners to identify the best opportunities for implementing projects.
5. Implement in-stream restoration practices that will improve habitat for fisheries and aquatic life.
6. Promote, support, and demonstrate best practices for mine land reclamation, focusing on techniques promoted by the Appalachian Regional Reforestation Initiative (ARRI).
7. Continue to assess and address AMD treatment system maintenance needs.
8. Continue to monitor the impact of AMD treatment systems in the watershed.
9. Provide support to the SAN Planning Committee as it works to address the gaps and barriers in local, regional, state, and national processes that focus on issues related to AMD and legacy mining impacts on source water.

AGRICULTURE

MAXIMIZE REDUCTION AND/OR PREVENTION OF AGRICULTURAL IMPACTS TO WATER QUALITY.

Objectives

1. Rehabilitate and/or buffer 5 miles (26,000 feet) of streams over the next 5 years.
2. Through the Berks County Conservation District and Berks Nature, complete 20 conservation and nutrient management plans annually.
3. Through Natural Resource Conservation Services (NRCS), complete 25 conservation plans (2,500 acres) annually.
4. Monitor water quality (quarterly) and aquatic life (annually) of streams downstream of completed agriculture restoration projects.
5. Through the NRCS, complete 15 Comprehensive Farm Management plans over the next 5 years.
6. Advance restoration goals of the Middle Schuylkill Implementation Plan as part of the Delaware River Watershed Initiative (DRWI).
7. Create and continue to populate database of farm best management practices (BMPs) completed in Berks County.
8. Evaluate impact of agriculture BMPs on stream health and communicate results to the watershed community.
9. Develop and maintain involvement in funding programs and initiatives to support current and future agriculture restoration activities.

Strategy

Agricultural runoff is a primary source of pollution in streams and rivers in the Schuylkill watershed and is responsible for over 30% of the watershed's water quality impairments. Pollutants carried in agricultural runoff include soil, nutrients, pesticides, bacteria, and other substances, all of which may increase water treatment costs and degrade aquatic habitats. Runoff from animal operations can contain manure, depositing high nutrient values and potentially disease-causing bacteria and pathogens into the local waterways. Nutrients cause excessive plant growth and algae blooms in waterways, which deplete the water of dissolved oxygen as the plant materials die. The presence of pathogens in source water may increase the cost and complicate the processes of downstream drinking water treatment.

Over the next five years, the Agriculture Workgroup will complete projects that reduce the impact of agriculture runoff on drinking water sources in the Schuylkill watershed. Through a collaborative approach, the workgroup will engage key partners and watershed stakeholders in the strategic implementation of agriculture BMPs, conservation and nutrient management plans, and progress monitoring. To accomplish the above agenda, the workgroup will identify and secure resources; support and help guide decisions on agriculture related programs; and continue to work with and strengthen its relationship with farmers, water utilities, and local watershed and conservation organizations.

The workgroup will also advance efforts of the DRWI, working to complete key elements of the Middle Schuylkill Cluster implementation plan. The workgroup will monitor the impact of its investments by regularly monitoring water quality of agriculture impacted streams. The workgroup will also catalogue all BMP projects completed that are contributing to improvement in the watershed.

The Agriculture Workgroup will focus specifically on the following strategies:

1. Continue to update and map priority farms for workgroup assistance.
2. Continue to maintain focus on BMP implementation on farms in priority subwatersheds that will have the greatest impact on improving drinking water sources.
3. Identify and secure funding from new sources, including programs such as the Pennvest NPS pollution program, Schuylkill River Restoration Fund, DRWI, and others to allow for greater leveraging of farm bill appropriations in the watershed.
4. Maintain involvement with the DRWI to substantially complete agriculture restoration projects in the Middle Schuylkill Cluster.
5. Strengthen relationships with water suppliers in priority subwatersheds and pursue joint ventures for implementing BMPs on priority farms/sites.
6. Utilize resource of the Conservation Reserve Enhancement Program (CREP) in the Delaware River watershed to restore priority streamside habitat.
7. Document agriculture BMP investments and successes in the watershed, including load reduction modeling results, and promote to watershed stakeholders.
8. Report gaps and barriers in local, state and regional programs for mitigating agricultural impacts to the Planning Committee and provide support for addressing them.
9. Expand restoration activities in Lehigh, Montgomery, and Chester counties.
10. Complete and implement the Lower Maiden Watershed Implementation Plan, securing additional federal funding for agriculture restoration in this area.
11. Continue to support and share data and other pertinent water quality and project information with Philadelphia Water Department and other water suppliers in support of their watershed planning efforts associated with the Long Term 2 Enhanced Surface Water Treatment Rule (LT2)/ Watershed Control Plan.

EDUCATION AND OUTREACH

IMPROVE PUBLIC SUPPORT FOR WATERSHED PROTECTION ACTIONS.

Objectives

1. Redesign and enhance the SAN website to better serve the needs of workgroups, partners, and the general public.
2. Increase engagement of the watershed community through social media (Facebook, Twitter, and Instagram) by 50% in 5 years (500 new combined followers).
3. Improve public perception of and/or connections with the Schuylkill watershed.
4. Post project descriptions, pictures, and/or videos on the SAN website for every completed workgroup project.
5. Increase media coverage of SAN events, projects, and activities (10 media hits per year).
6. Increase applicants for the Schuylkill Scholastic Drinking Water Awards program.
7. Increase number of cleanups, volunteers, and trash removed from the watershed through the *Schuylkill Scrub* initiative (700 cleanups over 5 years).
8. Develop a litter sampling protocol for *Schuylkill Scrub* volunteers to conduct and track types of litter found throughout the watershed.

Strategy

One of the most important aspects of ensuring the long-term protection of the Schuylkill watershed is raising awareness as to the resources it provides to residents. In the Schuylkill watershed, residents are accustomed to turning on a tap and receiving clean, safe drinking water, with little or no thought given to the source of that water or its availability. However, clean water cannot be taken for granted; polluted water is everyone's concern. Through concentrated public education and outreach efforts, people can discover how their decisions and daily actions directly impact the water they drink, the recreation they enjoy, regional wildlife habitat, human health, and sustainability for future generations. Education and outreach are necessary to raise public awareness of the problems and of the local management options to fix them. Ideally, SAN outreach efforts foster an appreciation and awareness of local water resources, inspiring stewardship and meaningful changes in the daily actions of residents.

Over the next five years, the SAN Education and Outreach (E&O) Workgroup will continue to generate the support and awareness necessary for the long-term protection and restoration of the Schuylkill watershed. To accomplish this, the E&O Workgroup will promote SAN projects and successes, watershed news and events, restoration and protection priorities, and individual opportunities for watershed action through the SAN website, social media, media outlets, and within the network. The E&O Workgroup will support the efforts of all the SAN workgroups. The E&O Workgroup will maximize these efforts, aiming to increase its reach by utilizing social media tools and resources. The workgroup will also partner more closely with the Philadelphia Water Department, advancing city-wide watershed outreach initiatives and finding opportunities to replicate them in upstream communities. The workgroup will also continue to support school-based watershed activities through its annual Schuylkill Scholastic Drinking Water awards programs and by assisting with workgroup school-based programs. The workgroup will lead engagement activities through the *Schuylkill Scrub* initiative, serving as a tool for watershed residents to take action in improving the health of the Schuylkill watershed. To accomplish the above agenda, the workgroup will identify and secure resources; support and help guide decisions on outreach-related activities; and continue to identify new opportunities for working on collaborative projects that increase watershed awareness and appreciation (such as Keep Pennsylvania Beautiful's Great American Cleanup of PA and EPA's Trash Free Waters program).

The Education and Outreach Workgroup will focus specifically on the following strategies:

1. Redesign the SchuylkillWaters.org website and continue to facilitate internal communication among SAN members, provide opportunities for online sharing of information among watershed professionals, and support public advocacy for protecting and restoring Schuylkill Waters.
2. Recognize, expand, promote, and support watershed education initiatives and schools/teachers/students as they implement water quality restoration, protection, and awareness projects.
3. Provide assistance to SAN workgroups on educational elements of their restoration and conservation activities.
4. Provide assistance to SAN Recreation Workgroup on all SAN outreach tools and messaging.
5. Maximize use of social media tools for outreach campaigns that aim to influence public perceptions/attitudes/behavior of watershed residents, encouraging them to view the watershed as a valuable resource.
6. Work with the Philadelphia Water Department to model drinking water protection education and outreach projects in the City of Philadelphia and disseminate to upstream communities for replication and collaboration.
7. Provide audience-specific education to different communities, making linkages between their community and water quality.
8. Host workgroup projects tours for specific audiences (ex. MS4 project tour to exhibit models for other municipalities to follow).
9. Develop a marketing strategy, using clear, concise, and uniform messaging.
10. Develop a simple brochure about SAN and separate brochures about each workgroup ready for partners to use and share.
11. Highlight local leaders in the watershed (farmers, teachers, township employees, etc) in outreach materials to promote and encourage replication of model watershed management practices.
12. Develop public education materials to targeted stakeholders not currently involved with the SAN and disseminate this information to watershed related/reliant business and community organizations.
13. Develop school outreach programs, including contests and games, to engage students in learning and caring about the Schuylkill watershed.
14. Assist workgroups in communicating SAN current and past accomplishments to build support from community leaders, elected officials, and corporate partners for future SAN activities.
15. Use key messaging received from feedback in the Strategic Plan General Public survey in all outreach materials.
16. Promote more citizen science involvement in PDE's freshwater mussel recovery program.

PATHOGENS AND POINT SOURCE

FACILITATE AND STRENGTHEN COMMUNICATION AND COORDINATION AMONG REGULATORY AGENCIES, DOWNSTREAM WATER USERS, AND BASIN STAKEHOLDERS REGARDING CLEAN WATER ACT AND SAFE DRINKING WATER ACT GOALS

Objectives

1. Provide educational opportunities to wastewater utilities on inflow and infiltration management, drinking water protection, and other clean water initiatives.
2. Track progress of projects addressing unsewered communities (on-lot malfunctions and wildcat sewer discharges).
3. Develop an outreach strategy to increase wastewater treatment operators' participation in the SAN.
4. Share information and facilitate discussion with wastewater and drinking water utilities on emerging contaminants and watershed issues.
5. Characterize conditions and treatment technologies of wastewater treatment plants (WWTPs) in the Schuylkill watershed (e.g. UV treatment for *Cryptosporidium*).
6. Track Act 537 Planning initiatives throughout the watershed.

Strategy

Over the next five years, the SAN Pathogens and Point Source Workgroup will maintain the current level of coordination and communication provided by wastewater treatment compliance practitioners, identifying opportunities to improve compliance and reduce threats to downstream water suppliers and other river users. The workgroup will maintain a focus on reducing illegal discharges, supporting and promoting the Delaware Valley Early Warning System (EWS), and supporting planning efforts aimed at reducing pathogen introduction in the watershed. Additionally, the workgroup will also provide assistance in coordinating support for increased pathogen monitoring efforts in the watershed.

The SAN Pathogens and Point Source Workgroup will focus specifically on the following strategies:

1. Promote funding opportunities, such as Pennvest, to wastewater and drinking water utilities.
2. Utilize the permit and compliance process to minimize discharges from wastewater treatment and encourage/require upgrades.
3. Implement a strategy to address any remaining and unidentified wildcat sewers.
4. Improve discharger/water supplier communication of events through use of the Delaware Valley EWS to minimize water quality threats to the Schuylkill River.
5. Assist the Philadelphia Water Department in the implementation of their LT2 Watershed Control Program Plan for the Queen Lane intake.
6. Support efforts that provide wet weather and inflow and infiltration management education to WWTP operators.
7. Explore options to improve monitoring at strategic locations in the watershed: downstream of point sources that could influence the water quality profile at drinking water intakes.
8. Characterize conditions of WWTPs in the Schuylkill watershed through Philadelphia Water Department's Sanitary Survey.
9. Continue to update information on wastewater treatment technologies and systems throughout the watershed (e.g. Chapter 94 reports).
10. Investigate evolving source water issues, such as Harmful Algal Blooms (HABs) and emerging contaminants and develop a better understanding of what these issues mean for water supplier's source protection strategies.

RECREATION WORKGROUP

ENGAGE RECREATIONAL USERS OF THE WATERSHED IN ACTIVITIES THAT LEAD TO INCREASED AWARENESS AND ADVANCEMENT OF WATERSHED PROTECTION AND RESTORATION STRATEGIES.

Objectives

1. Work with the SAN Planning Committee to improve and finalize the Recreation Workgroup strategic plan section and yearly workplans.
2. Initially invite at least 25 potential partners and 5 new partners annually, to participate in the newly formed Recreation Workgroup.
3. With the Education and Outreach work group, develop and implement an outreach strategy for the recreational community along the Schuylkill River.
4. Increase recreational engagement in the watershed.
5. Implement watershed restoration projects in close proximity to high traffic recreation sites (e.g. trailheads and boat launches).
6. Improve public perception of the Schuylkill River watershed as a safe, clean, and fun place to recreate.

Strategy

Within the last decade, recreational use and access to the Schuylkill River and its tributaries has increased remarkably. In 2009, 800,000 people used the Schuylkill River Trail. In 2015, that number grew to 2 million users, an increase of 150%. Also that year, the Schuylkill River Trail was voted the "Best Urban Trail" by *USA Today*. To capitalize on this success, the SAN Recreation Workgroup will focus on changing public perspective on the Schuylkill River, underscoring its transformation from a once heavily polluted river to a significantly cleaner and safer recreational resource. The Recreation Workgroup will do this by developing an outreach strategy for the recreational community that will heavily focus on experiential learning, as well as capture cultural and heritage aspects of the waterways.

Over the next 5 years, the SAN Recreation Workgroup will increase support for protection and restoration of the Schuylkill watershed by educating recreational users about the history and progress of the Schuylkill River and the SAN. The workgroup will work with existing recreational groups, such as rowing clubs, kayaking clubs, and hiking groups, to implement an outreach strategy for the entire recreational community along the Schuylkill River. The workgroup will strategically identify opportunities for connecting restoration and conservation projects with important recreational areas in the watershed. With the Education and Outreach Workgroup, The Recreation Workgroup will develop clear, concise messaging and innovative events to connect users to watershed protection and restoration efforts.

The SAN Recreation Workgroup will focus specifically on the following strategies:

1. Collaborate with the SAN Education & Outreach Workgroup, specifically the Schuylkill River Trash Task Force, to develop citizen science litter monitoring/sampling protocols for the *Schuylkill Scrub*.
2. Promote the use of reusable water bottles instead of single-use bottles.
3. Develop simple outreach materials with clear, concise messaging about the SAN and its connection to recreation for partners to use at recreational (and other outreach) events.
4. Attend at least four recreational events a year to promote the SAN and increase membership.
5. Pilot use the Schuylkill Acts & Impacts environmental curriculum as a model for the Schuylkill Sojourn during 2016-2020.
6. Develop a webpage on the SAN website that lists recreational events/opportunities in the Schuylkill watershed.
7. Promote existing recreational events on the SAN's newly formed recreational webpage and social media sites.
8. Develop educational signage in parks, along trails, at bike and boat rentals, and at boat ramps.

9. Increase public access to the Schuylkill River and its tributaries.
10. Expand and improve connection of the Schuylkill River Trail network.

STORMWATER

IMPROVE MANAGEMENT OF STORMWATER TO REDUCE AND/OR PREVENT POLLUTION FROM RUNOFF.

Objectives

1. Complete 15 stormwater BMPs, including riparian buffer restoration projects, on priority headwater streams.
2. Conduct workshops, tours and educational events for watershed stakeholders on best practices for stormwater management.
3. Develop an outreach strategy to increase municipality participation in the SAN and encourage more watershed based collaboration.
4. Perform targeted outreach and provide support to municipalities for better stormwater management.
5. Support implementation and documentation of stormwater BMPs and green infrastructure by workgroup partners.
6. Identify new partners/sites that are working to complete stormwater management projects.
7. Implement 10 stormwater improvement practices on school campuses within the next 5 years through the Schuylkill Action Students program.
8. Apply for funding for at least 3 stormwater improvement practices on school campuses annually through the Schuylkill Action Students program.

Strategy

Pollution carried by stormwater poses a serious threat to the health of the Schuylkill River, contributing to over 30% of the impairments to water quality in the watershed. Polluted stormwater degrades the quality of our river with sediment, excess nutrients, bacteria and pathogens, and debris. Stormwater runoff can lead to increased point and non-point source impacts along the Schuylkill River during storm events. Addressing stormwater runoff requires a multifaceted approach that involves engaging all stakeholders, including municipalities, state and federal governments, homeowners, businesses, schools, planners, developers, and water suppliers.

Over the next five years, the SAN Stormwater Workgroup will focus its efforts on activities that will reduce the volume and velocity, and improve water quality, of stormwater runoff. Focusing on priority watershed areas, the workgroup will implement both outreach and implementation projects including technical assistance to municipalities to improve their stormwater management strategies; dissemination of information on BMPs for innovative stormwater practices; implementation of on-the-ground projects that reduce runoff; and provision of a forum for stormwater practitioners to share information and resources for managing stormwater. The SAN will collaborate with the PWD to promote *Green City, Clean Waters* efforts to upstream communities.

The workgroup will continue to advance its focus on implementing innovative stormwater improvement projects on school campuses. Through the SAN's Schuylkill Action Students program, the workgroup will complete projects that will serve as demonstration projects for the schools' communities and be a catalyst for additional projects in the future. The workgroup will also work to identify and secure resources to accomplish this agenda.

The Stormwater Workgroup will focus specifically on the following strategies:

1. Implement stormwater BMPs and riparian buffer restoration projects on priority first and second order headwater streams through partner programs such as Treevitalize and the Schuylkill Action Students program.
2. Secure funding annually and complete innovative stormwater projects through the Schuylkill Action Students program.
3. Support and promote the implementation of stormwater BMPs and green infrastructure through outreach, education, and technical assistance in priority watershed areas.
4. Assist municipalities to better understand, navigate, and fulfill their stormwater management responsibilities by providing technical assistance and support in priority areas.
5. Work with the SAN Planning Committee to apply for and secure funds to implement stormwater BMPs and explore feasibility of stormwater authorities through new funding mechanisms such as the PENNVEST Nonpoint Source (Green Infrastructure) Program.
6. Integrate more closely with stormwater activities of the Delaware River Watershed Initiative.
7. Collaborate with the Philadelphia Water Department to disseminate information on the *Green City, Clean Waters* initiative to other communities in the watershed.
8. Implement projects designed for managing runoff to maintain stream base flows, reduce flashiness of streams and improve groundwater recharge.
9. Report gaps and barriers in local, state and regional programs for mitigating stormwater impacts on source water to the Planning Committee and provide support for addressing them.

WATERSHED LAND COLLABORATIVE

PROMOTE A SUSTAINABLE LANDSCAPE IN THE SCHUYLKILL RIVER WATERSHED THROUGH STRATEGIC CONSERVATION AND EFFICIENT LAND USE/MANAGEMENT TO PROTECT THE INTEGRITY OF WATER SUPPLIES FOR FUTURE GENERATIONS.

Objectives

1. Maintain or increase the pace of priority lands protected in the watershed (4,853 acres per 5 year period).
2. Permanently protect at least 400 acres annually of priority watershed lands in the Schuylkill Highland Cluster.
3. Protect and restore water quality advanced through completion of proposed projects, including: land protection, stewardship, and adoption of improved municipal policies.
4. Advance conservation goals of the Schuylkill Highlands Implementation Plan as part of the Delaware River Watershed Initiative.
5. Monitor water quality (quarterly) and aquatic life (annually) of streams downstream of completed conservation projects.
6. Maintain or increase the pace of priority lands protected in the Delaware Valley Regional Planning Commission (DVRPC) area to keep pace with priority lands developed (approximately 2,345 acres per 5 year period).
7. Support and work with the Schuylkill River Restoration Fund to administer a land transaction assistance program for the protection of priority lands.
8. Communicate successes of land protection projects to the watershed community.

Strategy

One of the greatest threats to source water in the Schuylkill watershed is the loss of open space. When undeveloped land is converted to hardscapes such as roads, parking lots, buildings, etc, water quality is impacted by both the introduction of new pollutants and a loss of the watershed's filtering capacity. Undeveloped land generally does not contribute pollutants to our water sources, and when covered with natural grasses, wetlands, plants, shrubs and trees, it serves as a filter, removing pollutants before they get deposited into our water bodies. Water quality improvement is one of the most powerful benefits of preserving open space.

Over the next two decades, development is expected to increase by 40% in the Schuylkill watershed. While it is both impossible and unnecessary to stop all development from occurring, it is critical that development is directed away from the most sensitive watershed areas. The Watershed Land Collaborative (WLC) will work with key watershed stakeholders to implement projects and promote actions that will lead to the conservation of the highest priority lands for drinking water protection. The WLC will provide outreach and technical assistance to local governments in priority watershed areas and utilize planning tools such as the watershed land prioritization model to engage local decision makers in activities that will protect critical watershed lands. When appropriate, outreach efforts will also provide townships with information on other drinking water protection strategies, including surface water and wellhead protection opportunities.

The WLC will continue to advance efforts of the Delaware River Watershed Initiative and implement key conservation, engagement, monitoring, and technical assistance activities in the Schuylkill Highlands region. The success of this work will be shared with the conservation community to encourage replication in other areas of the watershed. The workgroup will also monitor the water quality impact of its accomplishments. Additionally, the WLC will provide resources to land conservation practitioners to incentivize the protection of high priority lands. The WLC will also maintain focus on the practices and policies that lead to the protection of the watershed's riparian areas.

The Watershed Land Collaborative Workgroup will focus specifically on the following strategies:

1. Continue to promote the results of the watershed land prioritization model with local practitioners.
2. Provide targeted outreach to priority townships with goal of providing technical assistance to townships for implementing conservation measures.
3. Promote riparian buffer protection.
4. Secure funding to provide transaction assistance to land trusts, local governments, and other land conservation practitioners for projects that result in the permanent protection of priority watershed land.
5. Complete land restoration activities on properties with conservation priorities.
6. Implement demonstration projects on developed lands, such as Homeowner Associations (HOAs), to promote better development and stormwater management on high quality watershed land.
7. Implement land conservation measures with priority landowners in targeted areas throughout the Schuylkill watershed.
8. Continue to promote and utilize resources for land conservation activities through the Delaware River Watershed Initiative.
9. Transfer best practices and successful programs of the Schuylkill Highland Cluster to other areas of the watershed.
10. Engage new landowners by offering educational and recruitment events focusing on conservation and stewardship in targeted areas throughout the watershed.
11. Develop and update prioritization mapping to identify the most valuable land to protect in the watershed.
12. Implement professional-level monitoring programs with volunteers, such as the Schuylkill Water Stewards program, to assess the impact of conservation and stewardship practices.
13. Provide support to the SAN Planning Committee as it works to address the gaps and barriers in local, regional, state, and national processes that focus on issues related to protection of priority watershed lands.

LIST OF APPENDICES:

Appendix A: Background on the SAN's Organizational Development

Background on the SAN's Organizational Development (presented in a separate MSWord file) provides a brief history of the SAN's organizational development resulting in how the Network functions today.

Appendix B: Yearly Workgroup Workplans

Yearly workgroup workplans together provide detailed information on the SAN's strategies and activities. These workplans are presented as a series of eight files, one for each workgroup and corresponding goal area.

Appendix C: Watershed Practices Implementation Committee Guidelines

The WPIC overview guide explains the purpose and general function of the initiative.

Appendix A:

Background on SAN Organizational Development

Creation of SAN

The Schuylkill Action Network (SAN) is a collaborative network of over 100 partners working together to improve water resources in the Schuylkill River watershed. The SAN seeks to achieve this vision by working in partnership with local watershed and land conservation organizations, businesses, academics, water suppliers, recreational communities, local governments, and regional, state, and federal agencies.

In response to source water assessment efforts in 2003, the Philadelphia Water Department (PWD) sought help from the Environmental Protection Agency (EPA) Region III to develop a network of stakeholders that would include various agencies and organizations working to protect Schuylkill watershed resources. The EPA led the creation of the Schuylkill Action Network to address major threats to drinking water in the Schuylkill watershed, including pollutants from agriculture, abandoned mines, stormwater, and sewage.

The SAN was structured as a series of integrated workgroups or committees to address the identified threats to the Schuylkill River. The original workgroups include: Abandoned Mine Drainage, Agriculture, Stormwater, and Pathogens/Compliance Workgroups. Each workgroup was designed to meet regularly, under the leadership of a volunteer chairperson, to discuss watershed issues and plan and implement projects of strategic importance related to these topics. These workgroups were designed to represent the core of the SAN and the vehicle by which most of the SAN's work is accomplished. Workgroup membership and meetings were created to be open and accessible to anyone.

In addition to the workgroups, the SAN included an Executive Steering Committee (ESC), Planning Committee, Education/Outreach Committee, and Data Team to guide and support the activities of the workgroups. The ESC met semi-annually to provide high-level guidance and buy-in from the major public agencies, while the Planning Committee met monthly to provide more hands-on strategic direction to the SAN and help insure good internal communication. The Education/Outreach Committee and Data Team provided support services, benefitting all SAN workgroups and members. Figure 1 depicts the original organization of SAN workgroups and their responsibilities as of 2004.

Evolution of SAN

Over time, the organization of the SAN has evolved in several critical ways. In 2004, a subcommittee of the Stormwater workgroup was convened to address the recommendations of the Schuylkill River Watershed Conservation Plan. This was a critical first step for the SAN, taking a preventative approach to drinking water threats. The Schuylkill River Conservation Plan led to a successful Pennsylvania Department of Environmental Protection *Growing Greener* grant to prioritize land for preservation based on drinking water protection.

Also in 2004, the PWD and the Partnership for the Delaware Estuary (PDE) submitted a successful Targeted Watershed Grant proposal to the EPA to fund a series of projects in the Schuylkill watershed. This funding (\$1.15 million of federal funds, leveraging an additional \$1.49 million in match from various sources) has been critical in allowing the SAN to take action on the ground. It is also an example of the SAN at its best: a diversity of organizations and agencies leveraging their individual strengths/skills to bring new resources to the watershed and tackle widespread and complex problems in a targeted, strategic way. Under this grant, local organizations

acted as project managers and received and managed project funds for implementation of projects. Projects included abandoned mine drainage remediation, stormwater management improvements, agricultural improvements, and educational pilots and case studies. This grant provided funding for the SAN to implement a set of selected projects from 2004 to 2008, during which time the SAN leadership cultivated new financial resources to continue and expand on this model of implementation.

In August 2005, the Planning Committee began the process of strategic planning by taking a critical look at SAN's organizational structure and how it could be improved to enable and encourage more stakeholder leadership within the SAN. As part of this effort, several important decisions were made, including:

- ***The decision to add a non-governmental position at the ESC level*** for more balanced representation. Based on this decision, the PDE joined the SAN ESC in the beginning of August 2006.
- ***The decision to maintain a federal lead for the ESC*** in order to provide credibility to the collaborative approach and influence for stakeholder involvement.
- ***The decision to expand Planning Committee membership to include representatives from each of SAN's workgroups*** to provide a mechanism for additional stakeholder involvement and better communication across groups.
- ***The decision to focus on the Schuylkill River Congress as the primary outreach event for the SAN each spring, and hold the SAN Annual Workshop each fall.***

In spring 2006, the SAN engaged the Institute for Conservation Leadership (ICL) to lead a stakeholder input process to inform the strategic growth and direction of SAN.

The following critical decisions were made by the SAN leadership in August 2006 in response to the ICL's recommendations:

- ***The decision to elevate the Watershed Land Collaborative (WLC) to full workgroup status*** in an effort to make the connection between land and water management more explicit. As a result, the WLC was reinvigorated and met quarterly, which re-engaged land conservation interests in the watershed.
- ***The decision to devote time/effort to and get professional help for improving SAN communications***, including exploring new resources and ideas for improving SAN's internal communication, creating a website, and exploring the feasibility of a major public outreach campaign. As a result, one of the SAN's top priorities for organizational improvement was to hire a communications consultant to provide assistance on these critical communication issues in 2007.
- ***The decision to devote time/effort to sort and identify specific policy issues that the SAN could play a role in addressing on an issue-specific basis.*** As a result, the Planning Committee evaluated the vast number of policy suggestions made by stakeholders to identify discrete actions for the SAN and its leading agencies to undertake for improvement
- ***The decision to target municipalities as a key audience in the work of both the Stormwater Workgroup and the Watershed Land Protection Collaborative.***

Also in 2006, the SAN contracted with the Environmental Finance Center (EFC) to explore the feasibility for building a sustainable financing/funding mechanism for Schuylkill Watershed protection activities. Based on interviews and research, the EFC's report outlined the scale, sources, and institutions for financing/funding and steps to fill the financing/funding gap for each of the SAN's priority areas/workgroups. The EFC also made a series of recommendations to the SAN leadership, including developing a unified restoration/protection plan, expanding community engagement with outreach/education and by working with relevant stakeholder groups, focusing on prevention, and convening an Implementation Task Force to help create a funding institution.

In 2004, the SAN launched a webpage. In 2007, the SAN created its website: www.SchuylkillWaters.org. This website serves as a clearinghouse for information on the Schuylkill Watershed, SAN projects, and provides a

public outreach component of the network. The website also features an internal component, designed to facilitate interaction amongst SAN partners, allowing for projects reports to be created and shared, news items to be shared, email between workgroups and SAN members, and the hosting of workgroup documents. Since 2007, the website was upgraded to add an interactive calendar and was integrated with social networking tools and sites.

In 2009, the SAN, through the PDE, brought on a full time coordinator to oversee the day-to-day operation of the SAN, facilitate collaboration amongst members, and advance workgroup goals by securing funding and resources for priority projects.

In 2011, the SAN updated its strategic plan for another 5 years (2011-2016). This plan renewed commitments of the SAN workgroups, integrated new initiatives and workgroups strategies into the process, and set out an ambitious agenda to strengthen SAN's presence in the watershed.

In 2013, the SAN celebrated its 10 year anniversary, which was commenced with a series of events throughout the year, including a celebration that recognized the many milestones that the SAN was able to achieve, commitments of SAN partners, and a renewal of the stakeholders that contributed to making SAN what it is today. The SAN also released a 10-year progress report that highlighted all of the workgroup accomplishments since the SAN's inception.

In 2014, the SAN secured a fellow to assist the coordinator, which has since been turned into a full time SAN specialist position. Today, SAN now has two full-time staff members to oversee the network and assist workgroup with advancing an aggressive agenda for a clean and healthy Schuylkill Watershed.

SAN Today

Since 2003, the SAN has grown to approximately 150 organizations (over 500 people) including local watershed organizations and land conservation organizations, businesses, academics, water suppliers, recreational communities, local governments, and regional, state, and federal agencies. The SAN uses unique skills and experience of each of its partners to implement on-the-ground projects that improve water quality of the Schuylkill River and its tributaries.

Today, the SAN is composed of an Executive Steering Committee, a Planning Committee, six workgroups (Abandoned Mine Drainage, Agriculture, Education & Outreach, Pathogens/Compliance, Stormwater, and Watershed Land Collaborative) and is developing a seventh, Recreation workgroup. Figure 3 depicts the SAN's organizational structure as it is in 2016.

Over the past several years, the SAN has strived to encourage greater stakeholder participation and leadership. Because of these efforts, there are many opportunities for stakeholders to be involved in the SAN today. All workgroup meetings, times, and locations are posted on the SAN website and are open for anyone to attend. With the completion of its most recent strategic plan, an even more aggressive and inclusive agenda has been established to guide SAN through 2020. Many new partners have become part of the SAN and together, this collaborative network will continue to lead efforts to restore and protect the Schuylkill Watershed.

Schuylkill Action Network Fact Sheet – May 2004

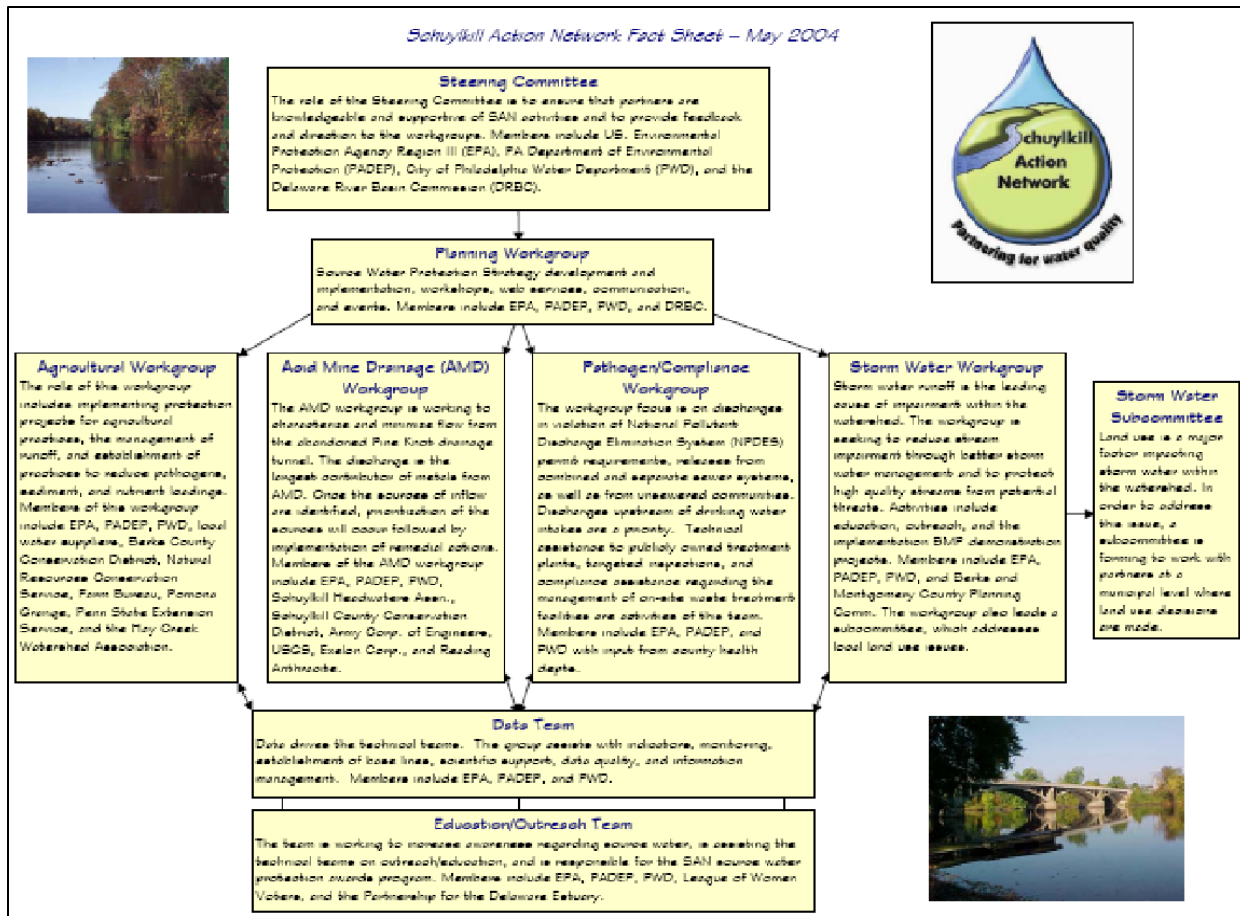


Figure 1: SAN Organizational Chart 2004

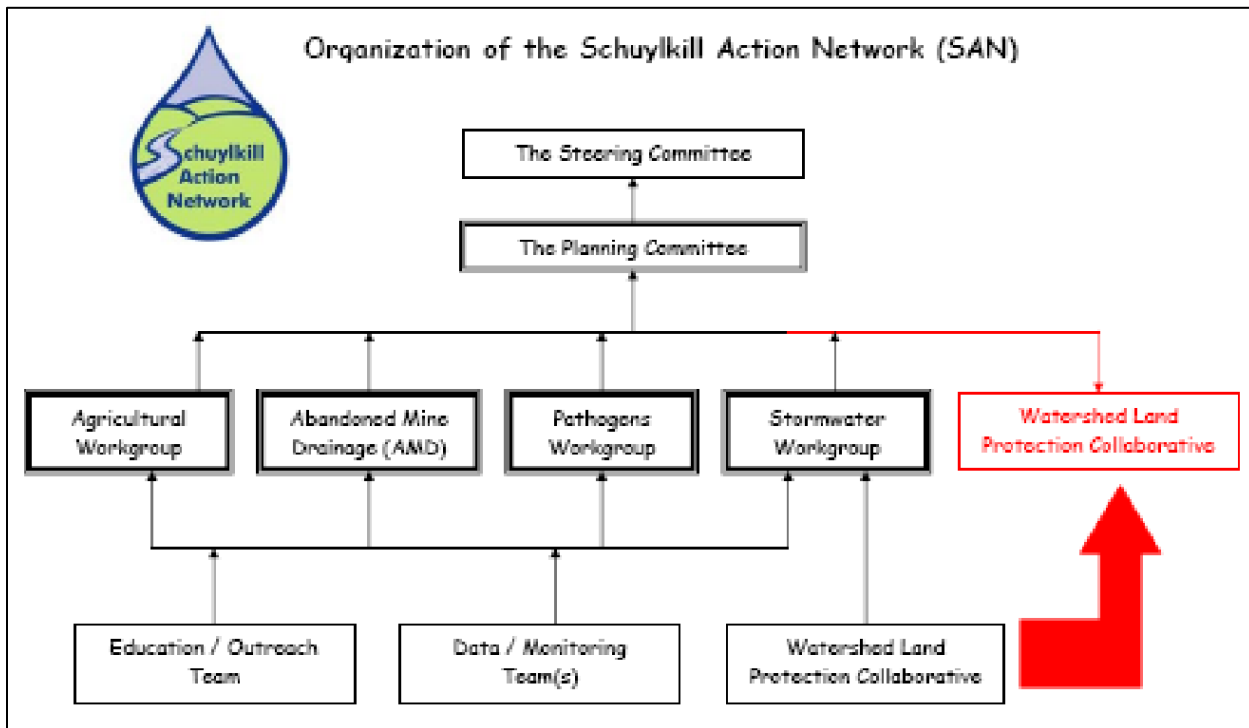


Figure 2: SAN Organizational Chart 2007



Figure 3: SAN Organizational Chart 2016

Appendix B: Yearly Workplans

View the Workplans

The Schuylkill Action Network's workgroups can be downloaded by clicking the below links. Please note that these are the 2016 workgroups' workplans, and the links will be updated each year.

- **Abandoned Mine Drainage** -
http://www.schuylkillwaters.org/doc_files/SAN%20AMD%202016%20FINAL%20Workplan.pdf
- **Agriculture**
- **Education & Outreach** – http://www.schuylkillwaters.org/doc_files/SAN%20E&O%202016%20Workplan.pdf
- **Pathogens & Point Source** -
http://www.schuylkillwaters.org/doc_files/SAN%20Pathogens%20Workplan%202016%20Final.pdf
- **Planning Committee** -
http://www.schuylkillwaters.org/doc_files/2016%20SAN%20Planning%20Committee%20Workplan.pdf
- **Recreation** – to be developed
- **Stormwater** -
http://www.schuylkillwaters.org/doc_files/SAN%20Stormwater%20Workgroup%20Workplan%202016.pdf
- **Watershed Land Collaborative**

Appendix C: Watershed Practices Implementation Committee

Purpose:

The SAN will take a leadership role in identifying and communicating opportunities for improving the processes that guide restoration and protection efforts in the Schuylkill River Watershed. This initiative will examine the processes, including common restoration and protection practices, watershed policies, decision making structures, procedures, and guidance documents with the intent of identification of gaps and barriers that impede the improvement of watershed management. When warranted, the effort will result in the formation of recommendations and strategies for eliminating these gaps and barriers.

Process:

A subset of SAN Planning Committee members will take the lead role in identifying specific issues that impede or frustrate restoration and protection efforts in the Schuylkill Watershed. The committee will meet as needed to discuss issues and develop recommendations. The recommendations will be reviewed by the Planning Committee and forwarded to the Executive Steering Committee (ESC) for additional action if warranted.

Dissemination:

For the purpose of both gathering and disseminating relevant information, a new section on the SAN website will be created to foster dialog among the SAN membership relating to improving policies and decision-making processes for watershed management, restoration and protection. This section will support the website purpose as a clearinghouse for watershed related information and platform for workgroup communication.

**Appendix B: SAN Pathogens and Point Sources and SAN Agriculture
Workgroups**

2019 Work Plans and Meeting Minutes

SAN Agriculture 2019 Workplan

Workgroup Goal: Maximize reduction and/or prevention of agricultural impacts to water quality.						
Strategy/Action #	Action	Lead	Timing	Status	Progress Tracking	Notes
Strategy 1: BMP Implementation	Support and implement agricultural best management practice (BMP) with funding, information, expertise, and collaborative problem solving.				Strategic Plan Alignment: Objectives 1, 2, 3, 5, 9 and Strategies 2, 3, 5, 6	
Action 1.a	Implement agricultural BMPs in selected priority subwatersheds.	All	Ongoing		# of BMPs implemented; projected water quality reductions	
Action 1.b	Investigate and apply for funding for BMP implementation on priority farms.	All	Ongoing		# of grants written; # of grants awarded; amount of funding awarded	
Action 1.c	Develop new conservation and nutrient management plans as needed.	All	Ongoing		# of conservation and nutrient management plans written	
Action 1.d	Work with farm and forest landowners, and collaboratives (i.e., Schuylkill Highlands Cluster) to explore opportunities for using conservation easements for long-term protection.	Berks Nature, Berks County Department of Agriculture	Ongoing		# of conservation easements; # of acres protected	
Action 1.e	Provide support and continue development of potential projects that advance Source Water Protection in the watershed (specifically with the creation of the Berks County Source Water Protection Plan).	All	Ongoing		Awarded USDA NWQI for Lower Maiden Creek Watershed area	
Action 1.f	Provide technical assistance and support for the Lower Maiden Creek National Water Quality Initiative (NWQI) readiness assesment, in preparation for implementation funding in 2020.	All / NRCS	2019			
Strategy 2: Communication	Provide a forum for partner and agency communication and coordination around agricultural projects and issues and the formulation of creative new approaches for				Strategic Plan Alignment: Objective 6 and Strategies 1, 4, 8, 9, 10	
Action 2.a	Convene quarterly meetings of the Agriculture workgroup, incorporating guest speakers and/or site-visit opportunities whenever appropriate and feasible.	Workgroup Chair, PDE	Feb, May, Aug, Nov		# of meetings; # of site visits; # of guest speakers	
Action 2.b	Continue to identify key partners and expand workgroup, using resources like the Saucony Creek Watershed Report and Agricultural BMP Guide.	All	Ongoing		# of new partners	

SAN Agriculture 2019 Workplan

Action 2.c	Develop an annual/final report of Ag team accomplishment, present at SAN annual workshop in fall, and create an annual work plan.	Workgroup Chair, PDE	Fall 2019		Progress report finalized	
Action 2.d	Provide workgroup information for posting on SAN's website and social media sites (funding opportunities, success stories, events, volunteer opportunities, etc.).	All, PDE	Ongoing		# of postings and views of those postings	
Action 2.e	Provide coordination of the Middle Schuylkill Cluster in the William Penn Foundation Delaware River Watershed Initiative, utilizing the SAN Ag workgroup as vehicle for collaboration and action.	PDE, BN, Stroud	Ongoing		Presented map and plan at May meeting	
Strategy 3: Monitoring	Monitor the impacts of agricultural BMP installations on stream water quality.	Strategic Plan Alignment: Objective 4, 7, 8 and Strategy 11				
Action 3.a	Coordinate monitoring plans and share data between conservation organizations, agencies, and water utilities.	All (SSM Group, PDE, Stroud, BN, BCCD, RAWA, WBWA)	Ongoing		Meeting held in early 2018	
Action 3.b	Conduct water quality monitoring as described in respective monitoring plans.	Stroud, BCCD, RAWA, WBWA	Ongoing			
Action 3.c	Provide support to watershed partners coordinating volunteer water quality monitoring programs (e.g. Berks Ambassador program, Master Watershed Stewards).	All	Ongoing		support provided	
Action 3.d	Work with DEP-Central Office on requirements for reassessing and delisting impaired streams-improving waters program.	All	Ongoing		# of streams delisted	
Action 3.e	Translate and communicate water quality data based on the workgroup's needs, programs, and initiatives.	All	Ongoing		# of outreach data products developed; # of times shared	

Glossary

BCCD	Berks County Conservation District	EPA	US Environmental Protection	SAN	Schuylkill Action Network
BN	Berks Nature	PDE	Partnership for the Delaware	SSM Group	Spots, Stevens, and McCoy
BMP	Best Management Practice	NWQI	National Water Quality Initiative	Stroud	Stroud Water Research Center
DEP	PA Department of Environmental Protection	RAWA	Reading Area Water Authority	WBWA	Western Berks Water Authority

SAN Agriculture 2019 Workplan

SAN Agriculture 2019 Workplan

Schuylkill Action Network Agriculture Workgroup

March 14, 2019 Meeting Minutes

INTRODUCTIONS/NEW MEMBERS

Review of November 2018 Meeting Notes

Update on grant requests/funding efforts/projects

NWQI Pilot Program (NRCS/EPA/PDE) – NRCS is waiting for more information on specific tasks to accomplish. A watershed assessment needs to be conducted, may use the Lower Maiden WIP. Plan on meeting after the next SAN Agriculture Meeting to discuss (May 22nd over lunch).

Berks Watershed Restoration Fund (Berks Nature) – still seeking funding, may contact Saucony Creek Brewery to return to funding support.

Cornerstone (DRWI) – wrapping up May 1; small farm workshops; Stroud's water quality project.

National Fish & Wildlife Fund-DRWI (Berks Nature/Stroud) – Some 2018 work completed by Berks Nature; submitted a new application for implementation practices on 2 farms. Stroud working on their project.

Maiden Creek Water Quality Report (BCCD) – BCCD presented trends from the draft report; members authorized finalizing the report; excellent reviews from members.

PA Sustainable Ag (PASA) (Stroud) – Soil benchmark study with farmers; looking at citizen science from farmers for water quality data.

USDA programs (NRCS) – 2018 Farm Bill Reauthorization-10% set-aside for SWP from EPA for effective BMPs and higher cost-share.

- Source water protection funding – 10% set aside for source water protection projects
- Environmental Quality Incentive- 2019 contracts for about \$1.7 million in Berks/Schuylkill counties
- Conservation Stewardship – concentrate on outreach efforts
- Regional Conservation Partnership Program – wrapping up 2 agreements for June 2020.
- Conservation Innovation Grant – No report
- Conservation Reserve Enhancement Program (CREP) – currently closed; Sept 2019 some parcel expirations around Blue Marsh; WRE phone calls and field visits.

Schuylkill River Restoration Fund Recipients (Berks Nature/Berks CD/Lehigh CD) – BN: finishing up 2018 projects and working on 2019 applications for May interview. BCCD: finished Irish Creek project for Samsel and Masemore farms. LCCD: will finish Bennicoff in 2019.

5-Star Urban Grants (EPA) – No projects in Berks County currently.

Mitigation Projects (Berks Nature/BCCD) – BN completed 77 acres in Maiden Creek; new conversion project starting up at Hawk Mountain. BCCD: Zartman stream restoration is ongoing, and a forest buffers in Albany Twp.

Mariner II (BCCD/BN) – BN is working with American Rivers for the Cacoosing Dam removal project.

Coldwater Heritage – BCCD is working on a draft plan for the Cacoosing Creek.

Growing Greener Projects (Stroud/LCCD/BCCD) – some work still being completed for 2018 round. Stroud did not receive grants as hoped.

Wyomissing Creek Watershed Coalition (BCCD) – group is working on a stormwater project with Mariner II funds.

Topton/Toad Creek project (BCCD) – going to bid soon.

Crypto monitoring (PWD/Lehigh) – Lehigh received project award; looking at fate & transport through soil. Western Berks Water Authority asked if the *crypto* results could be sent to DEP for LT2 requirements.

DCNR-CLI (Berks Nature) – Fleetwood management plan is nearly completed; the Willow Creek is nearly attaining designation; will apply for a new grant for BMPs.

DCED (BCCD) – Mt Penn/Crystal Lake project to fix stormwater issues with Growing Greener grant.

PACD Mini-Grants – manure management workshop applications to be submitted.

Reading Enviro Advisory Council (BN/BCCD) – BN will check status of planned removal of 5 dams in area. BCCD will assist with Bernhart Reservoir dam.

Wild Trout streams (Stroud) – meeting for grazing project planned.

Commonwealth Financing Authority – Act 13 grants due May 31.

Education/Outreach

BCCD workshops – education session for mushroom producers on compost; Buffer showcase and seedling sale on April 26

LCCD workshops – Ag and E&S workshops have had low attendance; possible workshop on DCNR funding.

Stroud workshops – planning a buffer training session in May.

Source Water Collaborative – toolkit on website for Ag BMPs; an AWWA webinar scheduled for March 20

PDE Science Conference – had great attendance at January conference.

Other Notable Items

- Berks County Water & Sewer Association is developing a brochure on fire-fighting foam; concerns with salt application on water sources.

Next Meeting:

Wednesday May 22, 2019 – 10:00 AM at Berks Ag Center

Schuylkill Action Network Agriculture Workgroup

May 22, 2019 Meeting Notes

INTRODUCTIONS/NEW MEMBERS

- Michelle Audie, EPA
 - Kim Fies, Berks County Dept. of Ag
 - Lamonte Garber, Stroud
 - Beth Garcia, EPA
 - Joe Hebelka, PADEP
 - Kate Hutelmyer, PDE
 - Larry Lloyd, Berks Nature
 - Damiam Loeper, NRCS
 - Lyn O'Hare, SSM Group
 - Nick Ramsey, NRCS
 - Ross Stowell, NRCS
 - Virginia Vassalotti, PDE
 - Lindsey Williams, NRCS
-

Review of March 14, 2019 Meeting Notes

Update on grant requests/funding efforts/projects

NWQI Pilot Program (NRCS/EPA/PDE) – Nick Ramsey updated everyone on the public meeting scheduled for June 25 at 10AM at the Virginville Grange. The entire Maiden Creek Watershed was selected as a pilot project. Projects need to be in readiness phase, with implementation of workplan in 2020. Program has EQIP eligibility rules. There is another round of NWQI with a focus on source water protection.

Berks Watershed Restoration Fund (Berks Nature) – want to develop strategies to re-engage RAWA and Saucony Creek Brewery.

Cornerstone (DRWI) – Complete. Final Report and financials submitted to NFWF by end of May.

National Fish & Wildlife Fund-DRWI (Berks Nature/Stroud) – Application are in; announcement in August. Additional funding to a new fund, the Delaware Watershed Conservation Fund (DWCF). The DWCF focus is on fish and wildlife habitat restoration, but ag protects are eligible if there are habitat benefits.

Maiden Creek Water Quality Report (BCCD) – Finalizing report; Virginia will check with Kent.

PA Sustainable Ag (Stroud) – 3 farms in Berks for soil benchmarking and soil health. Equipment will include moisture probes, runoff sensors, and infiltrometers.

USDA programs (NRCS) – 2018 Farm Bill Reauthorization

- Environmental Quality Incentive - \$750K allocated for 14 contracts. Field Office requested additional funds.
- Conservation Stewardship – 12 people in program, to be wrapped up in September
- Regional Conservation Partnership Program – RFP sometime this summer/fall
- Conservation Innovation Grant – accepting applications
- Conservation Reserve Enhancement Program (CREP) – Opens June 3 through August 23 for applications and reapplications. Check with FSA for requirements. CREP lands around Blue Marsh ending; Gamelands will manage half and farmers other half.
- Conservation Easements

Schuylkill River Restoration Fund Recipients (Berks Nature/Berks CD/Lehigh CD) – presentations scheduled for end of May.

Mitigation Projects (Berks Nature/BCCD) – Berks Nature working on Manor Creek – signed up for buffer easements.

Mariner II (BCCD) – Cacoosing Dam removal project is funded for 2020; American Rivers will remove dam.

Coldwater Heritage (BCCD) – No report

Growing Greener Projects (Stroud/LCCD/BCCD) – waiting for announcement.

Wyomissing Creek Watershed Coalition (BCCD) – No report

Topton/Toad Creek project (BCCD) – No report

Crypto monitoring (PWD/Lehigh) – No report

DCNR-CLI (Berks Nature) – Application for buffers and fencing at Love Farm submitted.

DCED (BCCD) – No report

PACD Mini-Grants – No report

Reading Enviro Advisory Council – “Green Between” event at Reading High School was successful; 200 students attended

Commonwealth Financing Agency grants – Berks Nature submitted grant for Maiden creek Twp along Willow Creek

PA American Environmental Stewardship Grant – BCCD planting trees and rain garden at Wilson West Middle

Education/Outreach

BCCD workshops – Buffer workshops; Farm Stewardship; Manure Management workshops conducted this spring

LCCD workshops – “Caring for your Stream” held in April

Stroud workshops – PA No-Till alliance is holding summer picnic on 7/25. Rodale has a 6-year project comparing organic and No-Till systems; Stroud is holding Field Day on August 7

Source Water Collaborative – look for webinar announcements for June/July; Farm Bill bulletin expected from State Conservationist; water utilities eligible for RCPP

Planning

Strategic Planning – PDE and partners working on 5-year plan update, covering 2021-2025

Annual Meeting – Save the date for Tues, Dec 10 at Albright College

Other Workgroup Updates

Stormwater/Schuylkill Action Students – Street Art winners announced; schools are showing interest in participating in SAS, locally Wilson and Conrad Weiser.

Education/Outreach (PDE) – the “Clean Sweep” app is running as a pilot. Workgroup members encouraged to download app and suggest improvements.

Pathogens (DEP) – next meeting scheduled for June 6

Recreation (SRHA) – Schuylkill Sojourn is nearly here – theme is “Our Working River”. Workgroup also launched “Fish the Schuylkill” on the SAN website.

Other Notable Items

- Friday September 13 – scheduled Bus Tour and SRRF Press Event – more details soon
- Lake Carsonia (Mount Penn) received funding for implementation projects
- Lancaster Water Week will be held in June
- NRCS has the old Berks Heim property set for a warm-season grasses demonstration area

NEXT MEETING:

Wednesday August 14, 2019 – 10:00 AM at Berks Agricultural Center

Schuylkill Action Network Agriculture Workgroup

August 14, 2019 Meeting Minutes

INTRODUCTIONS/NEW MEMBERS

- Alison Aminto, PWD
 - Chris Anderson, PWD
 - Jineen Boyle, PADEP
 - Lamonte Garber, Stroud
 - Josh Hanna, BCCD
 - Joe Hebelka, PADEP
 - Kate Hutelmyer, PDE
 - John Jackson, Stroud
 - Larry Lloyd, Berks Nature
 - Nick Ramsey, NRCS
 - Abigail Reiter, MCCD Ag Tech
 - Erica Rossetti, PDE
 - Ross Stowell, NRCS
 - Virginia Vassalotti, PDE
-

Review of May 22, 2019 Meeting Notes

Update on grant requests/funding efforts/projects:

NWQI Pilot Program (NRCS/EPA/PDE) – submitted draft workplan for Maiden Creek Watershed (2020-2023 funding). Requested \$1.1 million per year for the next 4 years, targeting toward Lower Maiden Creek initially. If workplan is approved, NRCS may need help with outreach for projects (by next meeting).

Comments:

- Need to come up with a more measurable outcome
- Need to identify critical source areas, although it is difficult to determine because intake locations are not public information
- Need to include more information on WPF clusters

Berks Watershed Restoration Fund (Berks Nature) – In implementation phase.

National Fish & Wildlife Fund (Berks Nature/Stroud) – Should be announced shortly. ***Note to break up into Delaware River Restoration Fund (DRRF): only DRWI partners eligible, and Delaware Watershed Conservation Fund (DWCF): available to nonprofits, conservation districts, municipalities in entire Delaware Basin.*

Maiden Creek Water Quality Report (BCCD) – No updates since last meeting.

PA Sustainable Ag (Stroud) – Finished installing several sensing instruments on 3 separate Berks County farms as part of pilot project for farmer-based citizen science to gather water quality data (e.g. runoff, infiltration) on farms with various conditions. Part of a larger soil benchmark / water infiltration study. Grant ends in December, with potential extension for one year.

USDA programs (NRCS) – 2018 Farm Bill Reauthorization

- Environmental Quality Incentive – received half amount of usual funding, expected to go back to normal amount next year
- Conservation Stewardship – have 10 agronomic projects to complete in Berks & Schuylkill Counties in next 3 weeks. Program will continue to be available; seeking more involvement.
- Regional Conservation Partnership Program – continuing to wrap up existing RCPPs with Stroud and NFWF
- Conservation Innovation Grant – no report
- Conservation Reserve Enhancement Program (CREP) – open through August 23rd
- Conservation Easements – always looking for easements, particularly wetland restoration and/or bog turtle protection. See Ross.

Schuylkill River Restoration Fund Recipients (Berks Nature/Berks CD/Lehigh CD)

- In implementation phase for Love Farm, Long property, and Albany Township
- PDE received funding for a stormwater train project in Lionville

- Would like to have a no-till alliance meeting for farmers in this area

MCCD workshops

- Planning a no-till workshop for the fall

Planning

Strategic Planning – working on new plan for 2021-2025. Brainstorm session will occur at annual meeting.

Annual Meeting – Tuesday December 10 at Albright College. Registration to go live in September.

Other Workgroup Updates

Stormwater/Schuylkill Action Students (PDE) –

- Working with Wilson West to build rain gardens and stream restoration project (put in application for DWCF).
- PDE did summer programming with Conrad Weiser, plan to do storm drain marking in the fall
- New GIS stormwater project prioritization tool Geodatabase on website – potentially going to make available as online tool for teachers or others. Created by PALTA

Education/Outreach (PDE) –

- Street art contest to open in September
- CleanSweep app coming to android soon, also working on minor improvements

Pathogens (DEP) – next meeting: September 18 @ DEP, featuring a presentation on the EPA “ECHO” tool

Recreation (SRG) - [#FishtheSchuylkill](#) photo contest open until September 22nd – post your catch on Instagram along the Schuylkill River for the chance to win \$50 or \$25

Other Notable Items

- Tulpehocken TU received \$15000 to install education station on Little Cacoosing creek
- BCTC students designed new logo for Berks Source Water Protection
- PWD seeing increased ag, nutrient, and equine management needs within the city, looking for tech transfer and technical expertise.
- PWD seeking restoration project sites to highlight during their annual tour
- Inquirer is interested in touring farm BMPs – please contact PWD
- Berks Water Week August 5-10; PA Local Waters Appreciation Week August 24-31
- Multifunctional Riparian Forest Buffer Program – grant pre-qualifications due 8/31
- Would like SAN to focus efforts on Tulpehocken Creek (similar to Maiden Creek) to improve Blue Marsh Lake

NEXT MEETING: November 13, 2019; 10am – 12 noon; Berks Ag
Please e-mail Virginia at Vassalotti@DelawareEstuary.org if you plan to attend.

Schuylkill Action Network Agriculture Workgroup

November 13, 2019 Meeting Minutes

INTRODUCTIONS/NEW MEMBERS

- Michelle Audie (EPA)
 - Jineen Boyle (PADEP)
 - Kim Fies (Berks Department of Ag)
 - Lamonte Garber (Stroud)
 - Christine Griesemer (BCCD)
 - Josh Hanna (BCCD)
 - Joe Hebelka (PA DEP)
 - Kent Himelright (BCCD)
 - Kate Hutelmyer (PDE)
 - Rebecca Kennedy (PENNVEST)
 - Damien Leoper (NRCS)
 - Larry Lloyd (BN)
 - Lyn O'Hare (SSM)
 - Erica Rossetti (PDE)
 - Ross Stowell (Stowell Associates)
 - Will Whalon (PWD)
-

Review of August 14, 2019 Meeting Notes

Stroud presentation on buffer maintenance support

- Stroud working with BCCD on buffer establishment support
- CREP requires 75% success rate. With ideal maintenance, trees now have a 90% survival rate and shrubs have an 88% survival rate.
- Ideal maintenance process:
 - Weed free zone around trees (4-10 feet diameter) via herbicide or other organic methods
 - area is mowed at least 2-3 times per seasons
 - Tree, stake, bird net, and tube maintenance
 - Quarter-sized hole in the center of the bird net so that the tree can continue to grow if the net is not removed at the proper time
 - Invasive identification and removal
 - Proper tree species selection and wetland delineation (make sure trees are planted where they should be to increase chances of survival) – EPA can help with this
- DCNR includes maintenance funding with their Riparian Forest Buffer Program grants

Update on grant requests/funding efforts/projects

NWQI Pilot Program (NRCS/EPA/PDE) –

- Getting money but not sure how much.
- Potentially splitting in half: half to Lower Maiden, half to other watersheds.
- Swatara River has received 750,000/year for next four years, let DEP know if you have projects in Lebanon County that might intersect.

Berks Watershed Restoration Fund (Berks Nature) – money has been spent, will begin again in Jan.

Delaware River Restoration Fund (Berks Nature/Stroud)

- WPF funding for projects within DRWI focus areas
- Next round will probably be in April.
- [2019 grants were announced by NFWF in September](#). Berks Nature, PDE, Stroud, and Green Valleys all received funding.

Delaware Watershed Conservation Fund (Berks Nature/Stroud) – WPF funding for other projects in Delaware Watershed

Maiden Creek Water Quality Report (BCCD) –

- report used in NWQI readiness assessment that NRCS submitted
- data also used in DEP's Integrated Water Quality Report

PA Sustainable Ag (Stroud) – no update

USDA programs (NRCS) – 2018 Farm Bill Reauthorization

- Environmental Quality Incentive Program (EQIP) – several applications in for Lower Maiden
- Conservation Stewardship
- Regional Conservation Partnership Program (RCPP) – ag, forest, and land preservation along Kitattiny Ridge
- Conservation Innovation Grant
- Conservation Reserve Enhancement Program (CREP)
- Conservation Easements
- [Forest Action Plans](#)
 - To be completed by June 2020
 - Bases for state priorities for stewardship funding and technical assistance driving forest management for the next 10 years
 - Public input about sourcewater protection priorities welcome. Contact state foresters.

Schuylkill River Restoration Fund Recipients (Berks Nature/Berks CD/Lehigh CD) –

- Berks Nature working on Love Farm in Hay Creek from 2019 grant round
- BCCD closing out Irish Creek grant from 2017 this year
- BCCD halfway done with 2019 project, projected to be complete in spring
- BCCD 2018 Ray Chaveaux projected for completion in the spring

Mitigation Projects (Berks Nature/BCCD) –

- BCCD Tulpehocken Stream restoration done with hard construction, should be finished this spring
- Cacoosing Dam Removal projected to take place next fall

Mariner II (BCCD) – mostly stormwater BMPs

- Spring Township 2 stormwater basin retrofits
- Cumru Township rain garden project

Coldwater Heritage (BCCD) – Wilson West Middle School project complete

Growing Greener Projects (Stroud/LCCD/BCCD) – due December 20th. This year, 50% allocated to Chesapeake Bay for sediment/nutrient reduction. Still plenty of funds for Delaware River Watershed, and ag and stormwater are still priorities.

Wyomissing Creek Watershed Coalition (BCCD) –

- 80 trees planted with 50 volunteers in October
- Stream cleanup coming up Saturday 11/16 10-12 in Cumru Township
- Another tree planting in spring

- CleanSweep app

Pathogens (DEP) – Water Utility Forum Jan. 28, 9am-1pm, Albright College, free lunch. [Please register](#)

Recreation (SRG) – 2019 #FishtheSchuylkill → 2020 #PaddletheSchuylkill initiatives. Next mtg Feb. 6 @ Schuylkill River Greenways

Other Notable Items

- DRWI entering Phase 2+, clusters are reviewing focus areas and strategies during planning process in the next 6-9 months
- Bite of Berks: SAN won the Conservation Organization of the Year from BCCD

NEXT MEETING:

February 19, 2020; 10am-12pm; Berks Ag (1238 County Welfare Rd.)

SAN Pathogens and Point Source 2019 Workplan

Workgroup Goal: Facilitate and strengthen communication and coordination among regulatory agencies, downstream water users, and basin stakeholders regarding the Clean Water Act and Safe Drinking Water Act goals.						
Strategy/Action #	Action	Lead	Timing	Status	Progress Tracking	Notes
Strategy 1	Strengthen communication between and provide educational resources to wastewater and drinking water utilities to improve source water protection efforts.			Strategic Plan Alignment: Objectives 1, 3 and Strategies 1, 4, 6		
Action 1.a	Promote use of the Delaware Valley Early Warning System (EWS) at workgroup meetings, workshops, and outreach events.	PWD, PADEP	Ongoing		# of users (PWD tracks)	
Action 1.b	Conduct EWS demonstration session for upstream water users/discharges during an existing meeting or in place of the Fall Pathogens meeting.	PWD	Fall 2019 (if updates are finalized)		# of EWS trainings; # of participants	Format depends on audience - would need computer stations for training. Albright & PADEP have comp stations.
Action 1.c	Promote various funding opportunities, such as Pennvest, for pathogen reduction projects throughout the watershed.	PennVest / All	Ongoing		# of posts on website and social media	
Action 1.d	Host and/or coordinate with Berks County Water and Sewer Association (BCWSA) to attend tours of waste water and drinking water treatment plants.	All	1 / Year		# of tours	Potential tour sites: Aqua PA, PWD, E. Greenville. BCWSA would be willing to do tours out of the county.
Action 1.e	Develop and enhance partnerships and communication relating to emergency response/preparedness.	All	Ongoing		# of new partnerships formed	
Action 1.f	Explore the feasibility of standardizing the downstream notification form and/or contact database of contact information.	PWD, PADEP	Quarter 1			
Strategy 2	Facilitate data and information sharing to document wastewater treatment			Strategic Plan Alignment: Objectives 2, 5, 6 and Strategies 3, 5, 7, 8, 9		
Action 2.a	Convene quarterly meetings of the Pathogens & Point Source workgroup, incorporate educational opportunities with experts in the field of pathogen research, whenever appropriate and feasible.	Workgroup Chairs	Quarterly			
Action 2.b	Develop a list of potential partners, such as wastewater treatment operators, to expand and enhance the Pathogens & Point Source workgroup.	All	Quarter 1		# of partners contacted on developed list	Erick can pull list - completed on Dec 13; make contact with EPWPCOA. Determine how to best utilize this list - survey?

SAN Pathogens and Point Source 2019 Workplan

Action 2.c	Track progress of projects addressing unsewered communities and identify partners currently working with those communities.	All	Ongoing		Spreadsheet shared	
Action 2.d	Track WWTP upgrades, new facilities, and community sewer improvement projects through DEP Regional Offices, Part II Permits, media releases, and review of government-funded projects.	PADEP, PWD	Ongoing		Information shared	DEP PA Bulletin or DRBC dockets; shared at quarterly meetings.
Action 2.e	Track status of Act 537 Plan statuses and provide assistance if needed.	PADEP	Ongoing		Information shared	
Action 2.f	Build on PWD's sanitary survey by identifying other sources of data to further characterize WWTP conditions.	PWD	January 2019			
Strategy 3	Investigate evolving source water issues, such as unregulated contaminants, and develop a better understanding of what these issues mean for water suppliers source water protection strategies.			Strategic Plan Alignment: Objective 4 and Strategy 10		
Action 3.a	Share research and best practices around unregulated contaminants with partners, such as DRBC, EPA, DRBC, and water utilities.	PADEP, DRBC, EPA, Aqua, PWD	Ongoing			Share data, risk communication practices, info from EPA's Contaminants of Emerging Concerns workgroup
Action 3.b	Provide trainings and opportunities for workgroup partners to share information, best practices, and lessons learned.	All	Ongoing			Aqua has a lot of information about risk communication around PFAS; what concerns do water utilities have? (as opposed to public concern).
Strategy 4	Engage and educate the public about pathogen water quality issues and solutions.			Strategic Plan Alignment: Objectives 3, 4		
Action 4.a	Develop an annual/final report of workgroup accomplishments to present at SAN annual workshop in fall and to include in the SAN annual progress report.	PDE, PADEP, PWD	Fall 2019		Report finalized	
Action 4.b	Provide workgroup information for posting on SAN's new website and social media sites (funding opportunities, success stories, etc.).	All	Ongoing		# of postings and views of those postings	
Action 4.c	Research, compile, and promote pharmaceutical take-back programs within the watershed.	All	Ongoing		# of postings and views of those postings	
Action 4.d	Work with water and wastewater utilities to compile partner resources for public outreach.	Aqua, PWD, PA American	Ongoing		# of resources shared, toolbox created	

SAN Pathogens and Point Source 2019 Workplan

Action 4.e	Promote What Not to Put Down the Drain fact sheet, and other outreach materials compiled from Action 4.d.	All	Ongoing			
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SAN Pathogens & Point Source Workgroup Meeting Minutes

Wednesday, March 6, 2019 10am-12pm

PADEP – Reading District Office

1. Introductions

- **Aqua:** Krista Scheirer
- **EPA Region 3:** Beth Garcia, Nick Holomuzki
- **PADEP:** Erick Ammon (SCRO), Steven Flannery (SERO), Joe Hebelka (CO), Tracey Johnson (SERO)
- **PDE:** Kate Hutelmeyer, Erica Rossetti, Virginia Vassalotti
- **PennVest:** Tess Schlupp
- **PWD:** Alison Aminto, Chris Anderson

2. Review Last Meeting Minutes – approved, uploaded to Workgroup Hub

3. Finalize 2019 Workplan – will upload finalized version to Workgroup Hub

- Strategy 2
 - Erick: has created list of wastewater utility contacts. Would like to use this info to ask utilities what they would like to share with the public via SurveyMonkey. We don't want to recreate the wheel but rather compile existing outreach material
 - Having internal presentations at pathogen meetings would be good
 - Resources to share
 - Beth: EPA has resource of pump assessment experts that offer support to Schuylkill Watershed plants
 - Let Nick know if you are interested in quarterly data sharing presentations that EPA offers
- Reword strategy 3a to clarify that the workgroup is not doing research but we will actively share the research from partner organizations.

4. Water Utility Forum

- Definitely will keep in workplan re: strategy 3 because it is a great way to bring all players to the table for information sharing
- Feedback from last year: some topics were over heads or not for correct audience; Adam Carpenter, AWWA, was a great speaker!

- Gage interest in this event and potential needs/topics of interest through the survey we will send out to wastewater utility contacts
- Could tag onto a pre-existing event first or organize a half day trial event in June
- Virginia will follow-up with subcommittee call in 2-3 weeks

5. [America's Water Infrastructure Act \(AWIA\) of 2018](#)

- A far-reaching law re: infrastructure improvements, drinking water resilience, sustainability, and source water protection
- Officially enacted
- Some new requirements for WWTP
 - Systems servicing 3300 – 10,000 people now must monitor for unregulated contaminants
 - 3300+ must conduct risk assessments every 5 years
 - Will take about 3 years to transition
 - Funding not yet available; stay tuned

6. PWD

- **Schuylkill Watershed Control Plan/Sanitary Survey**
 - Submitted in December
 - Waiting to hear back from Kevin Smith on approval status
 - Planning to extend to more areas of Delaware as an update to watershed control plan (October 2020) including Bucks County, Poquessing and Pennypack watersheds
 - PWD completing a needs assessment to identify gaps in partners, projects, geographic areas, and funding
- **Chapter 94 Data**
 - Annual wastewater reports, used to help develop sanitary surveys
 - In the past, updated every 5 years; we are almost at 5 years
 - Last update was made in Oct 2015 – posted on SAN workgroup hub
- **Delaware Valley EWS**
 - Still working on updates to make it more user-friendly, compatible on mobile, and have improved modeling
 - Training sessions:

1. April 8 @ SE DEP Regional Office, 1:00pm (internal)
2. April 22 @ SC DEP Office, 12:30pm (internal)
3. Also a refresher at Fall 2019 AWWA Conference

- Alison will follow up about fact sheet development

7. Emerging Contaminants

• Cyanotoxins

- No detections in Schuylkill Watershed thus far!
- PWD screening test strip tool: piloting this spring
- 3 PWD anticipated bloom hot spots: Lorraine Run, Manayunk Canal, Pleasant Hill Park
- Aqua: working on treatment action plan; will be looking for more cases in reservoir source water
- Several cyanotoxin events through [PA AWWA](#) (3/21 meeting and 4/3 workshop)

• PFAS

- New [EPA Action Plan](#)
- EPA will soon issue cleanup tools to polluted sites AND will determine whether or not to regulate by the end of the year
- DEP hiring toxicologist to set state MCL for PFA and PFAS
- Upcoming EPA [Webinar](#) on Cost-effective CECs / PFAS treatment technologies, March 20th, 2019

8. BCWSA Activities

- April 18: Source water protection meeting @ Albright, 9:30am
- May 16: Tour
- July 31: Annual conference

9. Funding

• PennVEST

- Send project ideas to Tess
- Next board meeting in April

- Next application cutoff is May 1; anticipating a huge influx this round
- [Several information sessions upcoming](#) (e.g. Chester County, 3/13, 9:30-noon, Tredyfrinn Township Building)
- Green infrastructure conference 4/2/2019
- **Other**
 - [Act 13 \(from Marcellus Legacy Fund\) funding available until May 31st](#)

10. Regulatory Updates

- **EPA**
 - New peak flows management rule: no updates yet
- **DEP**
 - Working on updates with Exeter Township

11. Watershed News

- **E-newsletter**
 - Send all pathogens / point source relevant news to Erica, erossetti@delawareestuary.org
 - Will send out via MailChimp 1-2 weeks prior to quarterly meetings
- **Top News Articles for Discussion**
 - [PA to begin its own process of setting health limit for two PFAS chemicals](#)
 - [EPA HABs Newsletter for January-February 2019](#)
 - [How the Clean Water Act fixed the Delaware River's pollution problem](#)
 - [Wastewater disposal requirements for pharmaceutical manufacturing](#)

12. Other Items

- [March 21 meeting to explore health, environmental issues of synthetic chemicals](#)
- [NGWA PFAS Management, Mitigation, and Remediation Conference](#) June 19-20 in Westerville, Ohio
- [EPA's Online Drinking Water Training System](#): April 3, 1-2pm

13. Next Meeting Date - June 5th, 2019



SAN Pathogens & Point Source Workgroup Meeting Minutes

Wednesday, June 5, 2019 10am-12pm

PADEP – Reading District Office

1. Introductions

- Aqua: Krista Scheirer
- DEP: Erick Ammon, Joe Hebelka
- EPA: Michelle Audie, Beth Garcia, Nick Holomuzki
- PDE: Erica Rossetti, Virginia Vassalotti
- PennVest: Tess Schlupp
- PWD: Alison Aminto

2. Review Last Meeting Minutes

3. Water Utility Forum (early 2020)

- a. Potential topics:
 - i. SAN Pathogens Workgroup overview
 - ii. Emerging Contaminants (e.g. PFAS, pharmaceuticals, cyanotoxins, Mn)
 - iii. Funding opportunities
 - iv. Compliance/technical assistance (e.g. DEP optimization program, FPPA program)
 - v. EWS
 - vi. New technology / regulations
- b. Surveys for wastewater and water suppliers
 - i. Trying to gauge what their needs are and what would drive them to come to an event
 - ii. PDE will work on survey and send to workgroup for review by the end of June

4. PWD

a. Schuylkill Watershed Control Plan/Sanitary Survey

- i. Submitted in January – waiting to hear back from DEP

- ii. Going to expand into more areas of the Delaware (to be submitted October 2020).
- iii. Will work with PDE on collaboration and funding from NFWF's DRRF & DWCF

b. Chapter 94 Data

- i. Now accessible on website
- ii. Spreadsheets need to be updated
 - 1. Erick can complete for Berks County

c. Delaware Valley EWS

- i. Becoming more important as smaller watersheds get hit with large rain events due to climate change

5. Emerging Contaminants

a. Cyanotoxins

- i. EPA Update
 - 1. 5/21 [Webinar](#) on HABs and Algal Toxin Treatment
 - 2. [CyanoHABs monthly newsletter](#)
- ii. PWD Update
 - 1. Working on tiered sampling plan and improved detection/analysis
 - 2. Not seeing outbreaks at this time
- iii. Aqua Update
 - 1. Assessing reservoirs through trophic state analyses at several points (worst case, downstream, and dam intakes)
 - 2. Not really a concern in the Schuylkill watershed
 - 3. Will continue monitoring through fall

b. PFAS

- i. EPA: seeking comments regarding PFAS in groundwater for the PFAS Action Plan (closes 6/10)
- ii. DEP Update: [Sampling plan developed](#), available online
- iii. PWD Update: Have observed that results from separate labs are similar
- iv. New research from Department of Defense in the Neshaminy and Pennypack creeks will display how PFAS reach out through groundwater and sediments

6. BCWSA Activities – annual meeting on July 31

7. Funding

a. PennVEST – Updates from Tess

- i. Last application round ended in May
- ii. Working on streamlining application to make process more user-friendly
- iii. Tess potentially moving to South Central region (will still keep Berks County), and Rebecca Kennedy moving to Southeast region

b. Other:

- i. Water & Waste Disposal Loan Grant Program (for small rural systems) applications due July 1

8. Regulatory Updates

a. EPA

- i. [Seeking comments on proposed options for regulating perchlorate in drinking water](#)
- ii. [AWIA of 2018: Risk Assessments and Emergency Response Plans](#)

b. DEP [discusses science behind the need to regulate Manganese](#)

9. Watershed News

a. E-newsletter

- i. First Pathogens E-Newsletter sent out 2 weeks ago
- ii. Will occur quarterly, 2 weeks before each workgroup meeting
- iii. Email news, grants, events, etc. to Erica at erossetti@delawareestuary.org

b. Top News Articles for Discussion

- i. [Top Senate Republics Unhappy with Manganese regulation discussions](#)
- ii. [Water pollution proposal faces mounting opposition from PA Legislature](#)
- iii. See [website](#) for all other news articles

10. Other Items

- a. Proposed Senate Bill 619: Changing definition of what pollution is under streams act will affect how Fish & Boat / DEP will respond to events
- b. Upcoming EPA [Webinars](#):
 - i. June 25th, Sanitary Surveys
 - ii. August 22nd and September 5th Webinar on Updated Risk Assessment and Emergency Response plan tools
- c. Interest in presentation on “Echo” public tool to look at wastewater and drinking water data
- d. SAN Save the Dates:
 - i. Bus Tour, September 13
 - ii. Annual Meeting, December 10

11. Next Meeting Date: September 18, 10-12, PADEP Reading



SAN Pathogens & Point Source Workgroup Meeting Minutes

Wednesday, September 18, 2019 10am-12pm

PADEP – Reading District Office

1. Introductions

AQUA PA – Krista Scheirer

PA DEP – Erick Ammon, Joe Hebelka

DRBC – Ron MacGillivray (call-in)

EPA Region III – Aryel Abramovitz, Mike Greenwald

PDE – Erica Rossetti, Virginia Vassalotti

PWD – Alison Aminto

2. Review Last Meeting Minutes

3. EPA Presentation – ECHO & Significant Noncompliance Initiative

- a. SNC is triggered when facilities are in significant violation for 2 consecutive quarters.
- b. Goal of initiative is to reduce SNC in PA by 50%
- c. Tracking & monitoring SNC
 - i. DEP submits data via EFACTS into EPA's ICIS Database, which communicates with echo.epa.gov
 - ii. ECHO Features: quarterly reports, facility search, map search, investigate pollution sources, analyze data trends

4. Water Utility Forum (early 2020)

- a. **Survey Results** – 19 responses mostly from water utilities, a lot from AQUA and PWD. Strong interest in emerging contaminants, regulatory updates, technical assistance program info, and a half day morning program consisting of presentations
- b. **Date** – January 22, 2020. (Snow date: January 29) half day in morning
- c. **Location** – Subcommittee will decide between Albright, MCCC, or AQUA Bryn Mawr
- d. **Topics & Speakers** – subcommittee to determine agenda. Potential speakers:
 - i. Emerging contaminants
 1. PFAS: Alicia from AQUA and Gloria from NJDEP
 2. Cyanotoxins: Nutrient management, PWD and Chip

- ii. Regulatory updates
 - 1. Erick, PADEP
 - 2. Adam Carpenter, AWWA
- iii. Compliance & technical assistance: PADEP

5. PWD

- a. **Schuylkill Watershed Control Plan** – still filling in gaps, ECHO will be useful tool
- b. **Sanitary Survey** – submitted January 2019, updated every 3 years
- c. **Delaware Valley EWS** – no update

6. Emerging Contaminants

a. Cyanotoxins

- i. Blue Marsh public outbreak
- ii. AQUA: finding them throughout watershed, just not near intakes

b. PFAS

- i. ECHO also has PFAS analytical tool
- ii. DRBC:
 - 1. Writing proposal for PA CZM focusing on source identification (specific facilities) and compiled data from sourcewater/sediment/fish sampling
 - 2. Submit any PFAS data to them to include in proposal
 - 3. Trying to start PFAS Take Back Programs similar to those in MA and NY
- iii. AQUA: PFNA is another emerging contaminant of extreme concern. High levels found in storm drain outlet in West Chester, PA.
- iv. PADEP: Hired toxicologist in July, working with Dpt. Of Health

7. BCWSA Activities - meeting September 19, 2019

8. Funding

- a. **PennVEST** – Rebecca Kennedy new Southeast contact after restructuring; State Revolving Fund Programs open

9. Regulatory Updates

- a. **EPA** – electronic submittal will be extended
- b. **DEP** – no report

10. Watershed News

- a. **E-newsletter** – sent out two weeks before meeting
- b. **Top News Articles for Discussion** – see SAN website and e-newsletter

11. Other Items

- a. **Ongoing:** EPA Webinars, HABs newsletter

12. Next Meeting Date

- a. **Water Utility Forum:** January 22
- b. **Next Meeting:** Wed. March 18, 10-12, PADEP Reading

Appendix C: Wildcat Sewer Update

Current Progress of Efforts in Schuylkill River Watershed to Improve Wastewater Planning and Infrastructure

Discharger	Municipality	County	Stream	Update	Sources
Blythe Township	Blythe Township	Schuylkill	Silver Creek and Schuylkill River	The municipalities of Middleport Borough, New Philadelphia Borough, Blythe Township and Schuylkill Township joined together to form the Schuylkill Valley Sewer Authority (SVSA) and completed an Act 537 plan. A new sewage treatment plant with the capacity to treat 550,000 gallons per day and over 30 miles of sewage pipe was construction using SVSA funds and an over \$18 million combined loan and grant package from PENNVEST. The new wastewater treatment plant began discharging treated effluent in June 2006. As of 2009, 1432 customers were connected to the SVSA WWTP, and 69 were not connected. Of those customers not connected, most were abandoned properties, buildings being foreclosed on or were being pursued legally to force connection.	Chris McCoach, Alfred Benesch & Company, personal communication, April 7, 2015; PENNVEST. www.pennvest.pa.gov
Village of Cumbola	Blythe Township	Schuylkill	Schuylkill River		
Middleport Borough	Middleport Borough	Schuylkill	Schuylkill River		
New Philadelphia	New Philadelphia Borough	Schuylkill	Silver Creek and Schuylkill River		
Schuylkill Township	Schuylkill Township	Schuylkill	Schuylkill River & tributaries		
Village of Brockton	Schuylkill Township	Schuylkill	Schuylkill River		
Village of Delano	Delano Township	Schuylkill	Pine Creek	Delano has public sewer. In 2007, Delano Township received a nearly \$3 million grant and loan package from PENNVEST to construct three miles of sewer lines and a pump station to convey sewage to Northeast Schuylkill Joint Municipal Authority which was previously being discharged to Delano Creek, a branch of Pine Creek.	Chris McCoach, Alfred Benesch & Company, personal communication, April 7, 2015; "Governor Rendell Announces \$61 Million Investment to Help Protect Pennsylvania's Waterways, Public Health; Promote Community Revitalization Efforts." April 17, 2007. PRNewswire. www.prnewswire.com
Minersville	Minersville Borough	Schuylkill	West Branch Schuylkill River	Minersville has public sewer. Minersville Sewer Authority received over \$4 million loan from PENNVEST to construct almost two miles of sewer and stormwater lines and replace about one mile of water mains to eliminate a continuous discharge of	Chris McCoach, Alfred Benesch & Company, personal communication, April 7, 2015; "Governor Rendell Announces Funding to Protect Pennsylvania's Waterways, Public Health; Promote Community Revitalization Efforts." Jul 18, 2006. PRNewswire. www.prnewswire.com

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				untreated wastewater to the West Branch Schuylkill River.	
Village of Llewellyn	Branch Township	Schuylkill	West Creek and West Branch Schuylkill River	The Village of Llewellyn has public sewer. Branch-Cass Regional Sewer Authority recived an over \$16 million loan and grant package from PENNVEST to construct over 28 miles of sewer collect lines and a 450,000 gallons per day wastewater treatment plan to serve portions of Branch, Cass and New Castle Townships and mitigate wildcat sewers and malfunctioning on-lot systems discharging untreated sewage into local streams. In 2010, Branch-Cass Regional Sewer Authority was acquired by the Schuylkill County Municipal Authority (SCMA).	Chris McCoach, Alfred Benesch & Company, personal communication, April 7, 2015; "PA Gov. Schweiker Administration Announces \$94 Million in Loans and Grnts for Clean-Water Projects." Nov 14, 2001. PRNewswire. www.prnewswire.com; Schuylkill county Municipal Authority. www.scmawater.com
Deer Lake Municipal Authority (acquired by Schuylkill County Municipal Authority in 2008)	Deer Lake Borough	Schuylkill	Pine Creek	In 2011, Schuylkill County Municipal Authority (SCMA) received grant and loan funding from PENNVEST to expand its Deer Lake wastewater treatment plant and construct several miles of sewerage collection lines. The project would eliminate several small, inadequate wastewater treatment plants and discharges from wildcat sewers and malfunctioning on on-lot septic systems to locate streams. Expansion and construction began in 2013. The wastewater treatment plant was completed and operational in September 2014. SCMA was awarded the Governor's Award for Environmental Excellence from PADEP in 2015 for completion of the project.	Chris McCoach, Alfred Benesch & Company, personal communication, April 7, 2015; "Pennsylvania Governor Corbett Announces \$99 Million Investment in Water Infrastructure Projects in 20 Counties." Jul 20, 2011. PRNewswire. www.prnewswire.com; Schuylkill county Municipal Authority. www.scmawater.com

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New Ringgold Municipal Authority	New Ringgold Borough	Schuylkill	Little Schuylkill and Koenig Creek	<p>In 2001, the Borough of New Ringgold received a loan from PENNVEST to design sewage collection lines and a WWTP to eliminate malfunction on-lot septic systems contaminating local drinking water wells, Koenig Creek and the Little Lehigh. The Borough of New Ringgold received over \$1.4 million in loans and grants in 2004 and over \$2.6 million in loans and grants in 2005 from PENNVEST to install approximately 3 miles of sewage collection lines to eliminate the use of malfunctioning on-lot septic systems that are contaminating a local stream and drinking water wells. The WWTP was completed in 2006.</p>	<p>"PA Gov. Schweiker Administration Announces \$94 Million in Loans and Grants for Clean-Water Projects." Nov 14, 2002. PRNewswire, www.prnewswire.com "PENNVEST Initiates Brownfield Program Approves \$97 Million for Water Projects," Mar 24, 2004. PRNewswire. www.prnewswire.com; "PENNVEST Approves \$100 Million for Water Projects." Mar 23, 2005. PRNewswire. www.prnewswire.com; "2014 Chapter 94 Annual Report Borough of New Ringgold Sewage Treatment Plant." 2014. <i>Chapter 94 Municipal Wasteload Management Report.</i></p>
West Hamburg	Tilden Township	Berks	Schuylkill River	<p>In 2008, Tilden Township received a \$5.3 million loan from PENNVEST to construct nearly six miles of sewage collection and transmission lines, three pump stations and other facilities to eliminate the use of wildcat sewers and malfunctioning on-lot septic systems discharging untreated and inadequately treated sewage into areas draining to the Schuylkill River.</p>	<p>"Governor Rendell Announces \$72 Million in Water Infrastructure Investments." Apr 14, 2008. PRNewswire. www.prnewswire.com</p>
Virginville	Richmond Township	Berks	Maiden Creek, Sacony Creek	<p>Richmond Township received a \$1.6 million loan in 2008 and over \$1.7 million in loans and grants in 2001 to construct a new WWTP, pump station, and sewage collection lines to serve 247 homes in the township, where malfunctioning on-lot septic systems are contaminating local wells. The Richmond-Virginville WWTP was completed in 2013.</p>	<p>"Governor Rendell Announces \$66 Million Investment in PA's Water Infrastructure," Oct 27, 2008, PRNewswire, www.prnewswire.com; "Governor Corbett Announces \$84 Million Investment in Water Infrastructure Projects in 14 Counties," Oct 26, 2011, PRNewswire, www.prnewswire.com; Steckbeck Engineering and Surveying, Inc., <i>Facebook</i>. www.facebook.com</p>

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Strausstown	Strausstown Borough	Berks	Tributaries to Blue Marsh Reservoir	<p>In 2002, Strausstown Borough received a loan from PENNVEST to design a sewage collection and treatment facility to serve Strausstown Borough and portions of Upper Tulpehocken Township, where wildcat sewers and malfunctioning on-lot septic systems are contaminating almost half of the local drinking water wells. In 2007, Strausstown Borough received \$3.65 million in loans and grants from PENNVEST to construct the wastewater collection and treatment system to serve both the Borough of Strausstown, as well as Upper Tulpehocken Township. The construction of approximately 3 miles of sewage collection lines and a 65,000-gallon per day wastewater treatment plant was completed in November 2009.</p>	<p>"Pennsylvania Gov. Schweiker Administration Announces \$95.5 Million in Loans and Grants for Clean Water Projects." Mar 20, 2002. PRNewswire. www.prnewswire.com; "Governor Rendell Announces \$69 Million in Clean, Safe Water Infrastructure Investments." Oct 23, 2008. PRNewswire. www.prnewswire.com; "Borough of Strausstown, Berks County, Sewage Treatment Plan, Municipal Wasteload Management." 2012. <i>Annual Report for 2012 DEP Rules and Regulations, Chapter 94</i>.</p>
Lenhartsville	Lenhartsville Borough	Berks	Furnace Creek, Maiden Creek	<p>Lenhartsville Borough received over \$1.3 million in 2002 and over \$1.6 million in 2004 in loans and grants from PENNVEST to construct a new sewage treatment plant and collection system to eliminate the use of on-lot septic systems contaminating drinking water wells and local streams, including Furnace Creek and Maiden Creek. The new sewage treatment plant went online in July 2005.</p>	<p>"Pennsylvania Governor Schweiker Announces \$3 Billion Milestone for Funding of Clean Water Projects in Pennsylvania." Nov 20, 2002. PRNewswire. www.prnewswire.com; "PENNVEST Initiates Brownfields Program, Approves \$97 Million for Water Projects." Mar 24, 2004. PRNewswire. www.prnewswire.com; PENNVEST. www.pennvest.pa.gov; "Borough of Lenhartsville Waste Water Treatment and Conveyance Facilities." 2012. <i>Title 25 Chapter 94 Municipal Wasteload Management Annual Report</i>.</p>
Sassmansville	Douglass Township	Montgomery	Schlegal Run and Middle Creek	<p>In 1999, 20 houses were cited by the Montgomery County Health Department for failing sewage systems. In 2007, Berks-Montgomery Municipal Authority completed a \$2.3 million project constructing a pump station and sewerage lines to serve a</p>	<p>"Douglass (Mont.) Oks Sassamansville Sewer Project." The Mercury News; Berks-Montgomery Municipal Authority Sewer Revenue Bonds. Apr 20, 2015. McElwee & Quinn Financial Printing. www.mcelweequinn.com.</p>

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				community of Sassmansville which is located in Douglass and New Hanover Townships.	
Village of Branchdale	Reilly Township	Schuylkill	Muddy Branch	The Village of Branchdale has wildcat sewers and failing on-lots. Alfred Benesch has worked on an Act 537 Plan for them but it is not affordable.	Chris McCoach, Alfred Benesch & Company, personal communication, April 7, 2015
Tamaqua	Tamaqua Borough	Schuylkill	Wabash Creek	Tamaqua Borough hired Alfred Benesch and Company to investigate wildcat sewers in Wabash Creek. A total of 101 connections were investigated - 17 had abandoned lines to Wabash Creek and were connected to the municipal sewer system. Five properties are not connected, four of which are vacant, abandoned properties with water service shut off. The remaining property is illegally discharging into Wabash Creek and has been issued several Notice of Violation Tickets and is being processed through the court system.	(Rob Jones, Tamaqua Public Works, personal communication, May 22, 2015)
South Tamaqua	West Penn Township	Schuylkill	Little Schuylkill	Act 537 planning in Walker and West Penn Townships is ongoing. The existence of wildcat sewers and malfunctioning on-lot disposal systems has been confirmed. In 2016, West Penn and Walker Townships continued to work with Rettew Associates and PADEP on Act 537 planning and creating a financially feasible plan to address 30 residences in five areas in need of sewage disposal. Possible solutions include five community on-lot sewage disposals or new or repaired individual on-lot sewage disposals. In March 2017, Walker Township's Board adopted a resolution to advance its	"Wildcat Sewers Exist in West Penn Township." Times News, LLC.. Apr 5, 2013. http://www.tnonline.com/2013/apr/05/wildcat-sewers-exist-west-penn-township ; "WestPenn-Walker Twp.. Sewage Plan Advances." Times News, LLC.. Mar 6, 2016. http://www.tnonline.com/2016/mar/05/west-penn-walker-twp-sewage-plan-advances "Walker Twp. submits sewage facility plan to DEP" Times News, LLC. Jun, 3, 2017. https://www.tnonline.com/2017/jun/0

				revised Act 537 plan to the state. In June 2017, the revised sewage facilities plan was submitted to the PADEP. The plan includes a maintenance ordinance that requires residents to have their on-lot septic systems pumped and inspected every three years. The 30 residences would either repair or replace their current system. Township officials met with DEP in December 2017 and adopted resolutions for their revised Act 537 sewage facility plan. The townships continue to await the completion of an administratively complete plan.	3/walker-twp-submits-sewage-facility-plan-dep "W. Penn, Walker to meet with DEP over previously submitted." Times News, LLC. Nov. 9, 2017. https://www.tnonline.com/w-penn-walker-meet-dep-over-previously-submitted "West Penn hears update on sewage facility plan." Times News, LLC. Feb. 21, 2018. https://www.tnonline.com/west-penn-hears-update-sewage-facility-plan
River Road Properties*	Philadelphia	Philadelphia	Schuylkill	Construction to connect residents of Upper Roxborough along Nixon Street and River Road to the public sewer system commenced in October 2019.	Weilbacher, M. "Natural Selections: Joanne Dahme - water is in her blood" Montgomery News. Nov. 28, 2018. http://www.montgomerynews.com/roxeview/opinion/natural-selections-joanne-dahme-water-is-in-her-blood/article_17d5fbbe-f262-11e8-9b89-9f0a3a92d9bb.html?fbclid=IwAR1urpwwdEjXprlRONJTrbq_Obg5WjrlxAXI_hNd3E3fqv5pMnIrXk9Nd_JY
Albany	Albany Township	Berks	Maiden Creek	Unknown	
Port Indian	West Norriton	Montgomery	Schuylkill River, main stem	Unknown	
Geigertown*	Geigertown	Berks	Hay Creek	Installation of a new sewer system and pumping station which connects 115 residents from failed, antiquated, and non-existent septic systems to an existing system 6 miles away in Birdsboro, PA. Residents will have until June 2020 to connect to the \$6 million project.	https://www.dailylocal.com/news/union-township-couple-pushes-to-get-geigertown-sewer-project-back/article_0043a620-ff2e-11e9-9685-df45bfbca347.html

*Updated from news sources

Appendix D: Schuylkill Action Network Annual Meeting

20
19

Schuylkill Action Network Annual Meeting



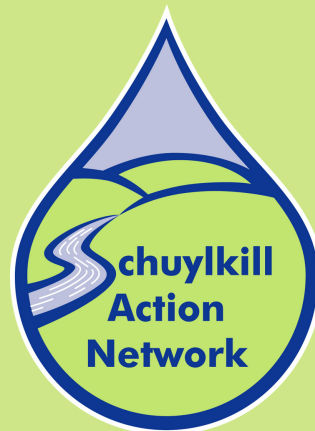
Photo by Jeremiah Green



Photo by Julia Aguilar



Tuesday, Dec. 10, 2019
9:30 am - 3:30 pm



Albright College
Reading, PA

PLANNING COMMITTEE



AGENDA

9:30-10:00

Registration & light breakfast

Kicking Off the 2019 "SANnual" Meeting

10:00-10:25 AM

10:00-10:10

Welcome to SAN Annual Meeting & Albright College

Virginia Vassalotti, *Partnership for the Delaware Estuary* & Andrea Weist, *Albright College*

10:10-10:15

Celebratory Welcome

Cathy Libertz, *U.S. EPA Region 3* & *SAN Executive Steering Committee Chair*

10:15-10:25

A Year in Review: Accomplishments in 2019

Virginia Vassalotti, *Partnership for the Delaware Estuary*

Presentations: Part 1

10:25 AM - 12:00 PM

10:25-10:40

Porter Floodplain Restoration Project

Bill Reichert, *Schuylkill Headwaters Association*

10:40-11:05

Reflections on Collaboration and Capacity Building from the Alliance for Watershed Education

Regan Moll-Dohm, *Berks Nature*

11:05-11:30

New Funding for the Delaware Basin: Delaware Watershed Conservation Fund

Rachel Dawson, *National Fish & Wildlife Foundation*

11:30-12:00

Helping Clean Our Waters, One Hatched Mussel at a Time

Kurt Cheng, *Partnership for the Delaware Estuary*

12:00-12:50

Lunch & SAN MVP Award

Strategic Planning Session

12:50-2:00 PM

12:50-1:00

Introduction to SAN Strategic Planning

Virginia Vassalotti, *Partnership for the Delaware Estuary*

1:00-2:00

Strategic Planning Activity

All

2:00-2:10

BREAK

Presentations: Part 2

2:10-3:25 PM

2:10-2:35

County Comprehensive Plans Leading to Environmental Policy and Real Improvements

Scott France, *Montgomery County Planning Commission*

2:35-3:00

Land Protection: Bryn Coed, 18 Years, and 16 Years

Peter Williamson, *Natural Lands* & Pam Brown, *French & Pickering Creeks Conservation Trust*

3:00-3:25

An Overview of Schuylkill Acts & Impacts: An Expedition for High School Students to Inspire Watershed Action

Ellen Schultz, *Fairmount Water Works* & Alexa Smith, *Schuylkill Conservation District*

3:25-3:30

Wrap up

WELCOME TO THE SAN ANNUAL MEETING!



Cathy Libertz

Director, Water Division

EPA Region III

SAN Executive Steering Committee (ESC) Chair

December 10, 2019

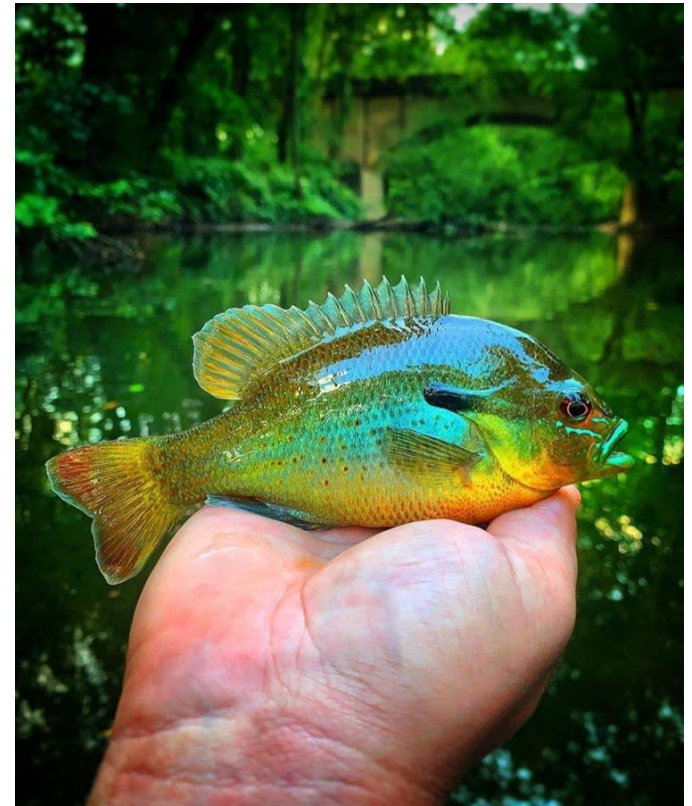
Schuykill Action Network (SAN)

- **Mission:** Improve water resources in the Schuykill River Watershed
- Executive Steering Committee & Planning Committee
- **Workgroups:**
 - Abandoned Mine Drainage
 - Agriculture
 - Education & Outreach
 - Pathogens & Point Source
 - Recreation
 - Stormwater
 - Watershed Land Collaboration
- SchuykillWaters.org



2019 SAN Highlights

- **Restoration Projects**
 - AMD treatment systems & monitoring
 - Agricultural BMPs
 - Stormwater BMPs
- **Outreach, Events & Recreation**
 - Schuylkill Street Art Contest
 - Schuylkill Scrub Cleanups
 - Schuylkill Sojourn & Schuylkill Acts & Impacts
 - Fish the Schuylkill
 - Funding for MS4 Projects Workshop
 - SAN Bus Tour & SRRF Press Event

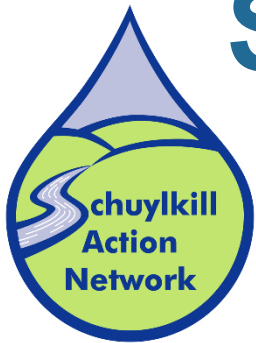


Thanks to SAN Planning Committee & Executive Steering Committee!





A Year in Review: 2019 SAN Accomplishments



*Virginia Vassalotti,
Partnership for the Delaware Estuary*

Tuesday, December 10, 2019

SAN Workgroups



Abandoned Mine Drainage (AMD) Work Group

- **Goal** = Maximize reduction and/or treatment of abandoned mine drainage.
- **2019 Accomplishments:**
 - March tour
 - Retrofitted the Reevesdale treatment system
 - New walking trail at New Philadelphia (near stream restoration project)
 - Monitored 5 treatment systems
 - Porter floodplain restoration
(stay tuned for Bill's presentation!)



Agriculture Work Group

- **Goal** = Maximize reduction and/or prevention of agricultural impacts to water quality.

- **2019**

Accomplishments:

- National Water Quality Initiative for Maiden Creek Watershed
- \$1.67 million invested from NRCS on...
 - Nutrient management plans
 - Manure storage
 - Barnyard repairs
 - Stream crossings
 - Riparian buffer plantings



Love Farm

Education & Outreach (E&O) Work Group

- **Goal** = Improve public support for watershed protection actions.
- **2019 Accomplishments:**
 - Schuylkill Scrub stats...
 - Over 400 cleanups
 - 28,433 volunteers
 - Over 1.1 million pounds of litter
 - 727 tires
 - Scrub & Pub event in Bridgeport
 - Street Art Contest
 - In school programming
 - Storm drain markers



Pathogens & Point Source Work Group

- **Goal** = Facilitate and strengthen communication and coordination among regulatory agencies, downstream water users, and basin stakeholders regarding CWA and SDWA goals
- **2019 Accomplishments:**
 - Delaware Valley Early Warning System
 - Water Utility Forum (2018) and upcoming in 2020!
 - Save the date: Jan 28, 2020



Recreation Work Group

- **Goal** = Engage recreational users of the watershed in activities that lead to increased awareness and advancement of watershed protection and restoration strategies.
- **2019 Accomplishments:**
 - 21st annual Schuylkill River Sojourn
 - Over 200 participants
 - Sojourn Steward: Julia Aguilar
 - #FishtheSchuylkill campaign and photo contest
 - Philly Fun Fishing Fest
 - 112 attendees
 - 250 fish caught



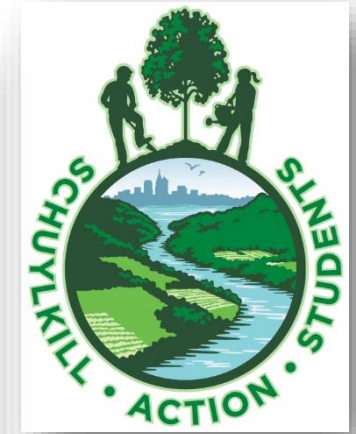
Stormwater Work Group

- **Goal** = Improve stormwater management to reduce and/or prevent stormwater runoff pollution.

- **2019**

- **Accomplishments:**

- Funding for MS4 Projects Workshop
 - 80 attendees
- New Schuylkill Action Students logo and brochure
- Presentations and tours at quarterly meetings

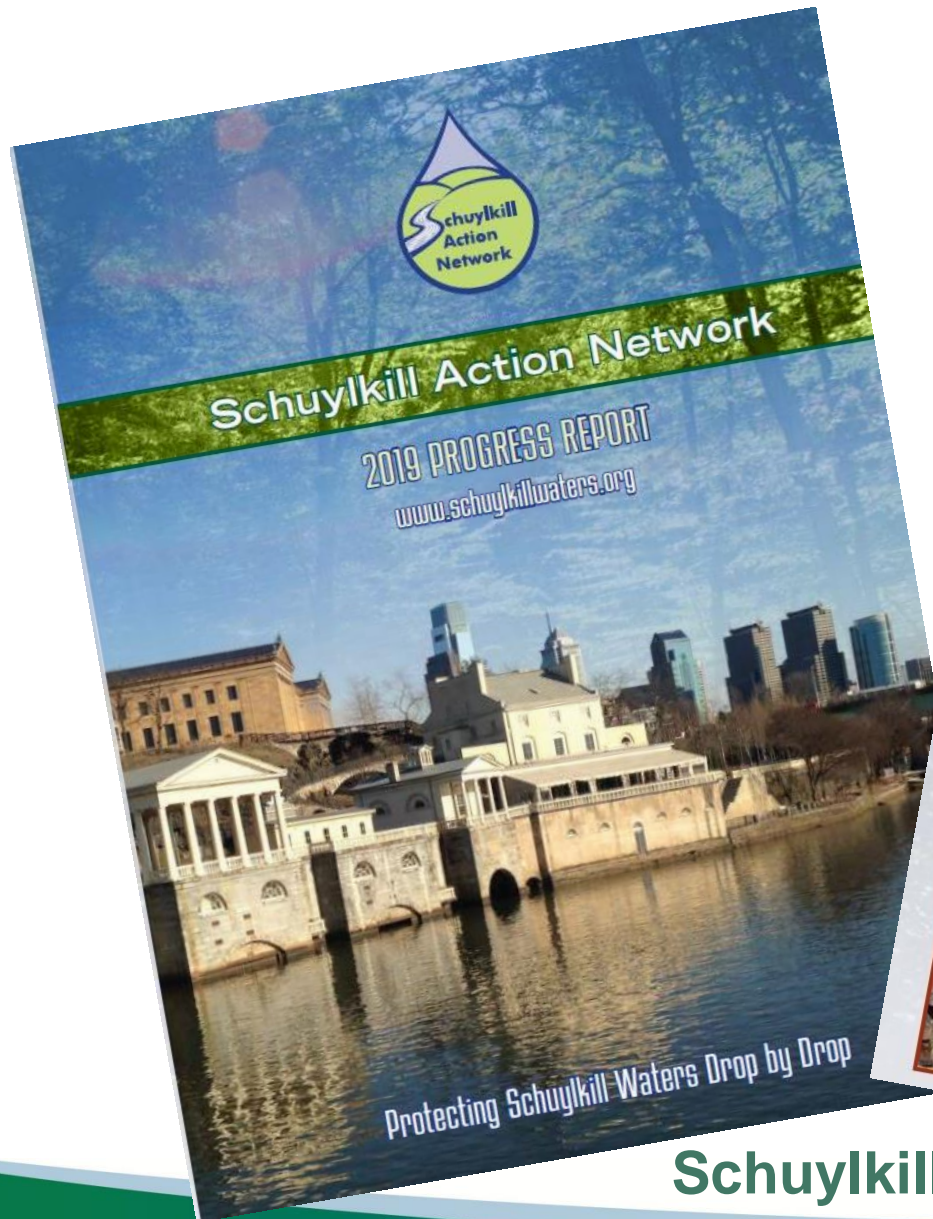


Watershed Land Collaborative

- **Goal** = Promote a sustainable landscape in the Schuylkill River Watershed through strategic conservation and efficient land use/management to protect the integrity of water supplies for future generations.
- **2019 Accomplishments:**
 - (Schuylkill Highlands Cluster)
 - June stakeholder bus tour
 - New projects:
 - 16 & 18 Years LLC
 - Bryn Coed (Stay tuned! You'll hear more from Pam & Peter!)
 - Buck Hollow Preserve



2019 SAN Progress Report



About the Schuylkill Action Network

The Schuylkill Action Network (SAN) is a collaborative network with over 150 partner organizations all working together to protect and restore the Schuylkill River and its tributaries. The SAN protects this valuable resource through collaboration, implementation of clean water projects, and promotion of long-term stewardship.

Schuylkill River Restoration Fund (SRRF)

Tim Fanchel from Schuylkill River Greenways announces the 2019 SRRF grantees.

In 2019, Schuylkill River Greenways awarded \$326,359 in grants to fund 9 projects in the Schuylkill River Watershed.

\$4 million	\$326,359
total SRRF funding since 2006 for 113 projects	from SRRF in 2017 for 9 projects
	\$5.4 million
	leveraged in 95 projects since 2006

The Schuylkill River Restoration Fund provides grants to government agencies and non-profit organizations that improve water quality in the Schuylkill Watershed. The grants focus on addressing stormwater runoff, agricultural pollution, and abandoned mine drainage. Funds are also allocated for land preservation projects. The fund was created in 2006 through a unique public/private partnership between Exelon, the Delaware River Basin Commission, and Schuylkill River Greenways. In 2019, fund donations came from Exelon Generation, Philadelphia Water Department, Aqua PA, MOM's Organic Market, and DTE Energy.

SCHUYLKILL RIVER RESTORATION FUNDING AND LEVERAGED FUNDING SINCE 2006

Strategic Planning

Participants in the SAN Bus Tour in East Greenville, PA.

Every five years, the Schuylkill Action Network revises its strategic plan. The SAN Planning Committee has already begun reviewing the 2016-2020 Strategic Plan in order to gear up for the new 2021-2025 plan. We look forward to hearing your feedback in 2020 on what has worked well, what needs to be improved, and what the future holds for the SAN.

SAN EVENTS IN 2019:

- Abandoned Mine Drainage Tour – 20 Attendees – April 23, 2019
- Scrub and Pub – 29 Attendees – May 16, 2019
- Funding for MS4 Projects Workshop – 80 Attendees – August 7, 2019
- SAN Bus Tour & SRRF Press Event – 45 Attendees – September 13, 2019

SchuylkillWaters.org



Partnership for the
**DELAWARE
ESTUARY**

Let's Collaborate!

Virginia Vassalotti

Schuykill Action Network Coordinator

(302) 655-990, x121 | VVassalotti@DelawareEstuary.org

*Connecting people, science, and nature
for a healthy Delaware River and Bay*

PORTER FLOODPLAIN RESTORATION

















Google Earth

Dunes











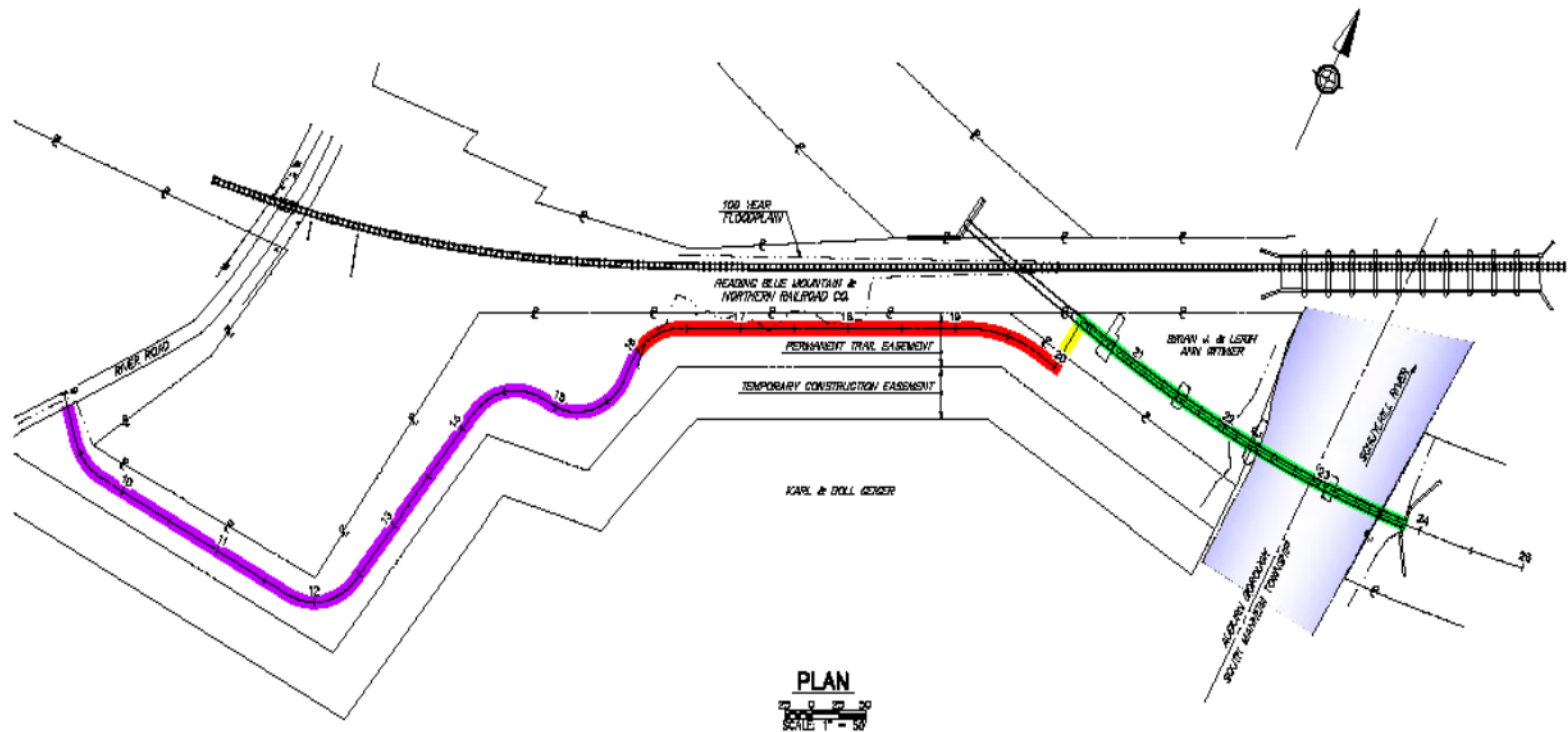












LEGEND

- ON-GRADE TRAIL
- TRAIL ON MSE WALLS
- CONNECTOR BRIDGE
- RE-DECK EXISTING BRIDGE

Mark	Description	By	CHK'd	Rev'd	Date
REVISIONS					

SCHUYLKILL RIVER GREENWAY ASSOC
SCHUYLKILL RIVER TRAIL
SCHUYLKILL COUNTY
BARTRAM TRAIL SEGMENT
 AUBURN BOROUGH & SOUTH MANHEIM TOWNSHIPS
 (ABANDONED PA RR, SCHUYLKILL RIVER BRANCH, BRIDGE NO. 83.40)
 OVER SCHUYLKILL RIVER
AUBURN PEDESTRIAN BRIDGE
SITE PLAN





An aerial photograph of a city skyline, likely New York City, featuring a river (the Hudson River) in the foreground. The skyline includes several prominent skyscrapers, some under construction with cranes. The foreground is dominated by lush green trees and a bridge crossing the river. The sky is a clear, bright blue.

REFLECTIONS ON COLLABORATION AND CAPACITY BUILDING

from the Alliance for
Watershed Education

December 10, 2019

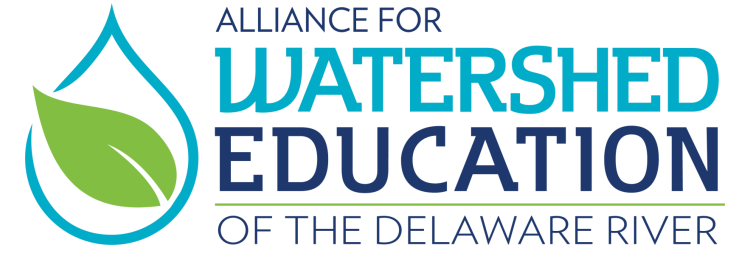
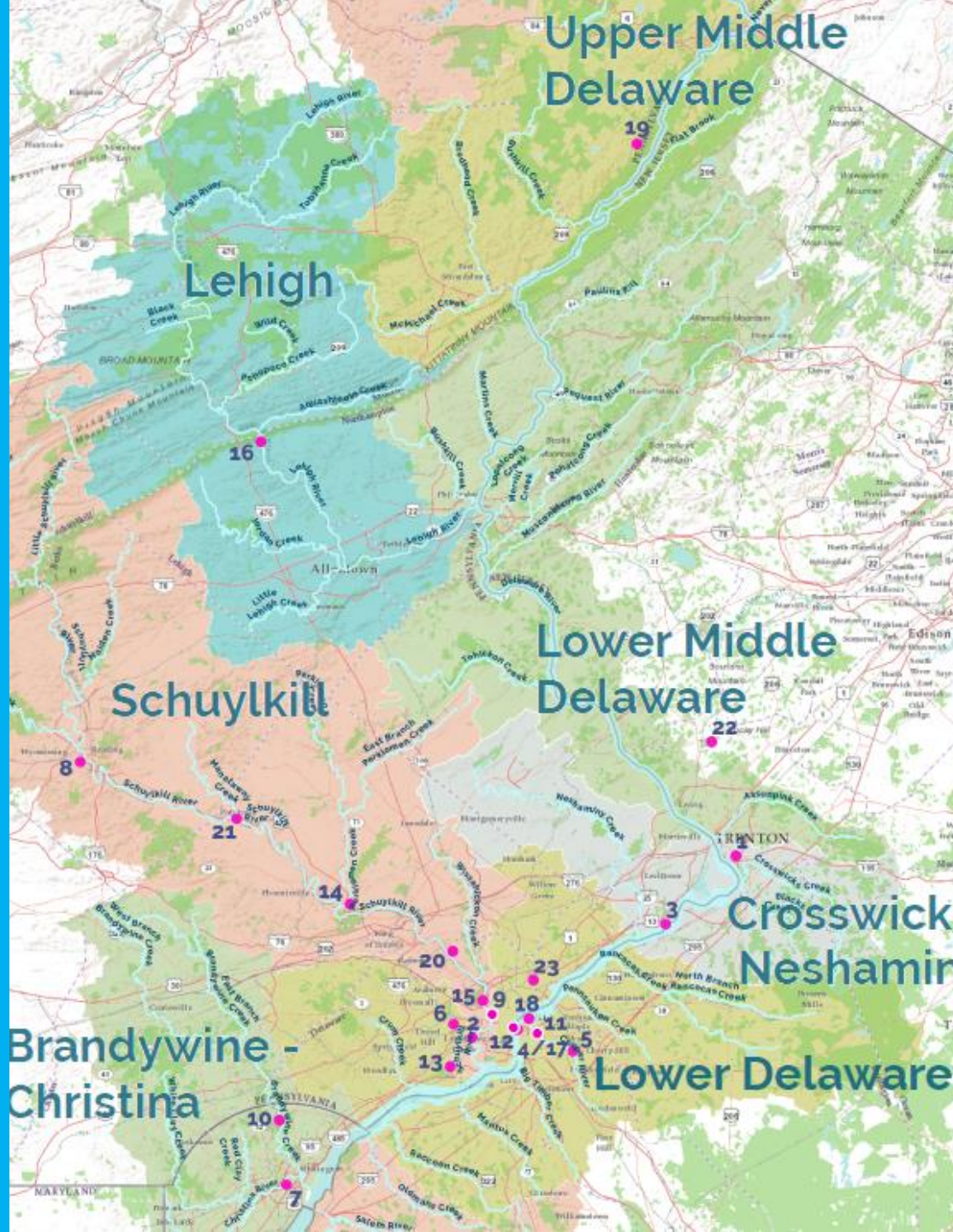
REGAN MOLL-DOHM

AWE Development Specialist | regan.dohm@berksnature.org



MISSION

Collectively increase and enhance constituency appreciation, knowledge, and stewardship of the Delaware River watershed, leading to greater protection and restoration of the watershed.





GOAL 1

Create a **larger and more inclusive constituency of people engaged** at and near centers and their waterways as defined by center-level constituency goals.



GOAL 2

Increase and enhance **constituent attitudes** (e.g., self-efficacy, pride, and appreciation), **knowledge, and intention to act** to ensure a healthy Delaware River watershed.



GOAL 3

Collaborate, learn from one another, and deliver **high-quality, inclusive watershed education programs** that are sensitive to community priorities.

RIVER DAYS

- Month-long, watershed-wide event series now consisting of 35 events!
- First point of contact for new constituents
- Annually, mid-September to Mid-October





500,000
people engaged through Center



10,000
miles traveled



11,000
River Days attendees



30%
increase in
participation

RIVER DAYS



AWE GOAL 1

Over 40% of Centers believed River Days **MODERATELY** contributed to broadening their constituency



AWE GOAL 2

Centers generally felt that River Days attendees **INCREASED** their awareness and knowledge



AWE GOAL 3

Over 50% of Centers believed River Days **ENHANCED** their collaborations.



VALUE

Over 80% of Centers felt that River Days was **VALUABLE** to them.

WATERSHED FELLOWSHIP

- 12-week PAID summer internship
- Centers host young adults from underrepresented community
- Capstone project
- Growing watershed ambassadors





80
Fellows

In 2017, Fellows engaged with an estimated **11,256** people.



2,355
people engaged per week

Since its inception in 2017, the Fellowship Program has served **3 cohorts of Fellows.**



28,258
people engaged in 2018

Fellows at Berks Nature have directly impacted **800 students** in the **City of Reading**

WATERSHED FELLOWSHIP



AWE GOAL 1

Over 80% of Centers indicated that the Fellows Program **ENHANCED** their reach to a new and diverse constituency.



AWE GOAL 2

86% of Centers felt that the Fellows Program **ENHANCED** their Center's programming.



AWE GOAL 3

78% of Centers believed Fellowship Program **ENHANCED** their relationship with other AWE Centers.



VALUE

Over 90% of Centers felt that the Watershed Fellows Program was **VALUABLE** to them.

VALUE TO CENTERS

“

*...We collaborated with the help of an AWE Innovations Fund grant to offer a shuttle service. This gave us an opportunity to highlight the interconnectedness of the waterways bordered by each of these centers, **with young “shuttle ambassadors” from Southwest Philadelphia disseminating information about the watershed** and AWE aboard the vehicles.*

*This year we were able to really focus on **broadening our constituency and I think we were very successful.** We had 1500 Camden residents pre-register for the event and almost 1000 attend. We were also able to **work with other local organizations to reach out to the constituents,** building a pipeline for future collaboration*

”

RIVER DAYS

- Expanded marketing opportunities
- Credibility building
- AWE-provided communication tools
- Collaboration for neighboring Centers

FELLOWSHIP

- Staff Capacity
- Funding for programs
- Effective at engaging priority communities

VALUE TO CENTERS

“

*Our Fellows participated 100%, alongside other Educators, in the creation and development of our summer camp education programs. **Their leadership, program ideas and execution of the programs were vital** to our summer education program success and without them, the summer activities would not have been as creative, since their "youthful" knowledge played a part in the development.*

”

RIVER DAYS

- Expanded marketing opportunities
- Credibility building
- AWE-provided communication tools
- Collaboration for neighboring Centers

FELLOWSHIP

- Staff Capacity
- Funding for programs
- Effective at engaging priority communities



SHARED PROFESSIONAL DEVELOPMENT

Coordinated by the Network Development Workgroup – tasked with building relationships between Centers to share knowledge, collaborate, and build Center staff skills.

The primary professional development strategy employed by the Network Development Workgroup.

Twice annual gathering of member Center's professional staff to share, model, network, and innovate.

WPI
WATERSHED PROFESSIONALS
INSTITUTE

WPI

Practices and resources from WPIs are **RELEVANT** and have **DIRECT APPLICATIONS** to a Center's work.



KNOWLEDGE GAINED

- Diversity of the Delaware River Watershed
- General knowledge of water, land, and conservation

PROFESSIONAL SKILLS DEVELOPED

- Communicating with reporters
- Engaging on Social Media
- Utilizing program evaluation tools
- Supporting the Fellowship Program



VALUE OF AWE

Proven programs that generate more and new diverse audiences

Proven programs that create change in individuals and help build a movement

Organizational development that ensures staff are better trained, represent a diverse community, and are retained in the long-term

**THANK
YOU**

I will happily take
any questions at
this time.



ALLIANCE FOR
**WATERSHED
EDUCATION**
OF THE DELAWARE RIVER

FIND US ON SOCIAL MEDIA

[Facebook](#)

[Instagram](#)

[Twitter](#)

[@dralliance](#) | [@Alliance4WatershedEd](#) | [@DelRiverWatershed](#)

REGAN MOLL-DOHM

AWE Development Specialist | regan.dohm@berksnature.org



ENVIRONMENTAL SENSITIVITY

Fellows demonstrated a significant, **INCREASE** in internal motivation towards environmental action following the Watershed Fellowship experience.



LEADERSHIP

Fellows demonstrated a **POSITIVE** shift in leadership self-perceptions following the Watershed Fellowship.

Fellows developed **KNOWLEDGE** and **SKILLS** important to becoming watershed ambassadors in the future. Fellows described a perceived increase in communication, education, and naturalist skillsets.



GOALS

For matriculating Fellows

EXPLORING THE DELAWARE WATERSHED CONSERVATION FUND

Rachel Dawson
Program Director, Delaware River
National Fish and Wildlife Foundation

Schuylkill Action Network
Annual Meeting – December 10, 2019



Delaware Watershed Conservation Fund

Conservation Action Grants



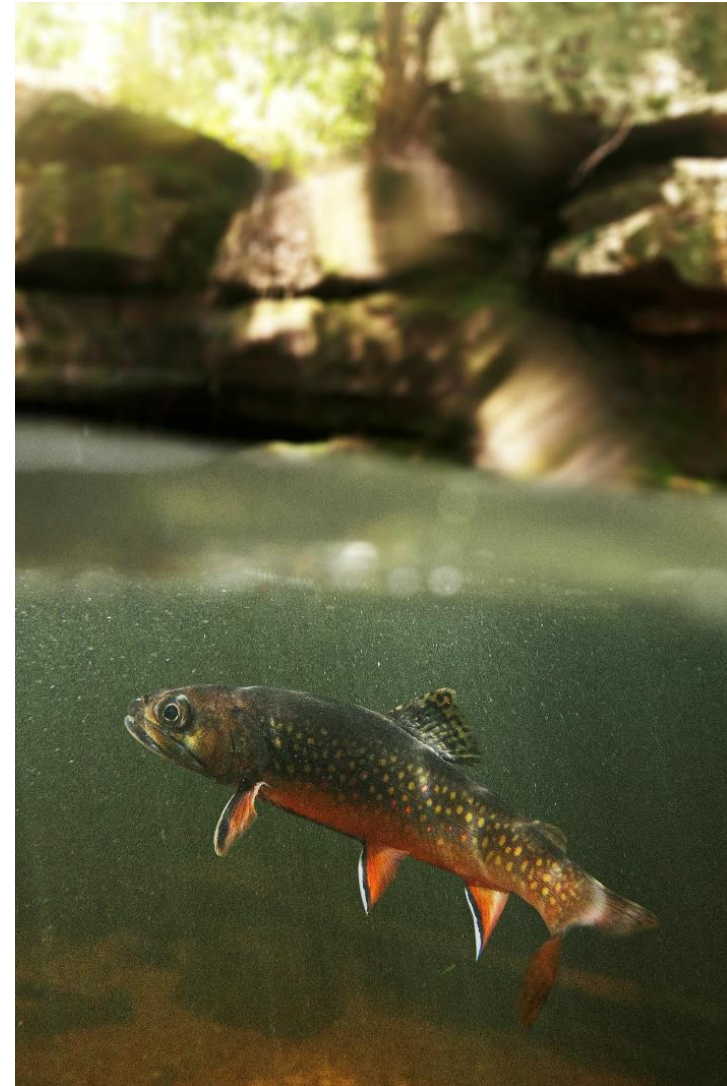
Delaware River Program 2020 RFP - DWCF

- Request for Proposals (RFP) drops Feb 2020
- Proposals due April 2020
- About \$5M available
- DE watershed only
- Conservation Action Grants for four priority strategies
 - Up to \$250,000
 - 1:1 nonfederal match required – can be cash, in-kind, TBD
- Apply via NFWF Easygrants on-line system



Habitat

Goal: To sustain and restore fish and wildlife populations through conservation and restoration of their associated habitats and promote native ecosystem restoration.



Water Quality

Goal: To protect and maintain water quality through projects and non-regulatory programs aimed at improving land and watershed management and reduce pollutants that can impair water quality.



For more information, please feel free to contact
US...

Rachel Dawson

Program Director, Delaware
River

(202) 595-2643

Rachel.Dawson@nfwf.org

Claire Flynn

Manager, Northeastern Region

(202) 595-2449

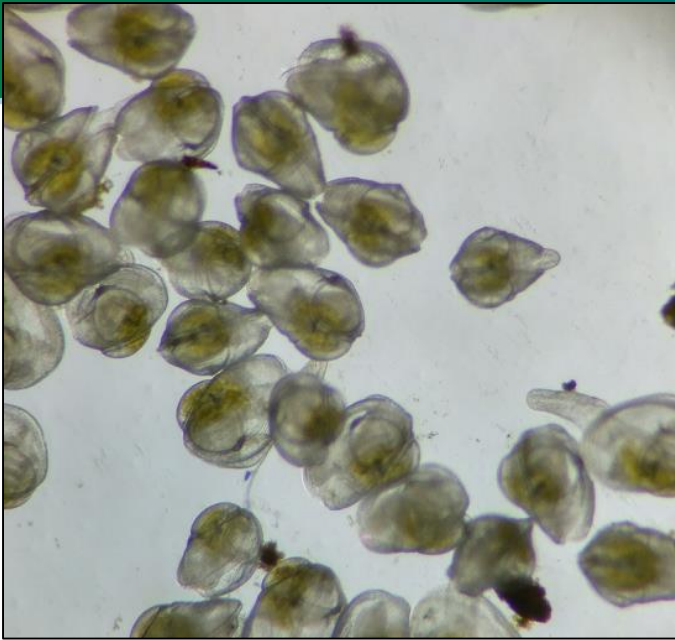
Claire.Flynn@nfwf.org



www.nfwf.org/delaware



Helping Clean our Waters, One Hatched Mussel at a Time



Kurt Cheng

December 10th 2019

SAN Annual Meeting

Freshwater Mussels

- 700+ Globally
- ~300 North America
- 13 species in Delaware River Basin



One of the most imperiled aquatic animal groups in North America

State Conservation Status of Freshwater Mussels				
Freshwater Mussel		State Conservation Status		
Scientific Name	Common Name	DE	NJ	PA
<i>Alasmidonta heterodon</i>	Dwarf Wedgemussel	Possibly Extirpated	Endangered	Critically Imperiled
<i>Alasmidonta undulata</i>	Triangle Floater	Possibly Extirpated	Threatened	Vulnerable
<i>Alasmidonta varicosa</i>	Brook Floater	Extirpated	Endangered	Critically Imperiled
<i>Elliptio complanata</i>	Eastern Elliptio	Secure	Secure	Apparently Secure
<i>Lampsilis cariosa</i>	Yellow Lampmussel	Possibly Extirpated	Threatened	Apparently Secure
<i>Lampsilis radiata</i>	Eastern Lampmussel	Critically Imperiled	Threatened	Critically Imperiled
<i>Lasmigona subviridis</i>	Green Floater	no data	Endangered	Imperiled
<i>Leptodea ochracea</i>	Tidewater Mucket	Critically Imperiled	Threatened	Critically Imperiled
<i>Ligumia nasuta</i>	Eastern Pondmussel	Critically Imperiled	Threatened	Imperiled
<i>Margaritifera margaritifera</i>	Eastern Pearlshell	no data	no data	Critically Imperiled
<i>Pyganodon cataracta</i>	Eastern Floater	Apparently Secure	Secure	Apparently Secure
<i>Strophitus undulatus</i>	Creeper	Critically Imperiled	Special Concern	Secure
<i>Utterbackiana implicata</i>	Alewife Floater	Critically Imperiled	Secure	Vulnerable

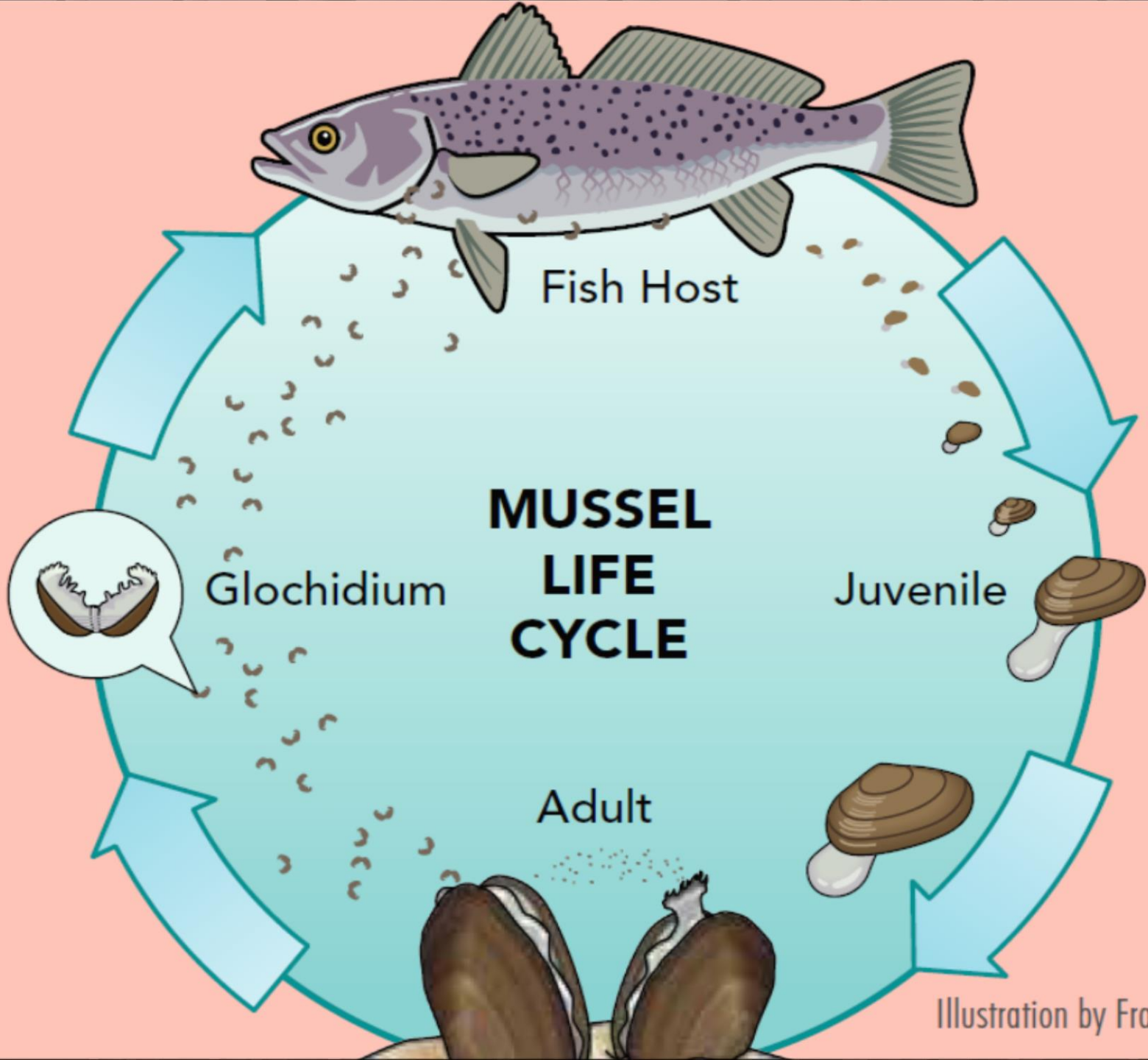
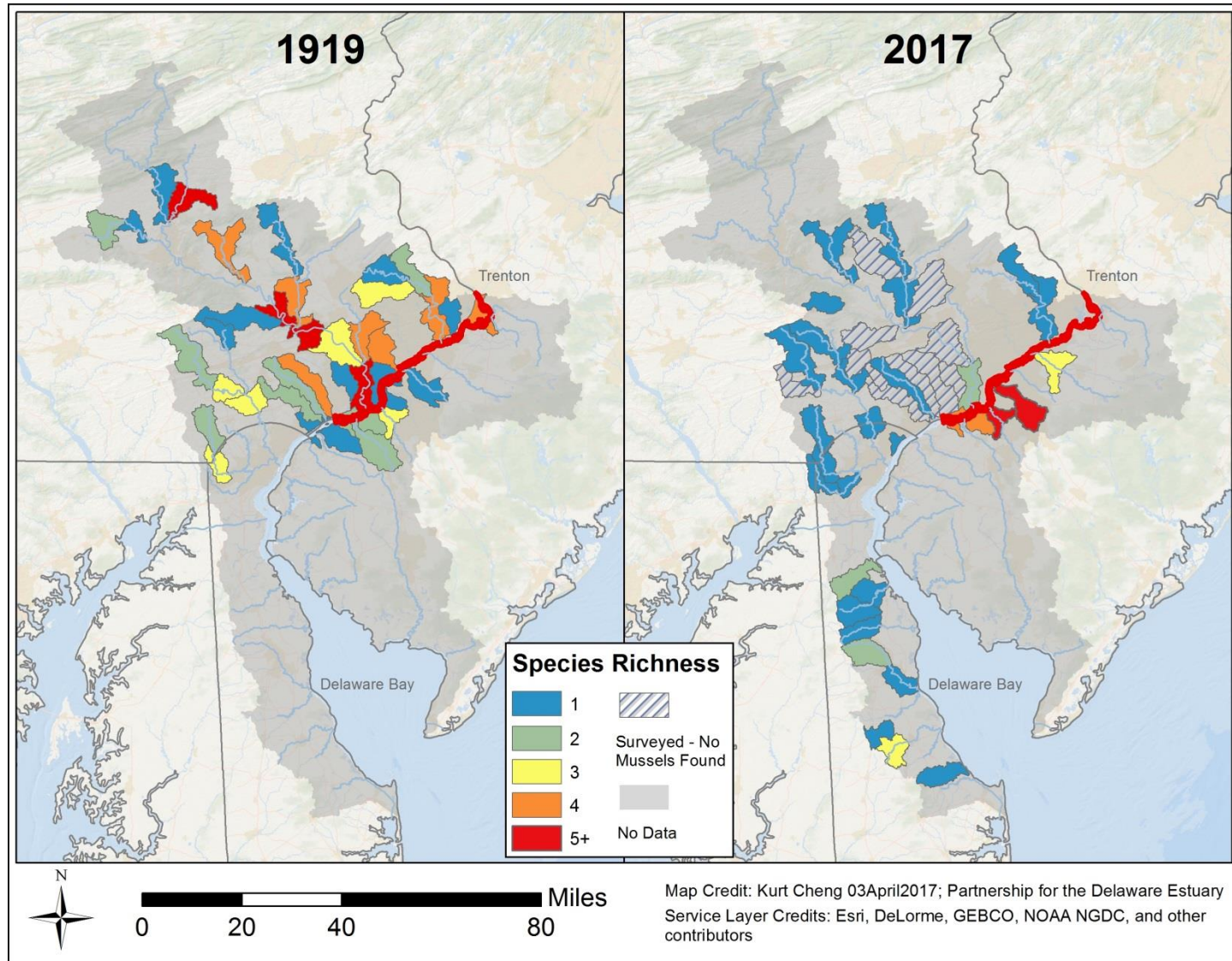
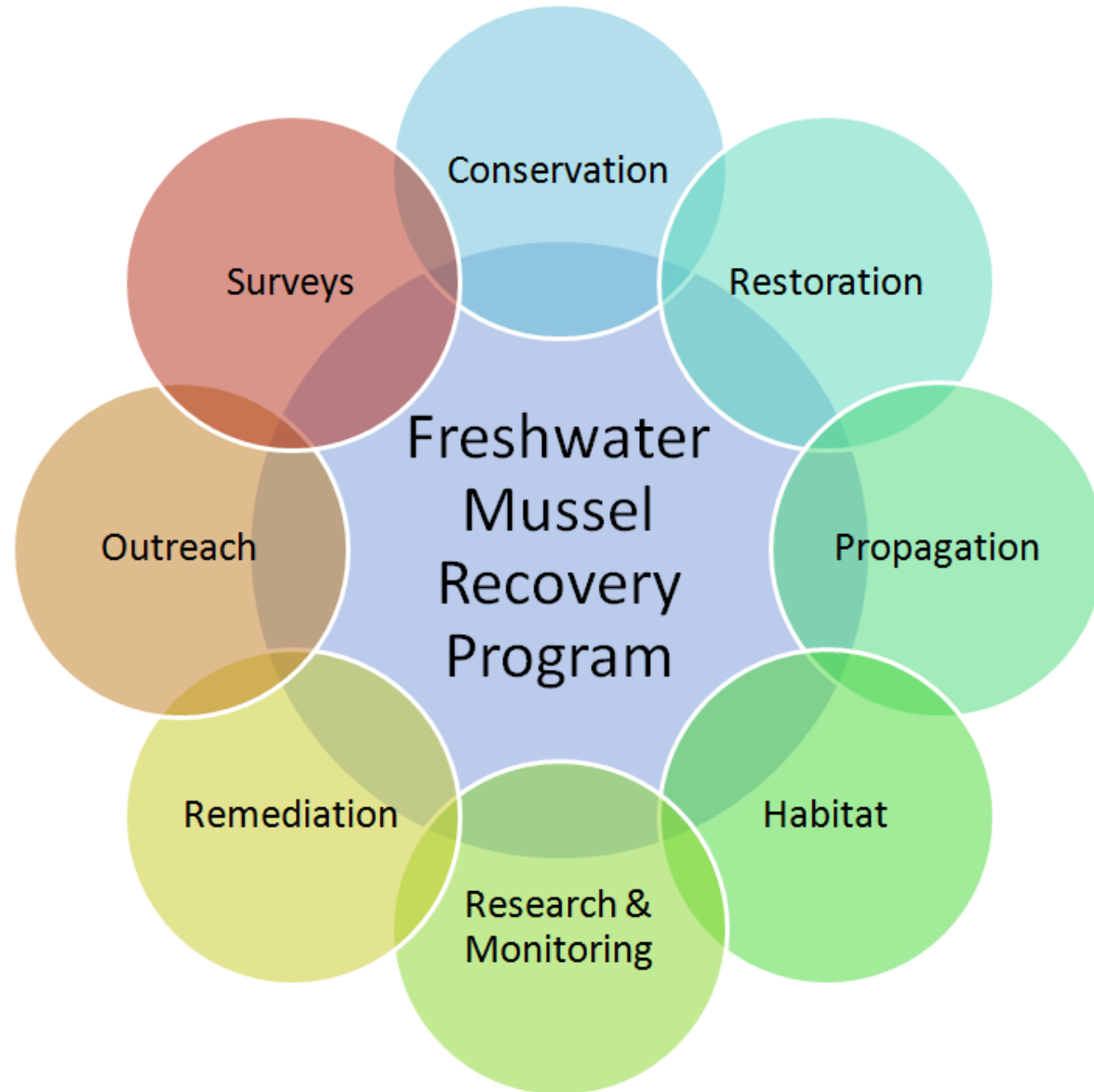


Illustration by Frank McShane.

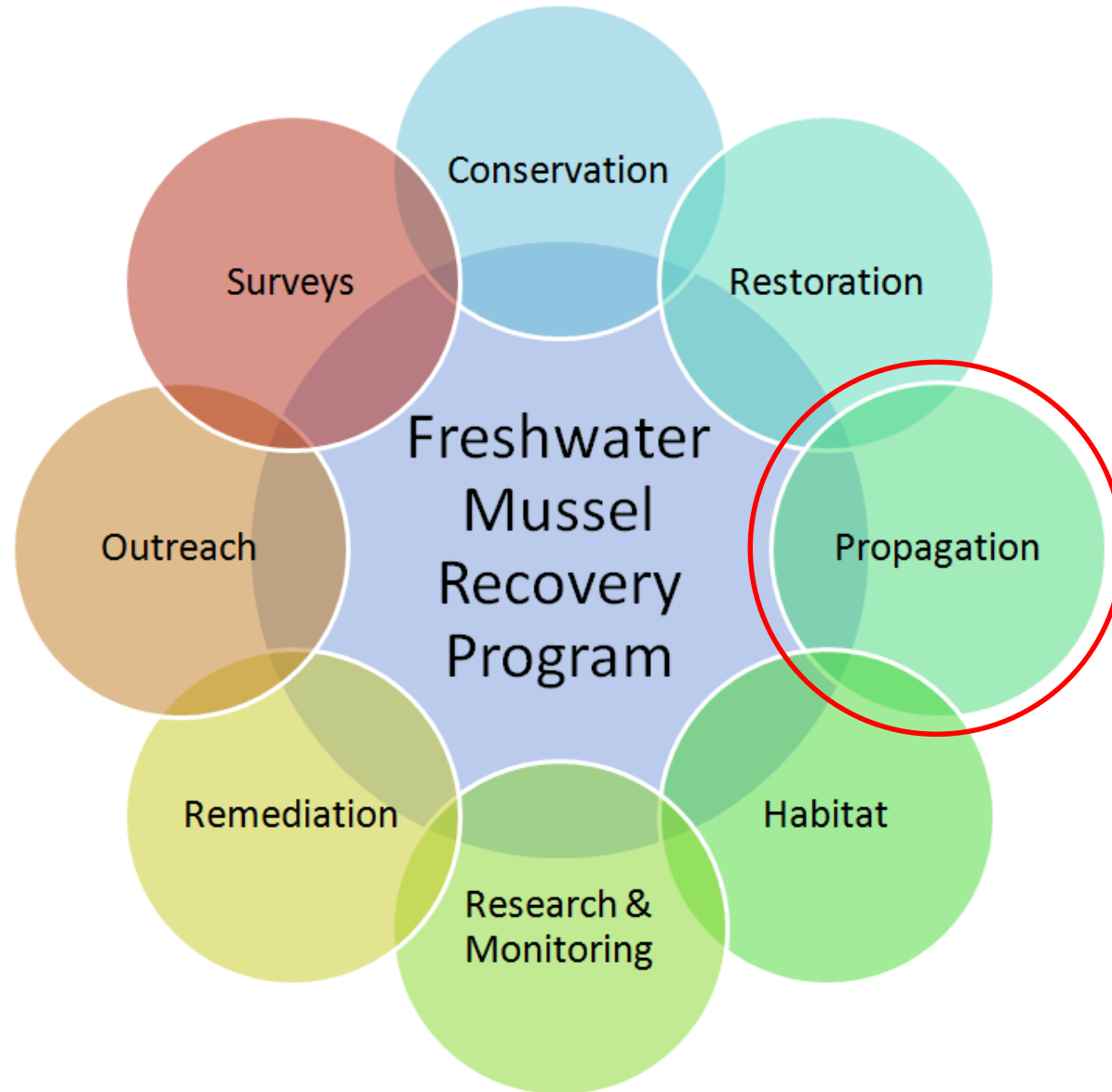
Trends in Delaware Estuary Populations



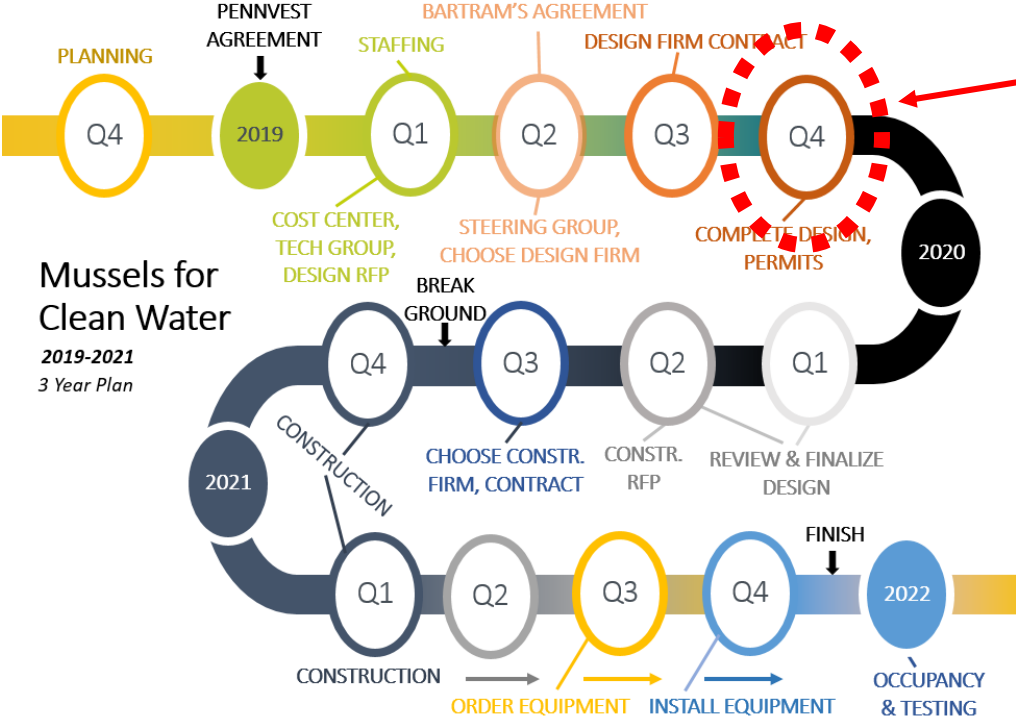
Freshwater Mussel Recovery Program



Freshwater Mussel Recovery Program

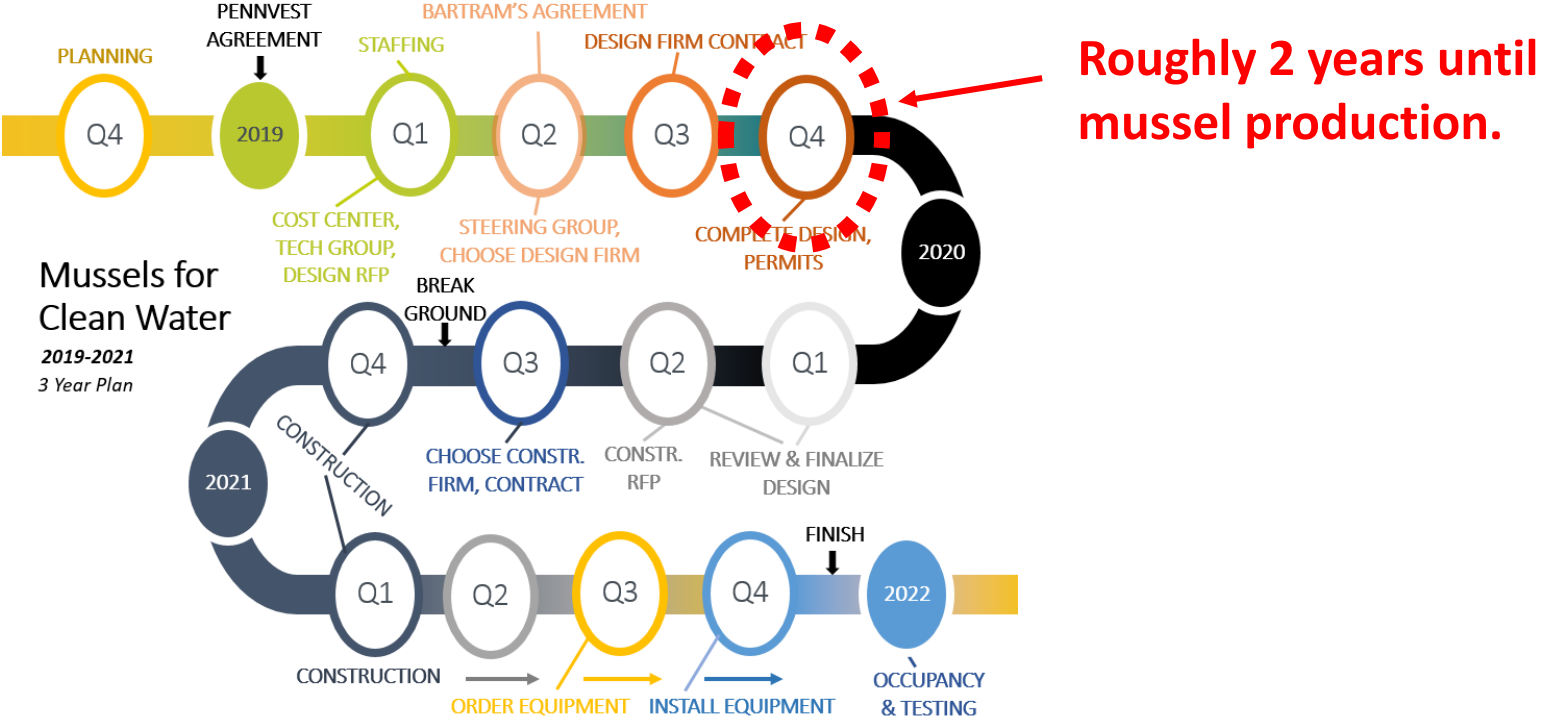


PDE Hatchery Timeline



Roughly 2 years until mussel production.

PDE Hatchery Timeline



Until then...

Topics to address...

- 1. What is the current status of mussels in our rivers and lakes?**
- 2. Where missing, would mussels thrive today?**
- 3. Where should mussels be prioritized?**

Topics to address...

- 1. What is the current status of mussels in our rivers and lakes?**
- 2. Where missing, would mussels thrive today?**
- 3. Where should mussels be prioritized?**

Surveys

Qualitative

- Covers large area
- Very inexpensive
- Presence/Absence data
- Efforts can be built upon
- Citizen scientists can observe without permits / disruption

Quantitative

- Covers very small area
- Expensive and laborious
- Population demographic data
- Data become outdated
- Disturbs mussels and habitat

Surveys

Qualitative

- Covers large area
- Very inexpensive
- Presence/Absence data
- Efforts can be built upon
- Citizen scientists can observe without permits / disruption
- **Open to all interested parties**

Quantitative

- Covers very small area
- Expensive and laborious
- Population demographic data
- Data become outdated
- Disturbs mussels and habitat
- **Restricted to professionals with permits.**

Qualitative Surveys

- Some historical data from 1900s
- Impossible to survey all streams continually
 - Local stewards know their streams best
- Volunteer surveys in past have provided insights
 - Farm ponds stocked with fish



Main Survey Results

- Presence of mussel species
- Absence of mussel species
- Habitat condition such as...
 - Water level / flow
 - Bed stability
 - Fish species present

Freshwater Mussels - Data Portal

Share your observations with our scientists to help protect and restore freshwater mussels in the Delaware Estuary. Be sure to hit SUBMIT when finished!

Have questions, comments, or interesting mussel photos? Talk to our Shellfish Coordinator, Kcheng@delawareestuary.org

* Required

Section 1: General Survey Information

Please complete all relevant sections for each survey performed

Name of person submitting data *

Your answer _____

Topics to address...

1. What is the current status of mussels in our rivers and lakes?

2. Where missing, would mussels thrive today?

3. Where should mussels be prioritized?

Habitat Assessment

Adult Mussels

- Reintroductions

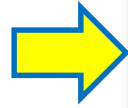
Juvenile Mussels

- Floating baskets
- Cement silos

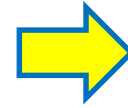
Water Quality

- Dissolved
- Particulate

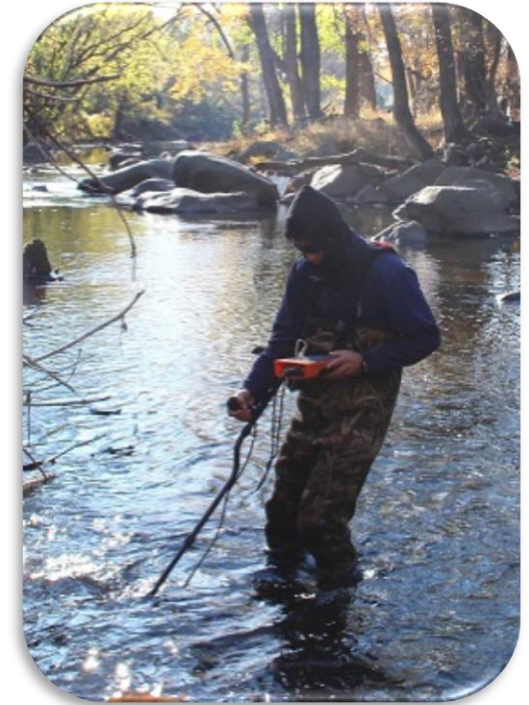
Tag



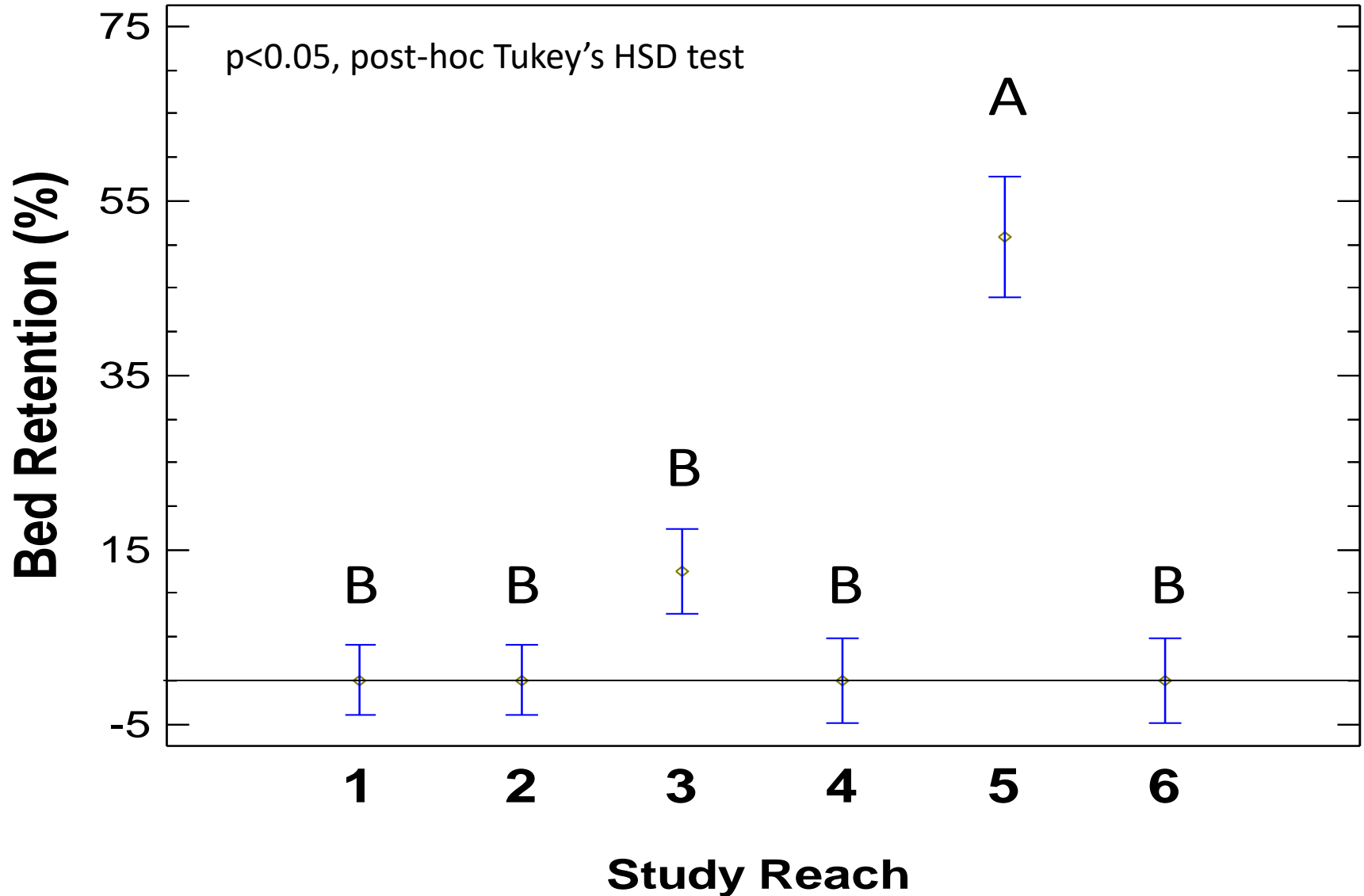
Deploy



Monitor



Skippack Creek Retention Rate





PARTNERSHIP FOR
THE DELAWARE ESTUARY
SCIENCE PROJECT
Phone #: (302) 683-4990

R
h







Site	Silo #	Day 0		Day 113		Day 205		Mean Growth Rate (mm/day)		
		SL (mm)		SL (mm)		SL (mm)		Winter	Spring	Overall
		Mean ± SEM	N	Mean ± SEM	N	Mean ± SEM	N			
Creek 1	1	21.9 ± 0.91	25	22.2 ± 0.94	24	28.2 ± 1.17	16	0.003	0.07	0.03
Creek 1	2	24.3 ± 1.28	25	24.8 ± 1.29	25	29.3 ± 1.32	24	0.004	0.05	0.02
Creek 1	3	24.3 ± 1.29	25	24.9 ± 1.27	24	29.8 ± 1.44	19	0.01	0.05	0.03
Creek 1	4	22.1 ± 0.97	25	22.6 ± 0.97	25	30.0 ± 0.92	23	0.004	0.08	0.04
Creek 2	1	25.0 ± 0.90	25	25.4 ± 0.90	25	29.6 ± 0.86	24	0.003	0.05	0.02
Creek 2	2	26.2 ± 1.04	25	27.0 ± 0.93	24	30.6 ± 0.98	22	0.007	0.04	0.02
Creek 2	3	24.1 ± 1.03	25	23.9 ± 1.02	25	27.7 ± 1.06	25	0.000	0.04	0.02
Creek 2	4	25.5 ± 1.04	25	25.7 ± 1.05	25	29.0 ± 1.01	24	0.002	0.04	0.02
Creek 3	1	26.7 ± 0.84	25	27.9 ± 0.74	25	28.2 ± 0.98	17	0.01	0.003	0.01
Creek 3	2	24.3 ± 1.04	25	25.0 ± 0.97	24	28.3 ± 0.88	22	0.006	0.04	0.02
Creek 3	3	22.4 ± 0.80	25	22.4 ± 1.13	13	nd	nd	4 x10 ⁻⁵	nd	nd
Creek 3	4	22.4 ± 0.84	25	22.6 ± 0.84	25	22.7 ± 0.80	24	0.002	0.001	0.002





Site	Basket #	Deployed #	Start SL (mm)		End SL (mm)		Trial Days	Daily Growth (mm)	Survival (%)
			Mean ± SEM	N	Mean ± SEM	N			
Site 1	1	100	32.1 ± 0.74	100	50.7 ± 1.2	43	67	0.28	43
Site 2	1	400	24.9 ± 0.46	100	65.8 ± 0.30	316	400	0.10	79
Site 2	2	400	24.7 ± 0.38	100	38.8 ± 0.47	100	231	0.06	91
Site 2	3	400	25.5 ± 0.37	100	63.2 ± 0.31	400	400	0.09	100
Site 2	4	400	26.0 ± 0.38	100	62.7 ± 0.28	399	400	0.09	99
Site 2	5	400	26.2 ± 0.41	100	63.5 ± 0.30	393	400	0.09	98
Site 2	6	400	26.6 ± 0.38	100	62.6 ± 0.30	389	400	0.09	97
Site 3-1	1	1200	18.6 ± 0.32	100	42.9 ± 1.1	20	375	0.06	49
Site 3-1	2	1200	19.0 ± 0.25	100	44.0 ± 1.1	20	375	0.07	55
Site 3-1	3	1200	19.1 ± 0.30	100	44.2 ± 1.2	20	375	0.07	47
Site 3-2	1	1200	19.2 ± 0.31	100	48.1 ± 1.6	20	375	0.08	52
Site 3-2	2	1200	20.1 ± 0.27	100	51.1 ± 1.3	20	375	0.08	25
Site 3-2	3	1200	18.9 ± 0.28	100	43.5 ± 1.2	20	375	0.07	33
Site 4	1	400	20.2 ± 0.42	100	54.8 ± 0.59	100	389	0.09	59
Site 4	2	400			61.3 ± 0.62	100	389	0.10	
Site 4	3	400			63.9 ± 0.52	100	389	0.11	
Site 5-1	1	1000	17.2 ± 0.35	100	24.9 ± 0.74	100	105	0.07	87
Site 5-1	2	1000	19.2 ± 0.29	100	25.0 ± 0.63	100	105	0.06	81
Site 5-1	3	1000	18.6 ± 0.25	100	nd	nd	4	nd	nd
Site 5-2	1	1000	17.9 ± 0.32	100	36.0 ± 0.89	20	321	0.06	8
Site 5-2	2	1000	18.9 ± 0.25	100	42.7 ± 0.90	20	321	0.07	32
Site 5-2	3	1000	18.7 ± 0.30	100	35.9 ± 1.1	20	321	0.05	18

Topics to address...

- 1. What is the current status of mussels in our rivers and lakes?**
- 2. Where missing, would mussels thrive today?**
- 3. Where should mussels be prioritized?**

Primary Goals Determine Priority

- Clean water
- Education
- Research
- Conservation





~400 μm















Partnership for the
**DELAWARE
ESTUARY**

Kurt Cheng

Shellfish Coordinator

(302) 655-4990, x107 | DelawareEstuary.org

*Connecting people, science, and nature
for a healthy Delaware River and Bay*



Partnership for the
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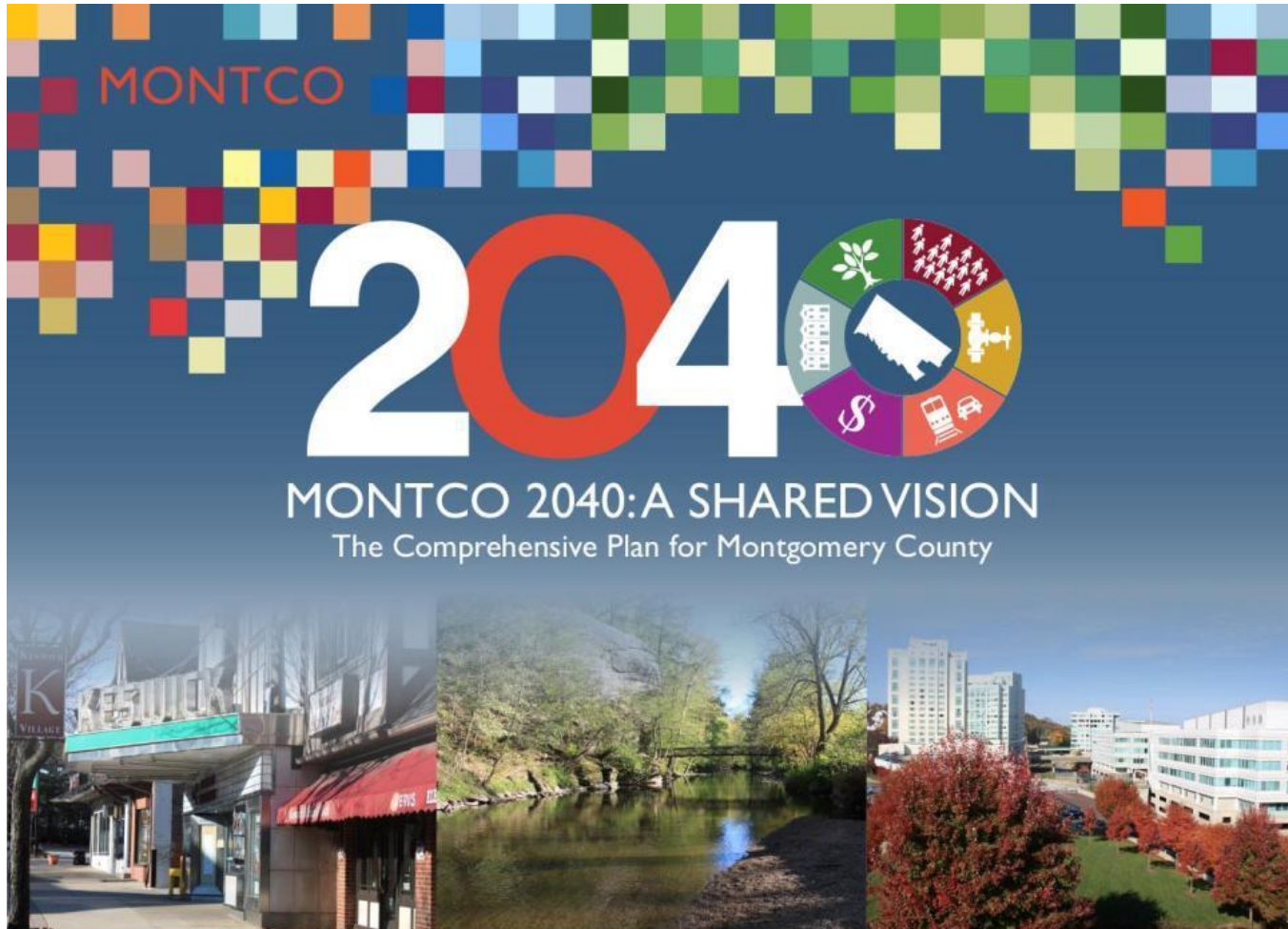
Learn even more at **MightyMussel.com**

MONTGOMERY COUNTY PLANNING COMMISSION

County Comprehensive Plans Leading to Environmental Policy and Real Improvements



Montgomery County 2040 Comprehensive Plan



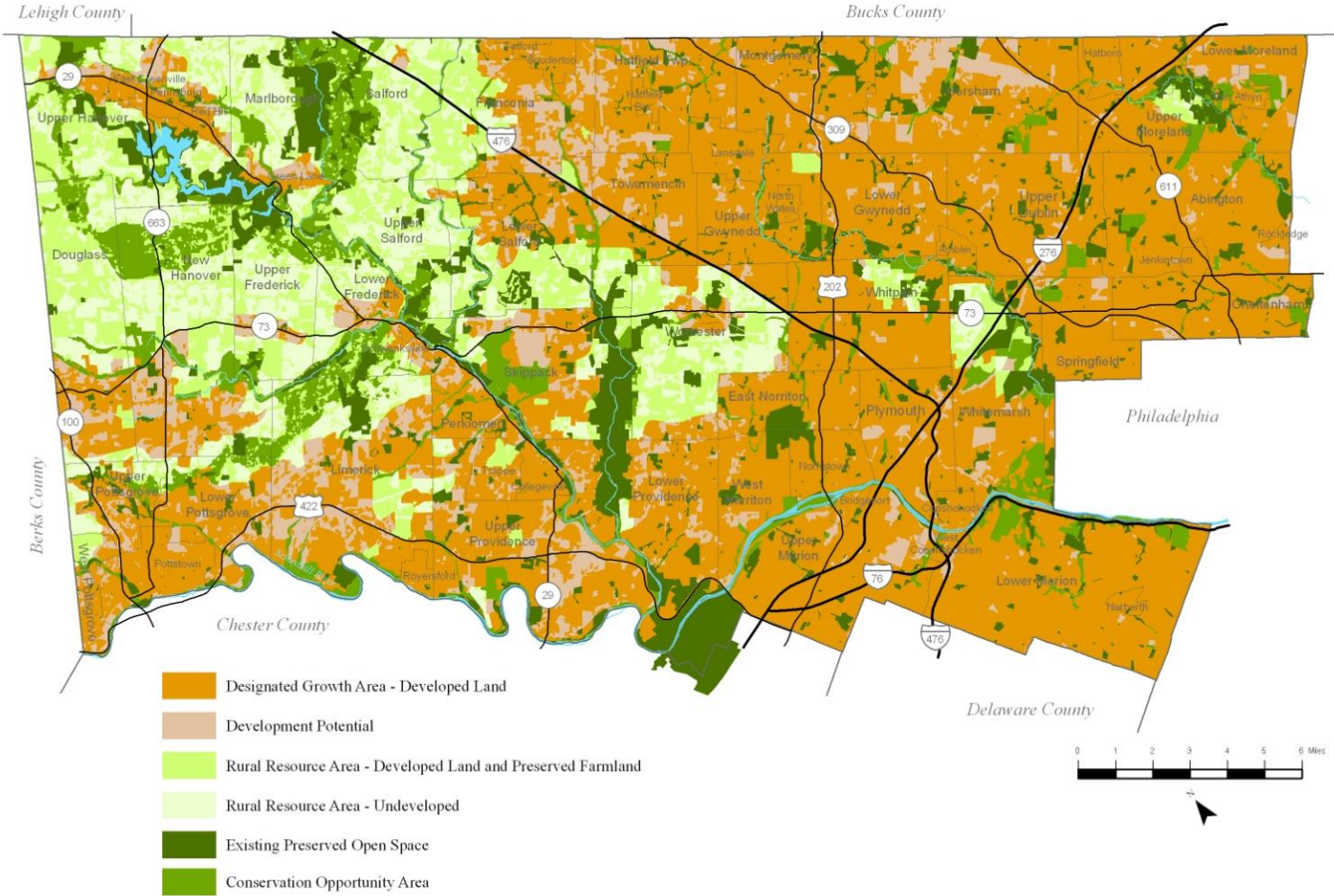


THE NEW COMPREHENSIVE PLAN FOR MONTGOMERY COUNTY

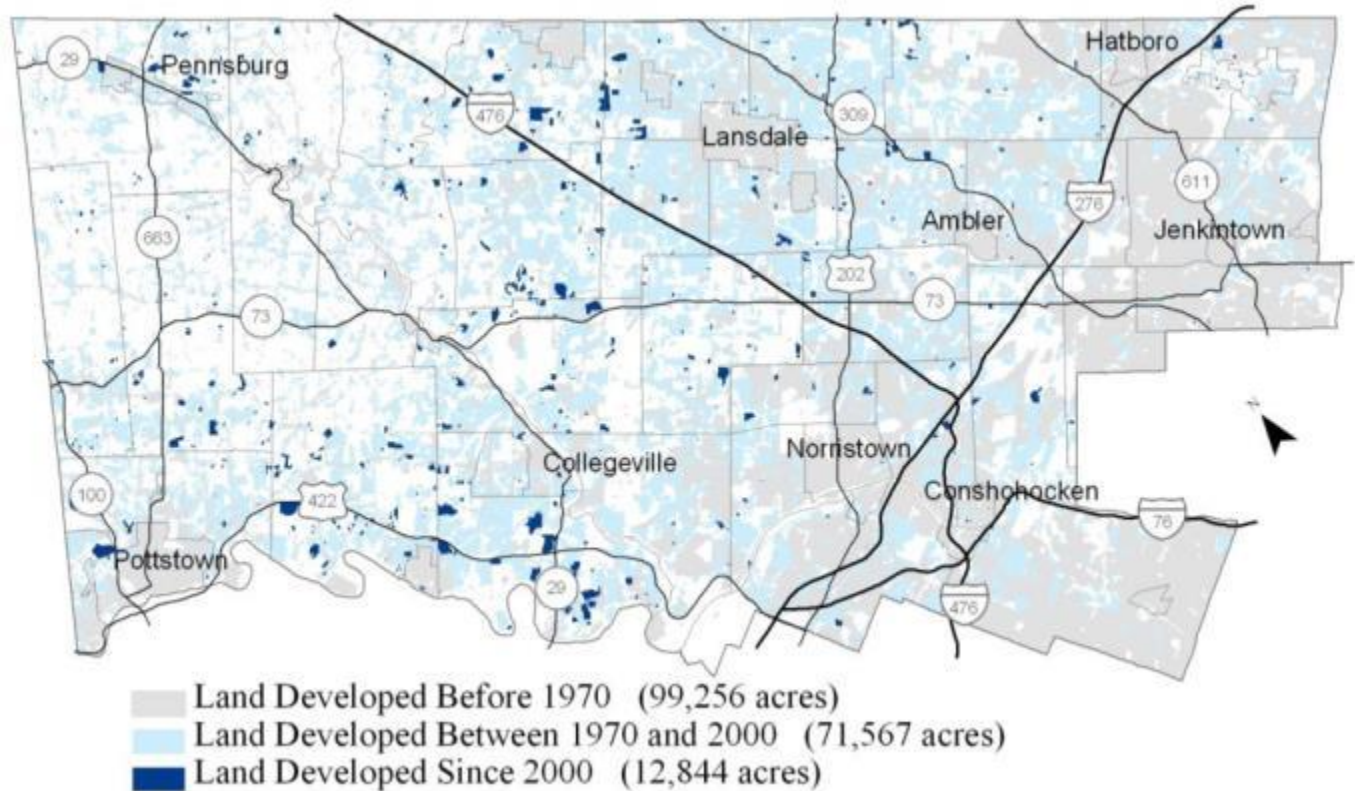
This plan provides an overall growth management framework for local municipal plans, a list of actions for county government, and guidance on issues that transcend local boundaries, such as:

- Highways
- Public Transportation
- Flooding
- Trails
- Growth Trends
- Economic Growth
- Impact of Large Developments
- Natural Systems
- Housing Needs
- Shopping Needs
- Redevelopment Trends

Growth and Preservation Map

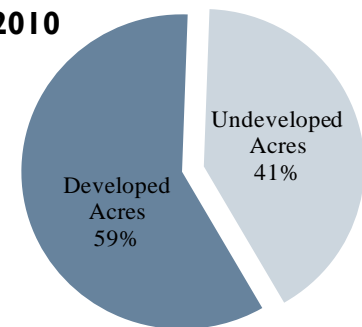


The Built Environment



Over the past decade, approximately 1,300 acres of greenfields were developed each year. At this pace, almost all of the county's remaining, unprotected farmland and open fields would be developed by 2040.

2010





THE NEW
COMPREHENSIVE PLAN
FOR MONTGOMERY COUNTY



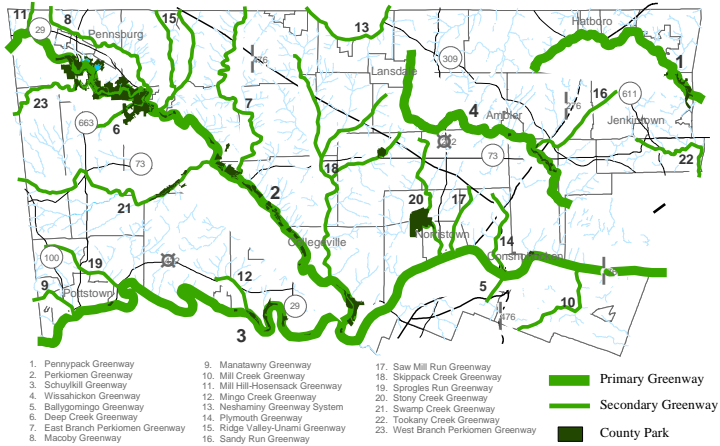


People want to be connected and part of a broader community. A key role for the county is to help these connections occur beyond local municipal boundaries.

Connected Communities



Goals



- **Encourage collaboration and partnerships among governments, businesses, institutions, schools, higher education, and other stakeholders.**
- **Improve transportation quality and expand options for workers.**
- **Expand and connect county trails, local trails, greenways natural areas and parks.**
- **Support strong downtowns & community destinations, including mixed use areas, arts and culture focal points, libraries, and other gathering places.**





The county is full of wonderful neighborhoods and communities. These places need to be sustained and enhanced in a long-lasting and effective way.

Sustainable Places



Goals



- Support a modern, resilient, green, and energy-efficient infrastructure network.
- Improve stormwater management and reduce the impact of flooding.
- Conserve natural resources, environmentally-sensitive areas, and farmland.
- Provide more opportunities for residents to exercise and have healthy lifestyles.
- Support housing choices and opportunities to meet the needs of all people.
- Enhance community character and protect neighborhoods.





A strong economy is critical for all places. With a vibrant economy, residents can earn and spend more, governments can make needed infrastructure improvements, and businesses can grow.

Vibrant Economy



Goals



- Improve transportation access to businesses.
- Encourage development and transformative investment where infrastructure already exists.
- Attract and retain businesses and vital community assets.
- Flexibly adapt to changing market conditions and demographics.
- Facilitate the marketing of the county and its assets.



Environmental Planning

- Stormwater management
- Watershed management
- Solid waste management
- Hazard mitigation
- Recycling
- Sewage facility planning
- Sustainability planning
- Resiliency planning

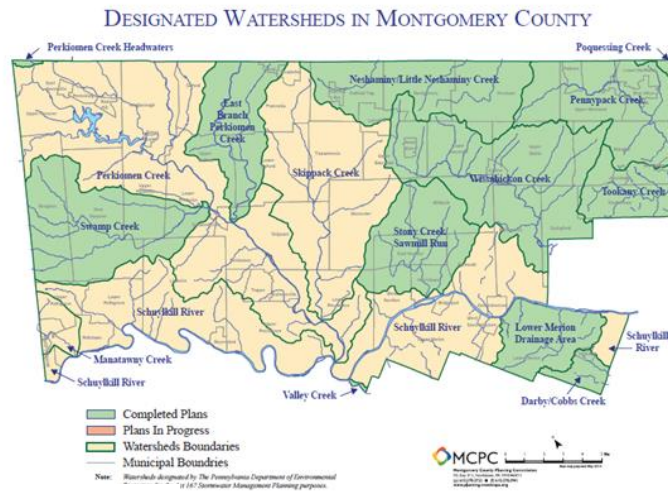


Montco 2040 - Implementation

Stormwater Management Plans

Act 167

- Watershed-based
- Modelling
- 12 completed
- 4 remaining
- County-wide Plan



Wissahickon Creek Watershed

Management Committee

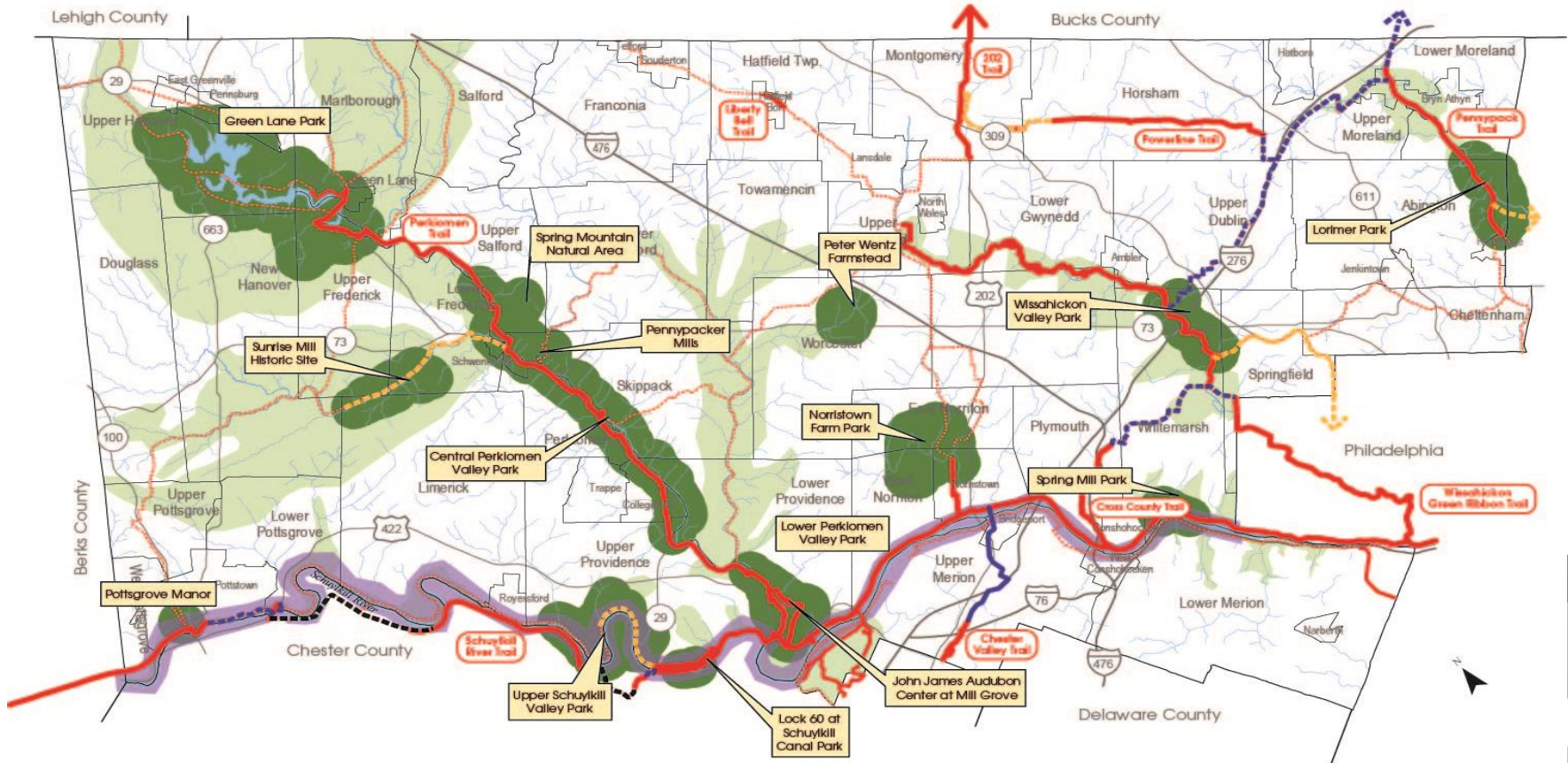
- 13 municipalities
- 4 wastewater treatment plants

Water Quality Advisory Team

- Pennsylvania Environmental Council
- Wissahickon Valley Watershed Association
- Temple Center for Sustainable Communities
- Environmental Finance Center



Open Space and Trail Planning



- Schuylkill River Corridor
- County Park Focus Areas
- NAI Conservation Landscapes
- Montco 2040 Future Trail Network
- Existing Trail
- In Pipeline - Funded
- In Pipeline - Needs Funding
- Next Priority Trail
- Out of County Priority

More than 90 miles of the county's proposed 257 mile network have been built. More than 45 of these miles were built in the past decade.

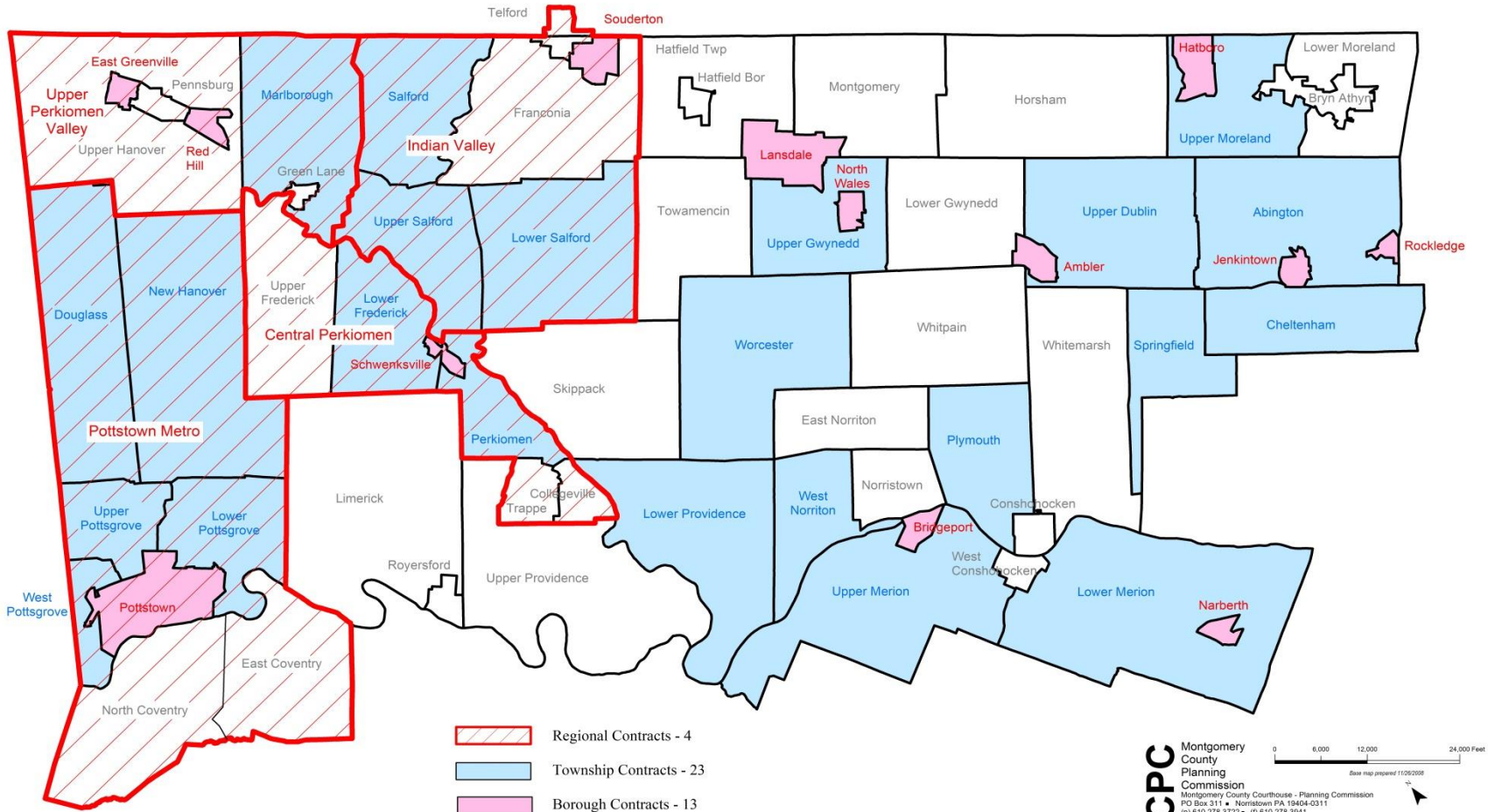
Translate Plans in Action

- Montco 2040 Grant Program
- County Transportation Grant Program
- Farmland Preservation Program
- Recycling Program
- County Trail Development
- County Road Projects
- Staffing the Transportation Authority, Open Space Board and Agricultural Preservation Board



Community Planning Assistance

Municipal and Regional Contracts January 2019



- Regional Contracts - 4
- Township Contracts - 23
- Borough Contracts - 13

MCPC Montgomery County Planning Commission
 Montgomery County Courthouse - Planning Commission
 P.O. Box 311 • Norristown, PA 19304-0311
 (p) 610.278.3722 • (f) 610.278.3541
 www.mcpcpa.org/plancom

This map is based on 2005 ortho photography and official sources. Property lines were compiled from individual block maps from the Montgomery County Board of Assessment Appeals, with no verification from the deed. This map is not meant to be used as a legal definition of properties or for engineering purposes.

Scale: 0, 6,000, 12,000, 24,000 Feet
 Date map prepared: 11/20/2018

Design Planning

- Advisory reviews of all zoning, land development, and municipal plans
 - subdivision or land developments
 - ordinance amendments
 - special reviews



Expand Planning Education

- 3 events this past year
- Montco Planning Smarter 2020



Sustainable Places

**Soak Up More Stormwater:
Partnering with Businesses and Homeowners**
June 2020



Connected Communities

Happy Trails! Planning and Designing Trails for All Users
October 2020

- Engage public through the website and social media



Montco 2040 Implementation Grant Program

Montgomery County Commissioners



Montco 2040 Implementation Grant Program

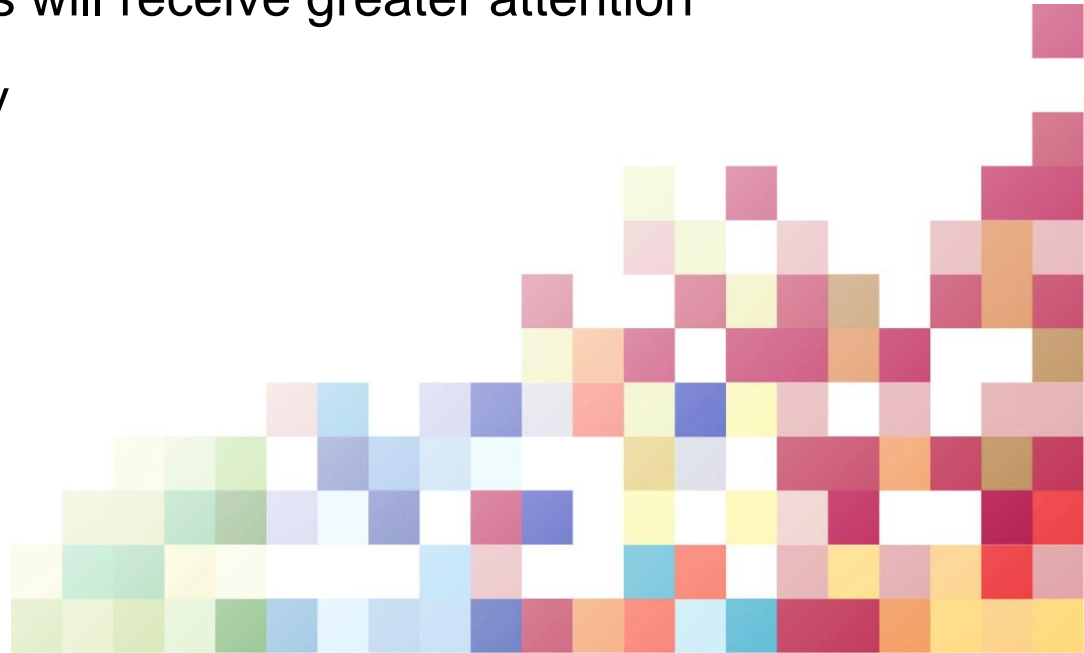
New Municipal Assistance Funding

As part of the implementation of the county's comprehensive plan, Montco 2040: A Shared Vision, the county has established a grant program for municipalities to make targeted physical improvements that achieve real progress toward the goals of the plan. The program offers the opportunity to move general themes and issues at the countywide level into specific improvements at the local level that transforms planning into action.

- Originally conceived as a \$5 Million Grant program over 5 years beginning in 2016
- \$1 Million annually became \$1.5 million and now proposed for \$2.25 million
- Through 4 years of the program, \$5.5 million has been awarded to 56 projects

Eligible Projects

- Applications are accepted for projects that specifically advance the goals of the County Comprehensive Plan under one of its three themes: *Connected Communities*, *Sustainable Places*, and *Vibrant Economy*
- However, several specific project types are highlighted each year and these Focus Categories will receive greater attention
- Physical improvements only



Focus Categories – 3 Offered Each Year

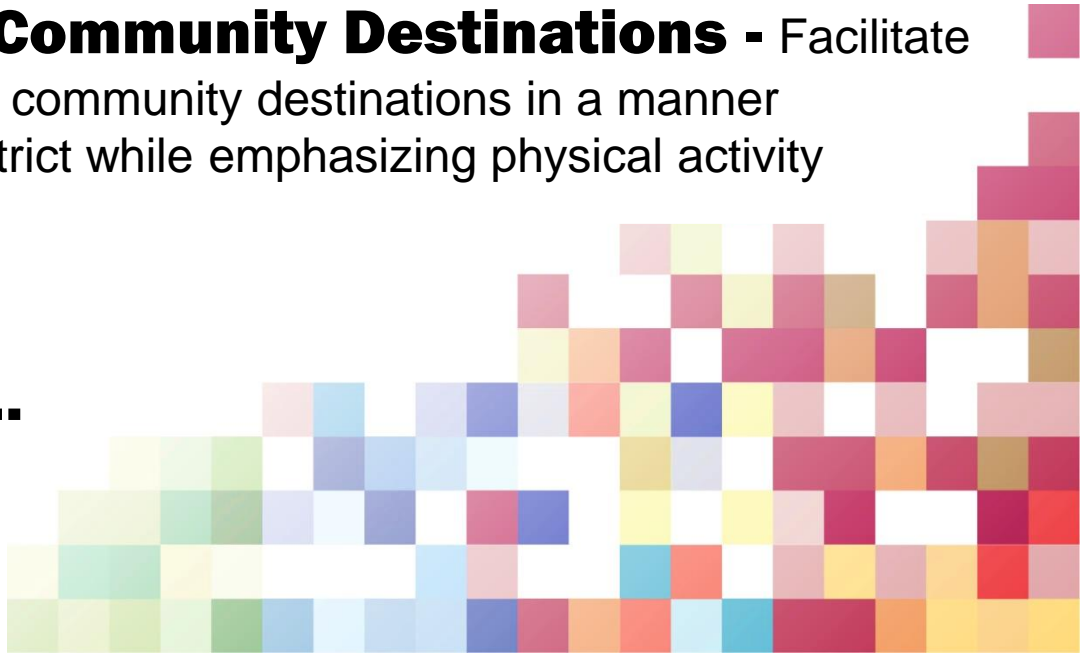
Retrofitting Our Parking Lots - Opportunities to create more sustainable, pedestrian-friendly, and attractive environments in existing parking lots

Walk / Bike Montco - Trails, Paths, Sidewalk Connections

Revitalizing Office and Business Parks - Adapting existing office and business parks to make them more attractive to businesses and employees

Support Downtowns and Community Destinations - Facilitate the development of downtowns and community destinations in a manner that supports a central business district while emphasizing physical activity and social connections.

Adaptation & Resiliency...



Adaptation & Resiliency Focus Category Added in 2018

Continued growth and development in the county coupled with climate change and extreme weather events accelerates the decline of natural systems and ultimately threatens public health and quality of life.

Communities must **adapt** to these changes and become more **resilient** to better sustain their futures.

- Floodplain Mitigation
- Streambank Restoration
- Retrofit Municipal Property with Stormwater BMPS
- Green Streets
- Community Gardens

This category intends to support the most needed projects that help protect against or recover from negative environmental changes. Municipalities may need to reference their MS4, TMDL, PRP, or stormwater management plans for competitive projects.

** NEW in 2020 – Open Space Preservation*

Projects Awarded

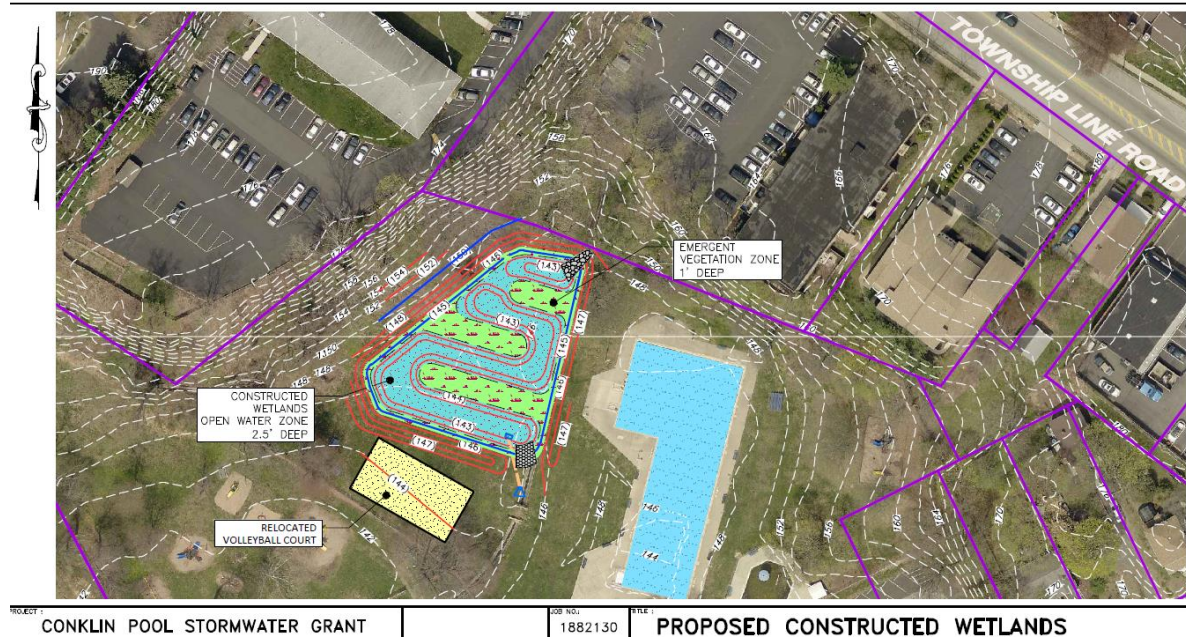
Schwenksville –
Perkiomen Trail Drainage
Improvements and
Observation Deck



Projects Awarded – Creek Restorations

Conklin Recreation Center
Stormwater Management
in Jenkintown Creek
Watershed

Wynnewood Valley Park
Stream Restoration



Projects Awarded – Bioretention Basin / Garden

Red Hill Borough Bioretention Garden and Nature Area

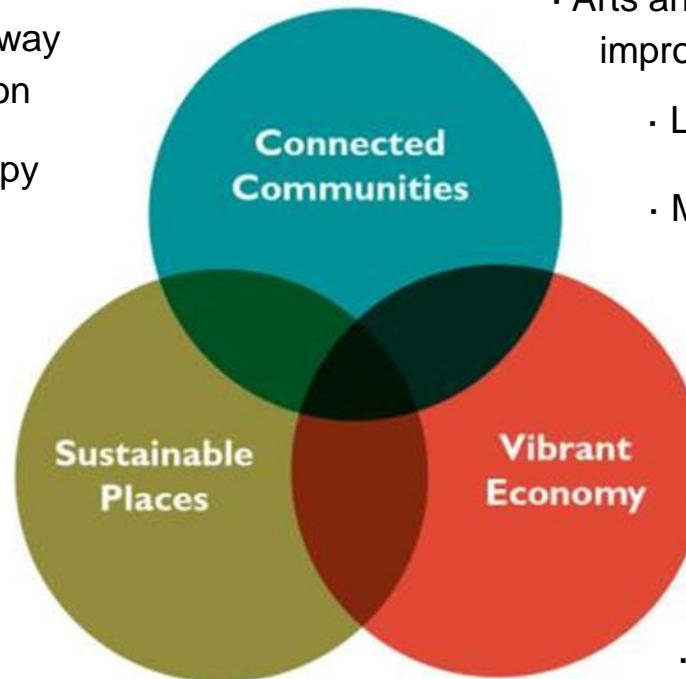


Upper Moreland - Fair Oaks Park Bioretention Basin



General Categories

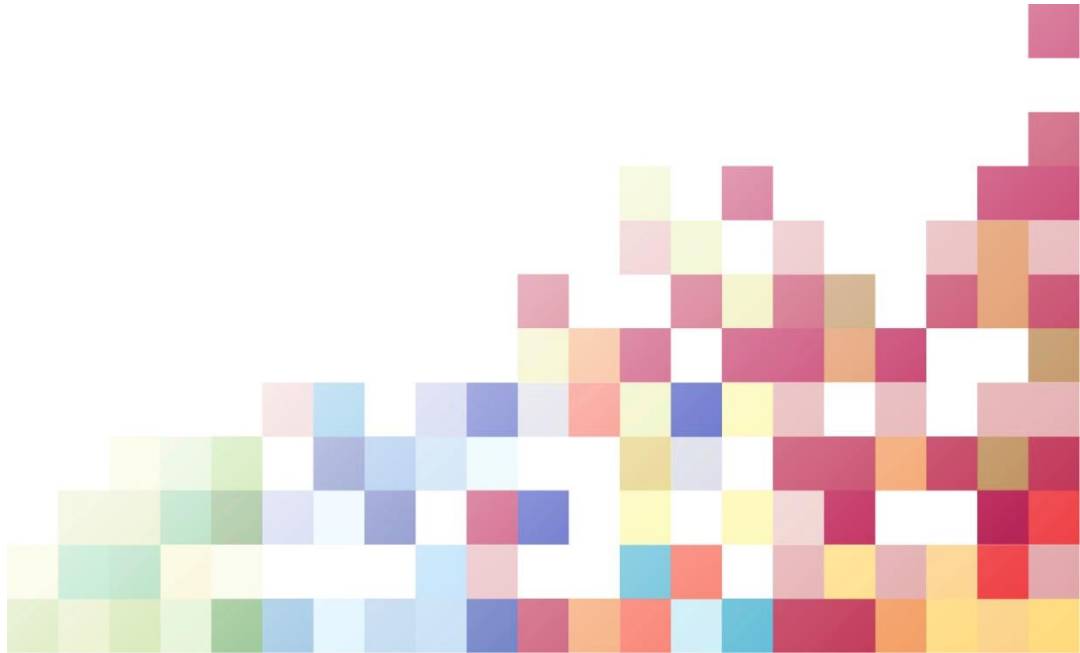
- Bicycle improvements and/or facilities
- Local greenway preservation
- Reinvigorate tree canopy
- Traffic calming
- Green streets
- Energy conservation / reduction of greenhouse gas emissions
- Stormwater management improvements
- Natural resource protection
- Increase the supply of local, fresh food



- Downtown revitalization initiatives
- Arts and culture facility improvements
- Library improvements
- Meet the needs of an aging population
- Improve access to employment centers
- Expand or improve transit options in employment centers
- Signage and wayfinding systems
- Support walkable, mixed use, transit-friendly, and entertainment-supportive employment centers, towns, and destinations

Other Program Details

- Only municipalities may apply, but they can partner with private or nonprofit organizations
- Grant Funding: Maximum of \$200,000 with expected average level of funding to be around \$100,000
- Minimum Local Match of 20% (Open Space Preservation requires 50%)





MONTGOMERY COUNTY PLANNING COMMISSION

P.O. Box 311, Norristown, PA 19404-0311

www.montcopa.org/planning



Scott France, AICP, Section Chief of County Planning

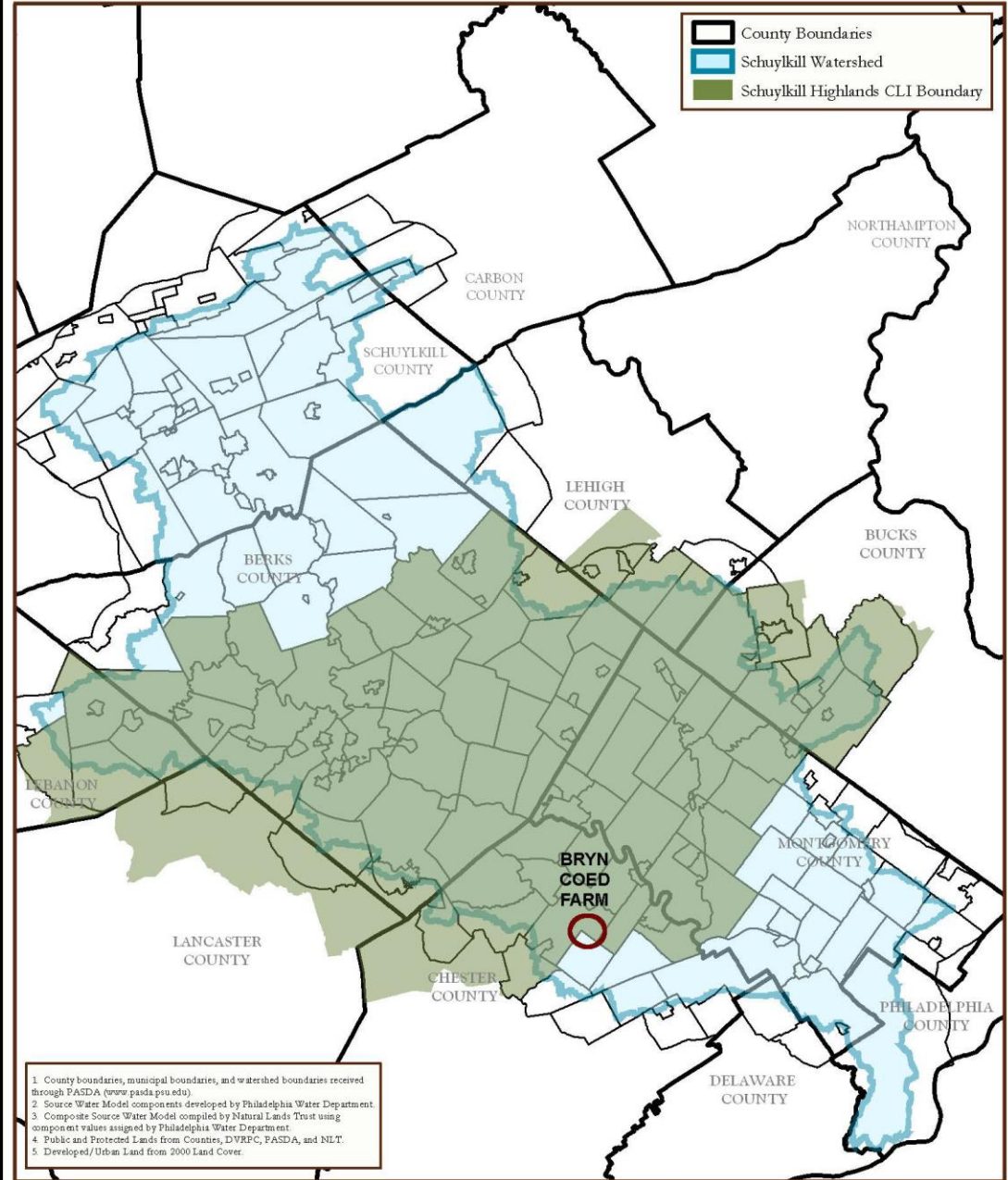


Natural Lands

land for life. nature for all.



BRYN COED



County Boundaries
 Schuylkill Watershed
 Schuylkill Highlands CLI Boundary

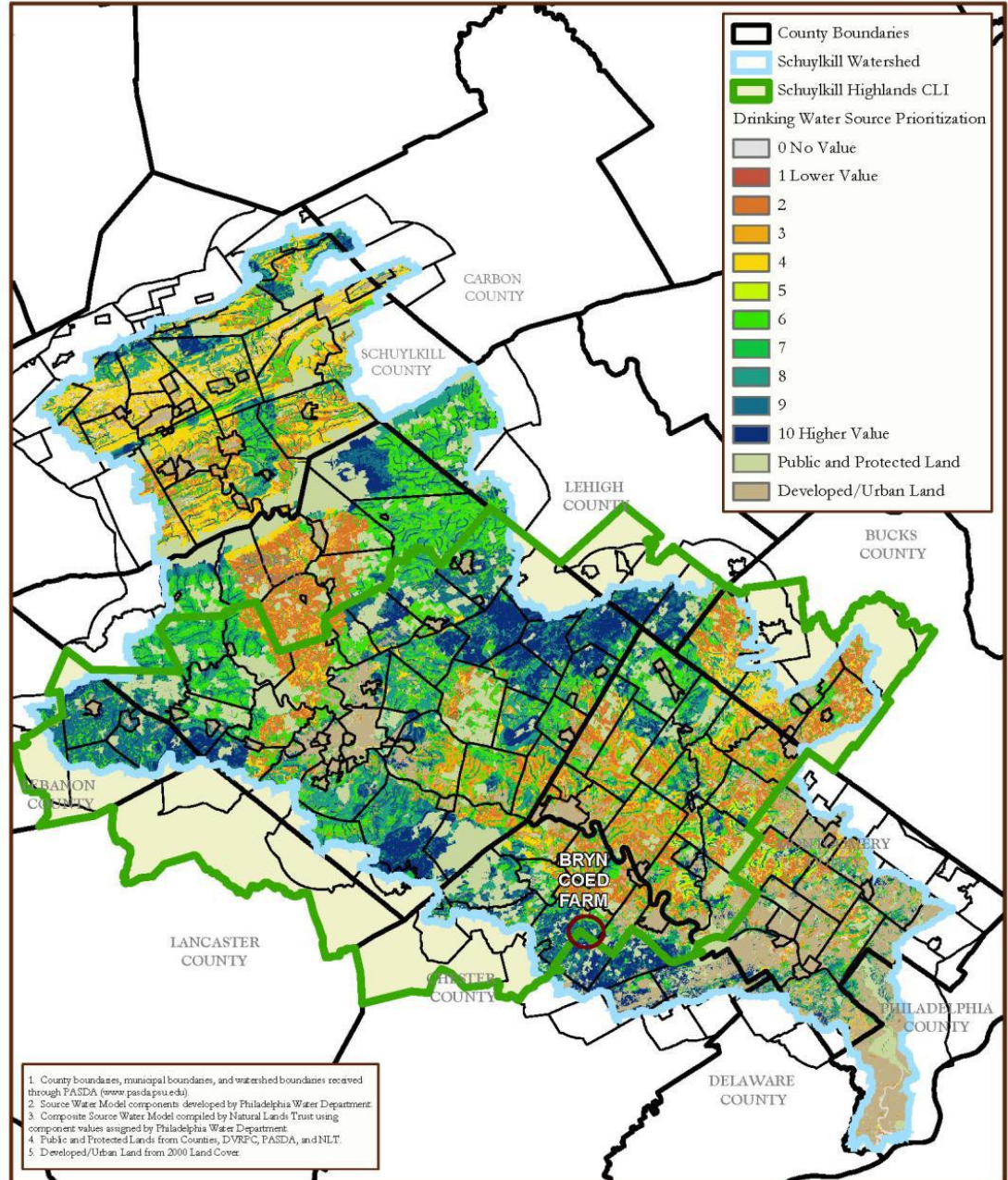
1. County boundaries, municipal boundaries, and watershed boundaries received through PASDA (www.pasda.psu.edu).
2. Source Water Model components developed by Philadelphia Water Department.
3. Composite Source Water Model compiled by Natural Lands Trust using component values assigned by Philadelphia Water Department.
4. Public and Protected Lands from Counties, DVRPC, PASDA, and NLT.
5. Developed/Urban Land from 2000 Land Cover.

Land Prioritization Strategy Partners:

Philadelphia Water Department
Drinking Water Source Prioritization
 SCHUYLKILL WATERSHED
 LAND PRIORITIZATION STRATEGY

N

 0 25,000 50,000 Feet
Compiled By: MFM 03-30-12



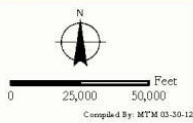
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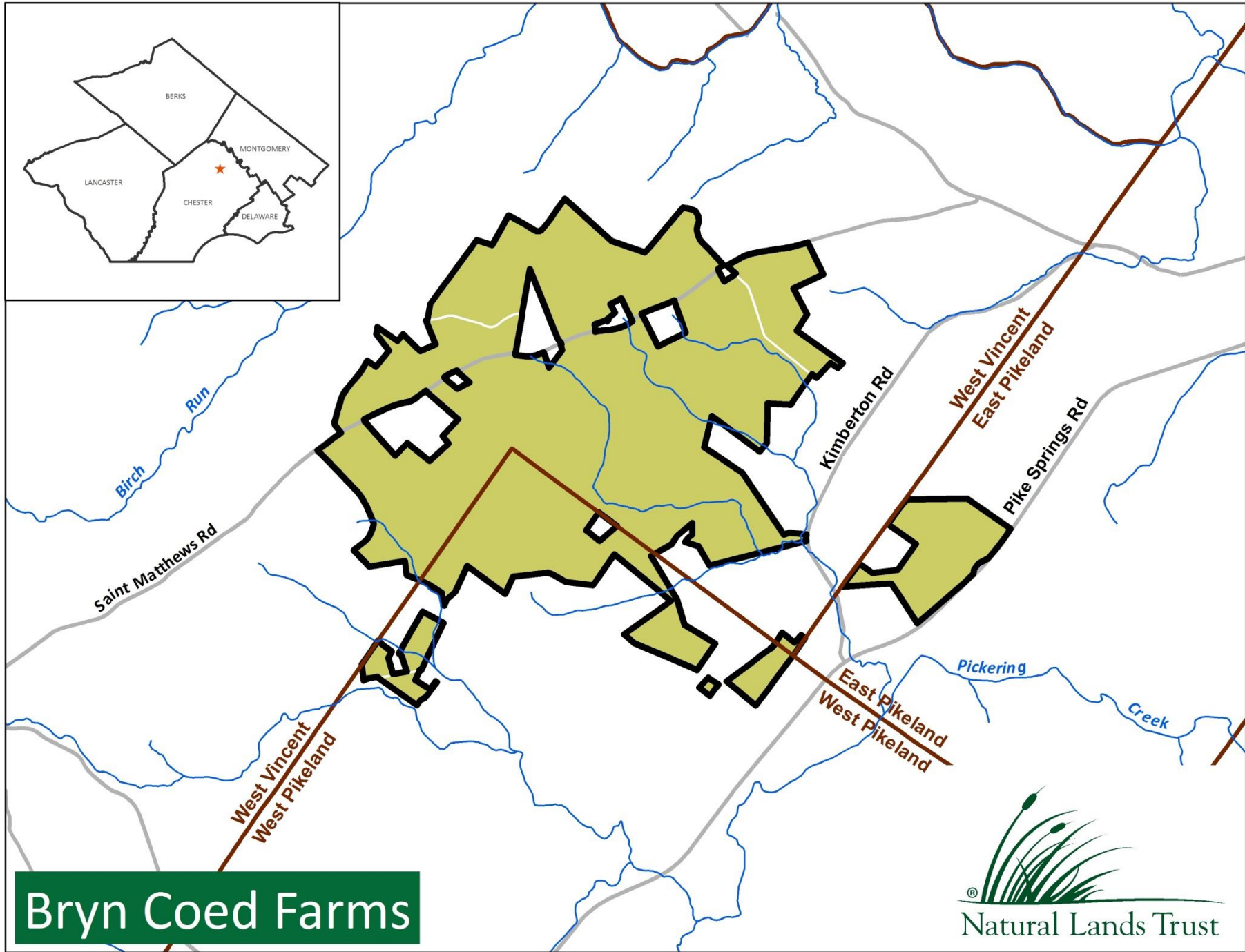
Land Prioritization Strategy Partners:



**Philadelphia Water Department
Drinking Water Source Prioritization**

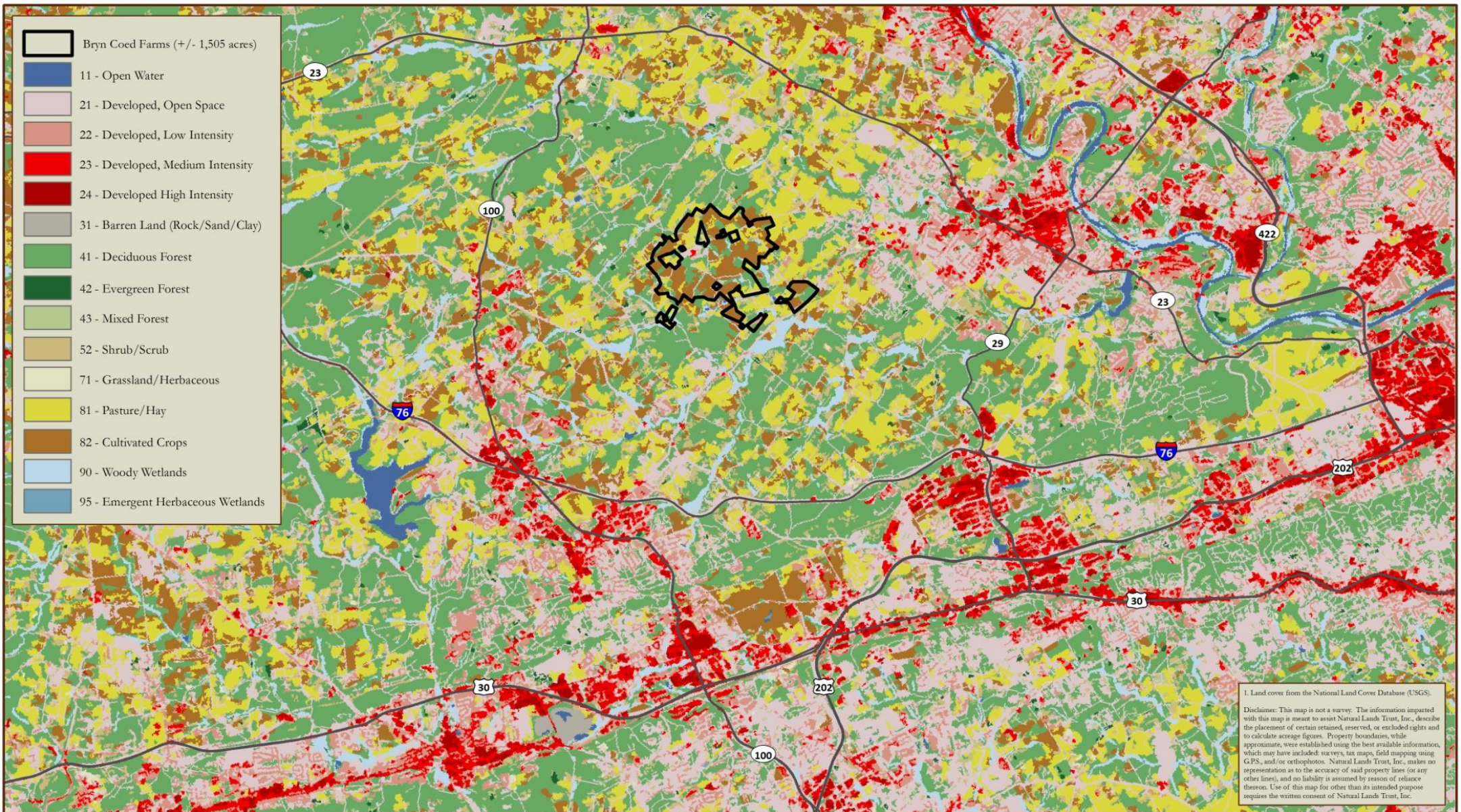
**SCHUYLKILL WATERSHED
LAND PRIORITIZATION STRATEGY**








Bryn Coed Farms





-  Bryn Coed Farms
-  Municipality Boundaries
-  Parcel Boundaries



1 2010 Aerial Photography from DVRPC.
 2 Parcel and municipal boundaries from Chester County

Disclaimer: This map is not a survey. The information imparted with this map is meant to assist Natural Lands Trust, Inc., describe the placement of certain retained, reserved, or excluded rights and to calculate acreage figures. Property boundaries, while approximate, were established using the best available information, which may have included: surveys, tax maps, field mapping using GPS, and/or orthophotos. Natural Lands Trust, Inc. makes no representation as to the accuracy of said property lines (or any other lines), and no liability is assumed by reason of reliance thereon. Use of this map for other than its intended purpose requires the written consent of Natural Lands Trust, Inc.







SITE DATA: Sheets 2-5

WEST VINCENT TOWNSHIP - PARCELS 1-5 (R-2 and R-3)

Total Number of Lots Permitted: 682
 Total Number of Lots Provided: 654
 82 SFD (min. 135' x 240' or 32,400 sf)
 119 SFD (min. 130' x 185' or 172 ac)
 150 SFD (min. 70' x 135' or 9,450 sf)
 292 TH (24' interior unit/ 30' end unit)
 11 Existing SFD

Total Open Space Required: 66% of 999.77 ac (ATA) or 593.86 ac
 Total Open Space Provided: 66% of 999.77 ac (ATA) or 593.86 ac

EAST PIKELAND TOWNSHIP - PARCEL 1 (R-1)

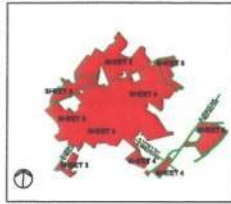
Total Number of Lots Permitted: 42 lots
 Total Number of Lots Provided: 40 SFD (min. 150' x 300' or 1 ac)
 Total Open Space Required: 40% of 101.65 ac (gross area) or 40.66 ac
 Total Open Space Provided: 41.5% of 101.65 ac (gross area) or 42.16 ac

WEST PIKELAND TOWNSHIP - PARCEL 1-6 (CR)

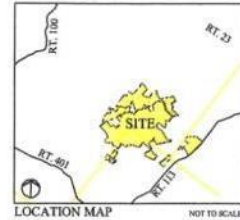
Total Number of Lots Permitted: 103 lots
 Total Number of Lots Provided: 62 SFD
 41 SFD (min. 220' x 440' or 2 ac)
 1 Existing SFD

TOTAL NUMBER OF LOTS PERMITTED: 827

TOTAL NUMBER OF LOTS PROVIDED: 756



KEY MAP



LOCATION MAP NOT TO SCALE

WEST VINCENT TOWNSHIP - PARCELS 1 - 5

Parcels	1	2	3 A & 3 B	4	5	Total	
Existing Zoning	R-3					R-2	
Gross Tract Area (ac)	258.38	95.75	752.86	70.23	5.32	1182.54	
Less Existing R.O.W. (ac)	-5.34	-4.71	-7.08	-2.91	-0.28	-20.32	
Less 75% of Flood Hazard District (ac)	-0	-0	-21.34 x 75% = -16.01	-0	-0	-21.34 x 75% = -16.01	
Less 75% of Wetlands (ac)	-0	-7.00 x 75% = -5.25	-149.10 x 75% = -111.83	-8.18 x 75% = -6.14	-3.17 x 75% = -2.38	-167.43 x 75% = -125.60	
Less 75% of Slopes >25% (ac)	-0	-0	-3.02 x 75% = -2.27	-0	-0	-3.02 x 75% = -2.27	
Less 50% of High Water Table Areas (ac)	-15.76 x 50% = -7.88	-3.70 x 50% = -1.85	-37.68 x 50% = -18.84	-0	-0	-57.14 x 50% = -28.57	
Adjusted Tract Area (ac)	245.16	83.04	596.83	61.18	2.66	989.77	
Total Number of Permitted Lots	245.16 x 43,560 / 75,000 = 142 Lots		744.61 x 43,560 / 60,000 = 540 Lots			682 Lots	

WEST PIKELAND TOWNSHIP - PARCELS 1-6

Parcels	1	2	3	4	5	6	Total
Existing Zoning	CR						
Gross Tract Area (ac)	8.82	8.43	15.05	207.60	9.46	2.03	261.39
Less Existing R.O.W. (ac)	-0.59	-0.51	-0.43	-0	-0.76	-0.17	-2.46
Tract Area (ac)	8.23	7.92	14.62	207.60	18.70	1.86	258.93
Total Number of Permitted Lots	258.93 ac x 0.80 / 2 ac per lot = 103 Lots						

EAST PIKELAND TOWNSHIP PARCEL 1

Existing Zoning	R-1
Gross Tract Area (ac)	101.65
Less Existing R.O.W. (ac)	-1.50
Less Stormwater Management Areas (ac)*	-2.21
Less Slope Slopes >25% (ac)	-2.11
Less Wetlands (ac)	-0.83
Adjusted Tract Area (ac)	95.00
Total Number of Permitted Lots	95 ac / 2.25 ac per lot = 42 Lots

* See Sheet 3 for the Location of Stormwater Management Areas

TOTAL GROSS ACREAGE: 1,545.58 AC

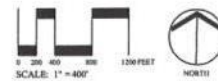
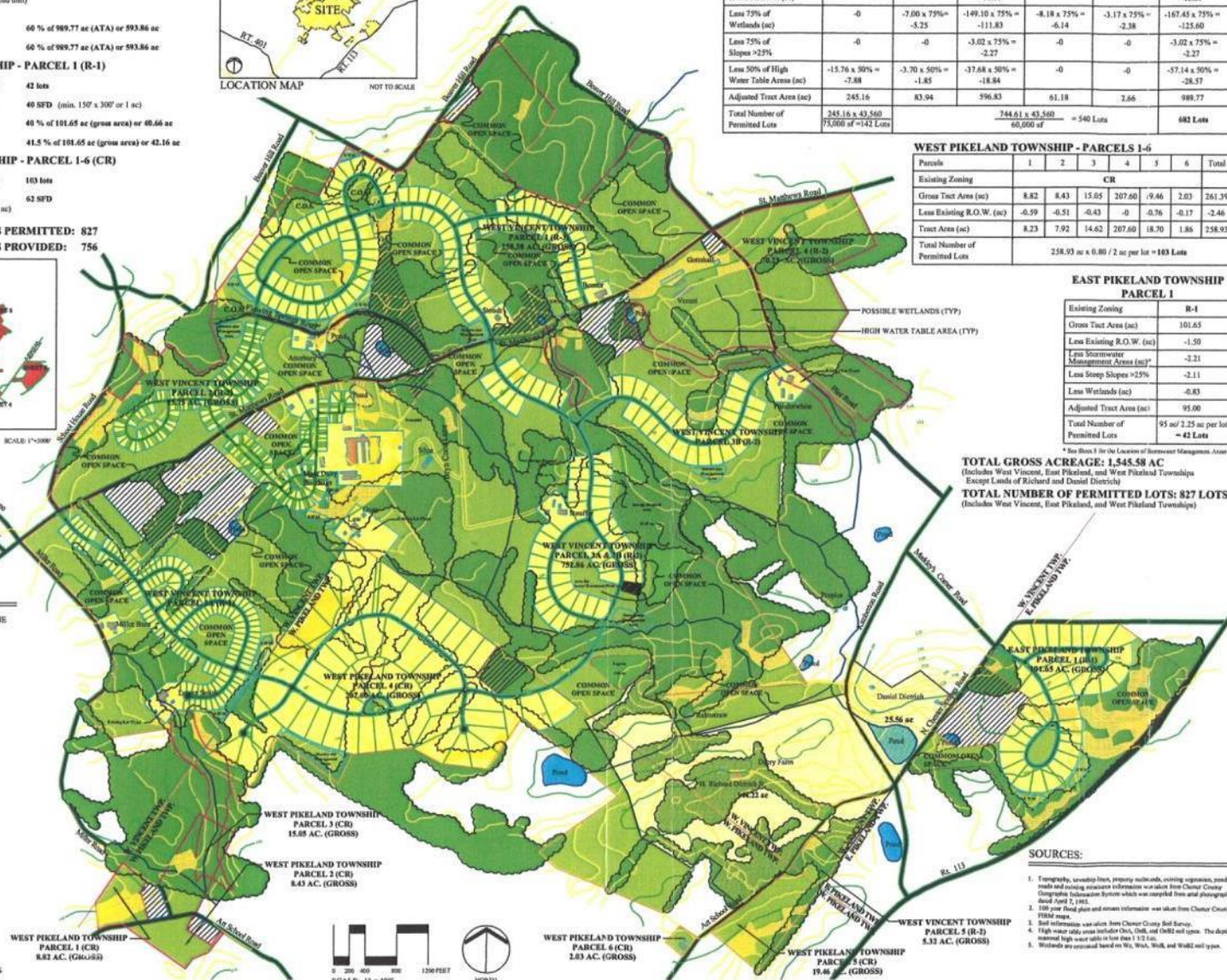
(Includes West Vincent, East Pikeland, and West Pikeland Townships Except Lands of Richard and Daniel Dietrich)

TOTAL NUMBER OF PERMITTED LOTS: 827 LOTS

(Includes West Vincent, East Pikeland, and West Pikeland Townships)

LEGEND:

- EXISTING VEGETATION LINE
- EXISTING STREAMS
- STEEP SLOPES 15-25%
- STEEP SLOPES 25% +
- 100 YEAR FLOOD PLAIN
- PROPERTY LINE
- TOWNSHIP LINE
- EXISTING CONTOUR
- OUTPARCEL
- EXISTING STRUCTURE
- LANDS OF RICHARD & DANIEL DIETRICH
- POND
- POSSIBLE WETLANDS/ HIGH WATER TABLE AREAS



SCALE: 1" = 400'

SOURCES:

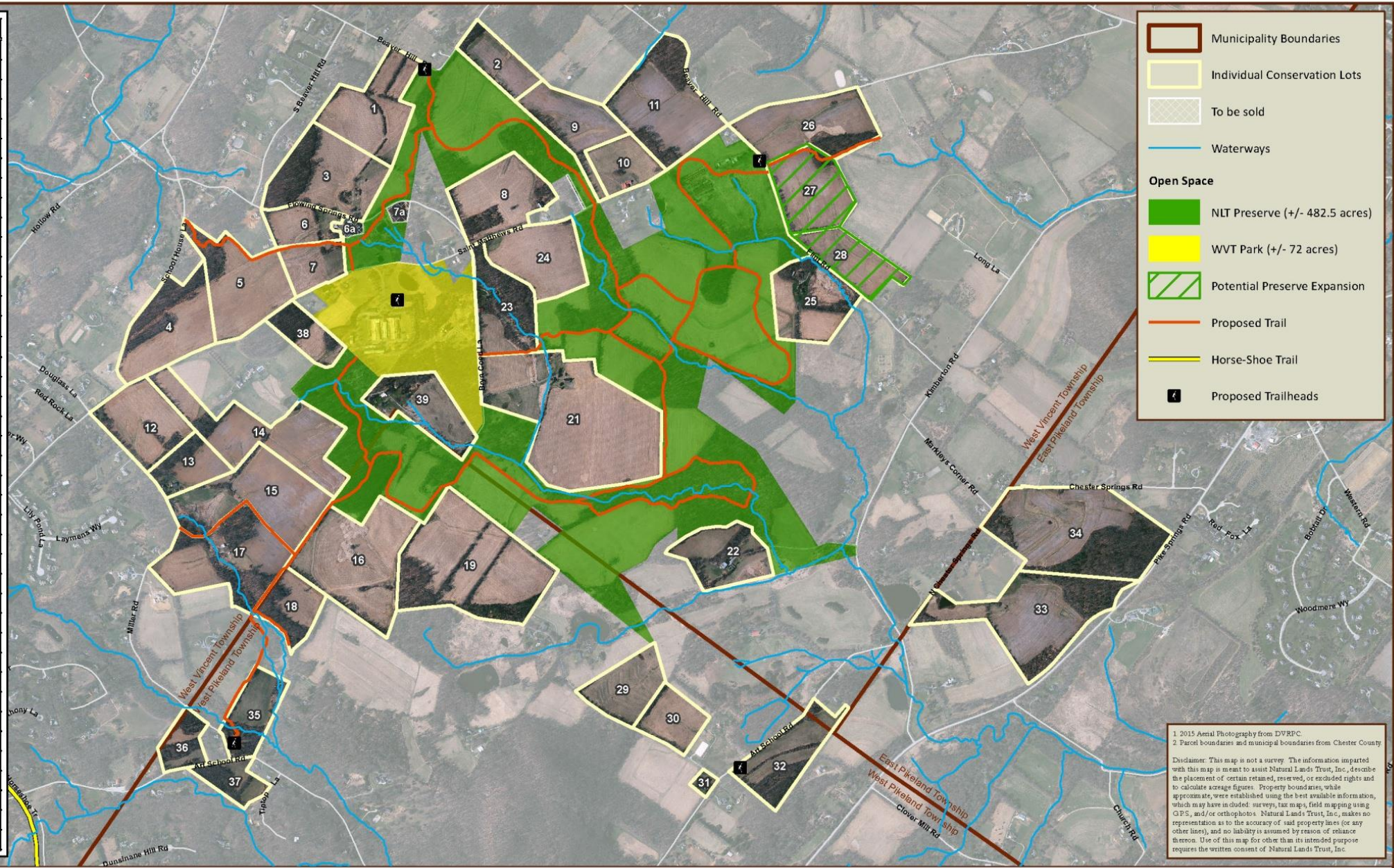
1. Topography, township lines, property boundaries, existing structures, ponds, roads and existing easement information was taken from Chester County Geographic Information System which was compiled from aerial photography dated April 7, 1985.
2. 100 year flood plain and stream information was taken from Chester County FIRM maps.
3. Soil information was taken from Chester County Soil Survey.
4. High water table areas were taken from Ohio, Utah, and OH&E soil maps. The depth of measured high water table is less than 1.52 feet.
5. Wetlands are assumed based on Wet, Wet, Wet, and W&B soil types.

Glackin Associates, Inc.
 Land Planning / Zoning / Feasibility Studies / Landscape Architecture
 11200 Old York Road, York, Pennsylvania, PA 17403
 Phone: 717-765-2222 Fax: 717-765-2222

OVERALL PROPERTY PLAN WITH DENSITY CALCULATIONS
Chester Springs
 West Vincent Township, East Pikeland Township, West Pikeland Township, Chester County, PA

PROJECT #20-08
 DATE: 11-15-08
 SHEET: 1 OF 5

Label	Acres
1	27.7
2	12.7
3	32.2
4	29.1
5	30.0
6	11.2
6a	2.0
7	11.4
7a	1.7
8	25.5
9	20.9
10	12.7
11	37.4
12	22.7
13	12.6
14	37.1
15	37.3
16	43.5
17	36.0
18	13.8
19	58.6
20	34.8
21	74.8
22	20.1
23	22.5
24	24.2
25	24.2
26	30.3
27	23.2
28	16.3
29	17.0
30	12.6
31	1.8
32	21.5
33	45.1
34	56.0
35	15.2
36	9.2
37	9.2
38	10.7
39	21.2



- Municipality Boundaries
- Individual Conservation Lots
- To be sold
- Waterways

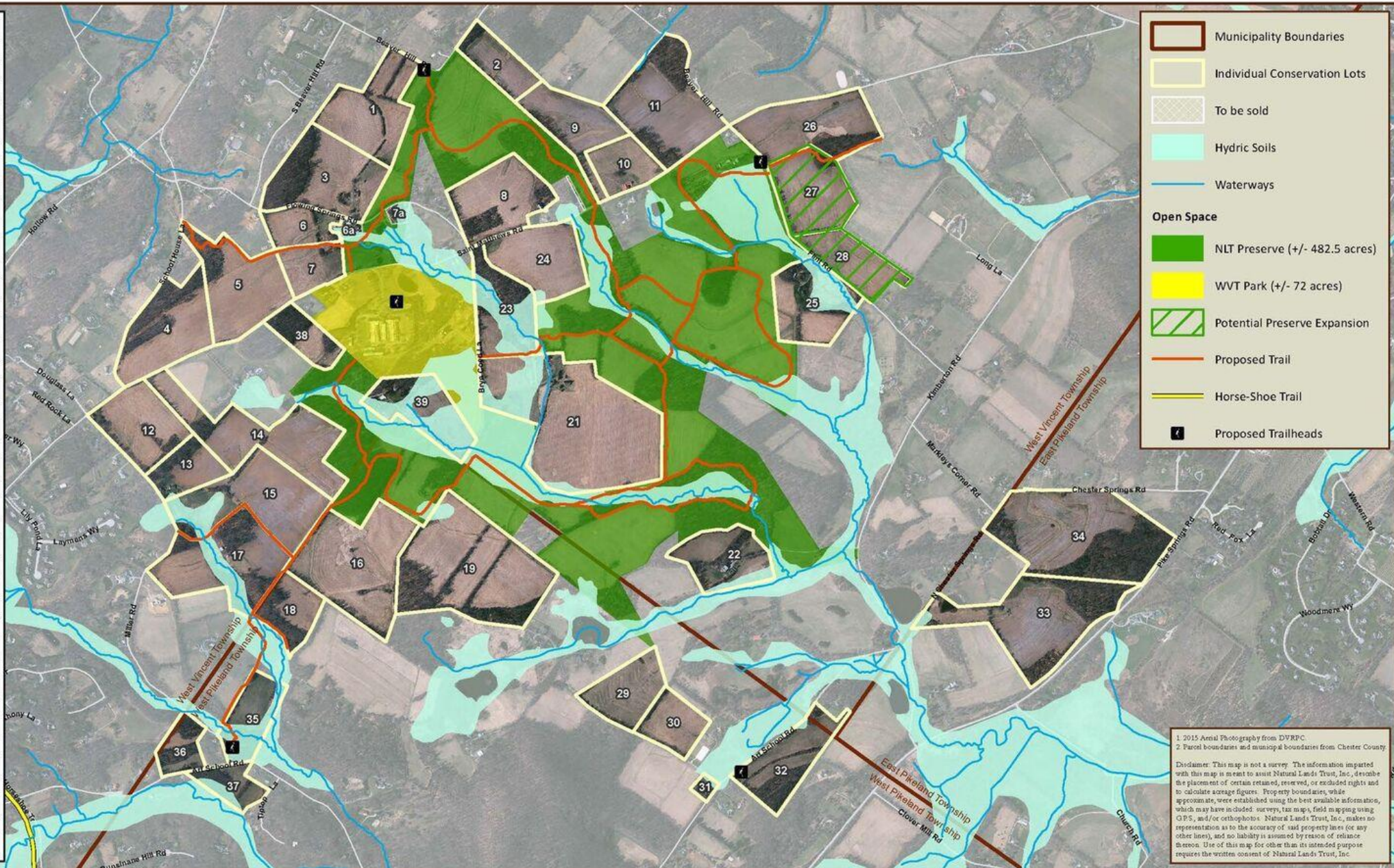
Open Space

- NLT Preserve (+/- 482.5 acres)
- WVT Park (+/- 72 acres)
- Potential Preserve Expansion
- Proposed Trail
- Horse-Shoe Trail
- Proposed Trailheads

1 2015 Aerial Photography from DWRPC
 2 Parcel boundaries and municipal boundaries from Chester County

Disclaimer: This map is not a survey. The information imparted with this map is meant to assist Natural Lands Trust, Inc., describe the placement of certain retained, reserved, or excluded rights and to calculate acreage figures. Property boundaries, while approximate, were established using the best available information, which may have included: surveys, tax maps, field mapping using GPS, and/or orthophotos. Natural Lands Trust, Inc., makes no representation as to the accuracy of said property lines (or any other lines), and no liability is assumed by reason of reliance thereon. Use of this map for other than its intended purpose requires the written consent of Natural Lands Trust, Inc.

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13	12.6
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15	37.3
16	43.5
17	36.0
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33	45.1
34	56.0
35	15.2
36	9.2
37	9.2
38	10.7
39	21.2



1. 2015 Aerial Photography from DVRPC
 2. Parcel boundaries and municipal boundaries from Chester County.

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FUNDING

SOURCES

• Chester County	\$ 8,000,000
• Commonwealth	\$ 2,000,000
• West Vincent Township	\$ 1,000,000
• West Pikeland Township	\$ 1,000,000
• East Pikeland Township	\$ 560,000
• Natural Lands Trust (from sale of eased parcels)	\$ 16,520,000
• Private Fund Raising (includes \$2m from William Penn Foundation)	\$ 5,000,000

TOTAL	\$34,080,000
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Note: Public Funds = 37% of Funding

USES

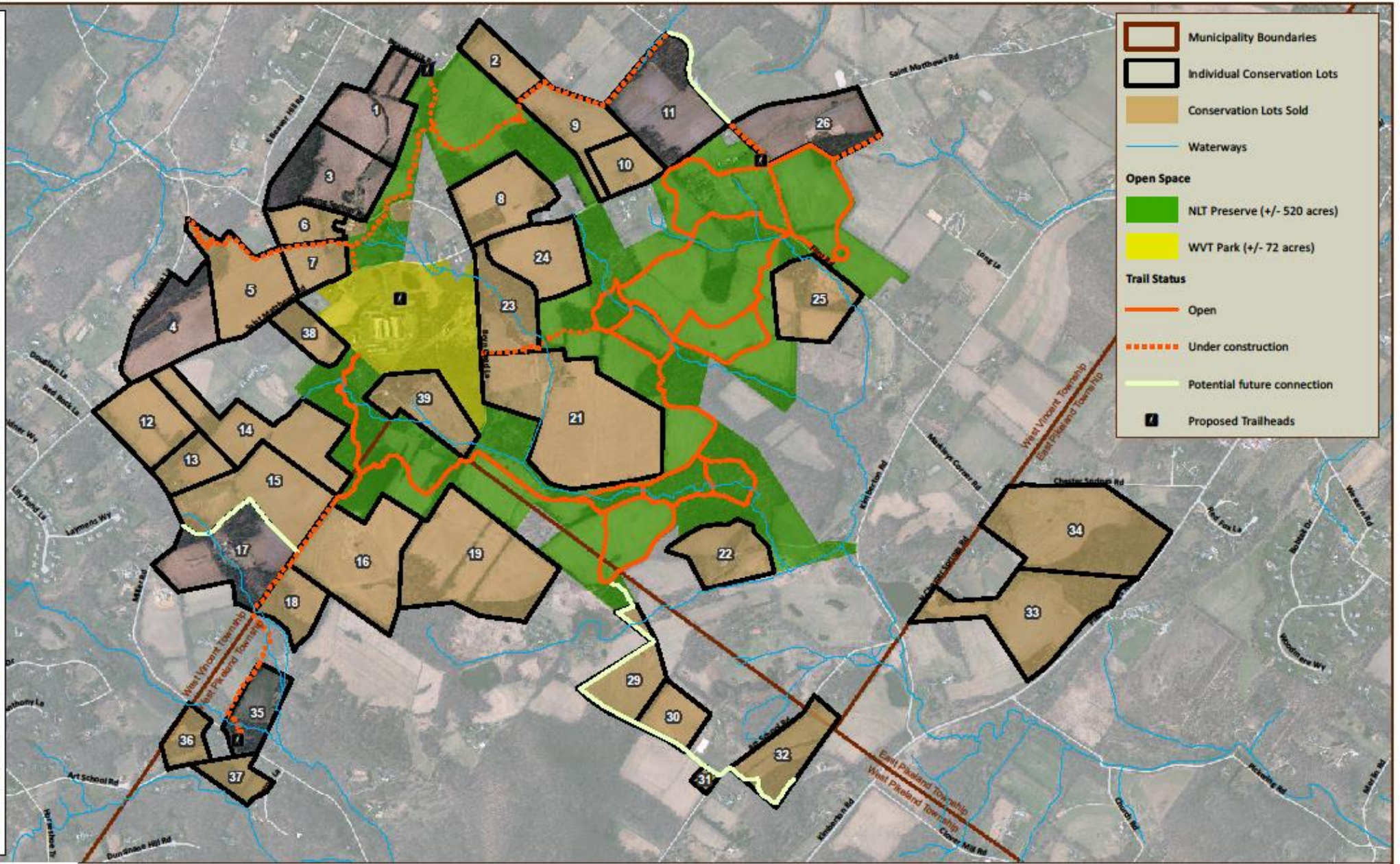
• Purchase Price & Transaction Costs	\$30,080,000
• Preserve Startup Costs	\$ 1,000,000
• Endowment	\$ 3,000,000
TOTAL	\$34,080,000



HELP SAVE BRYN COED FARMS

Join the campaign. bryncoedfarms.org/give

Label	Acres
1	27.7
2	12.7
3	32.2
4	29.1
5	30.0
6	11.2
6a	2.0
7	11.4
7a	1.7
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15	37.3
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33	45.1
34	56.0
35	15.2
36	9.2
37	9.2
38	10.7
39	21.2





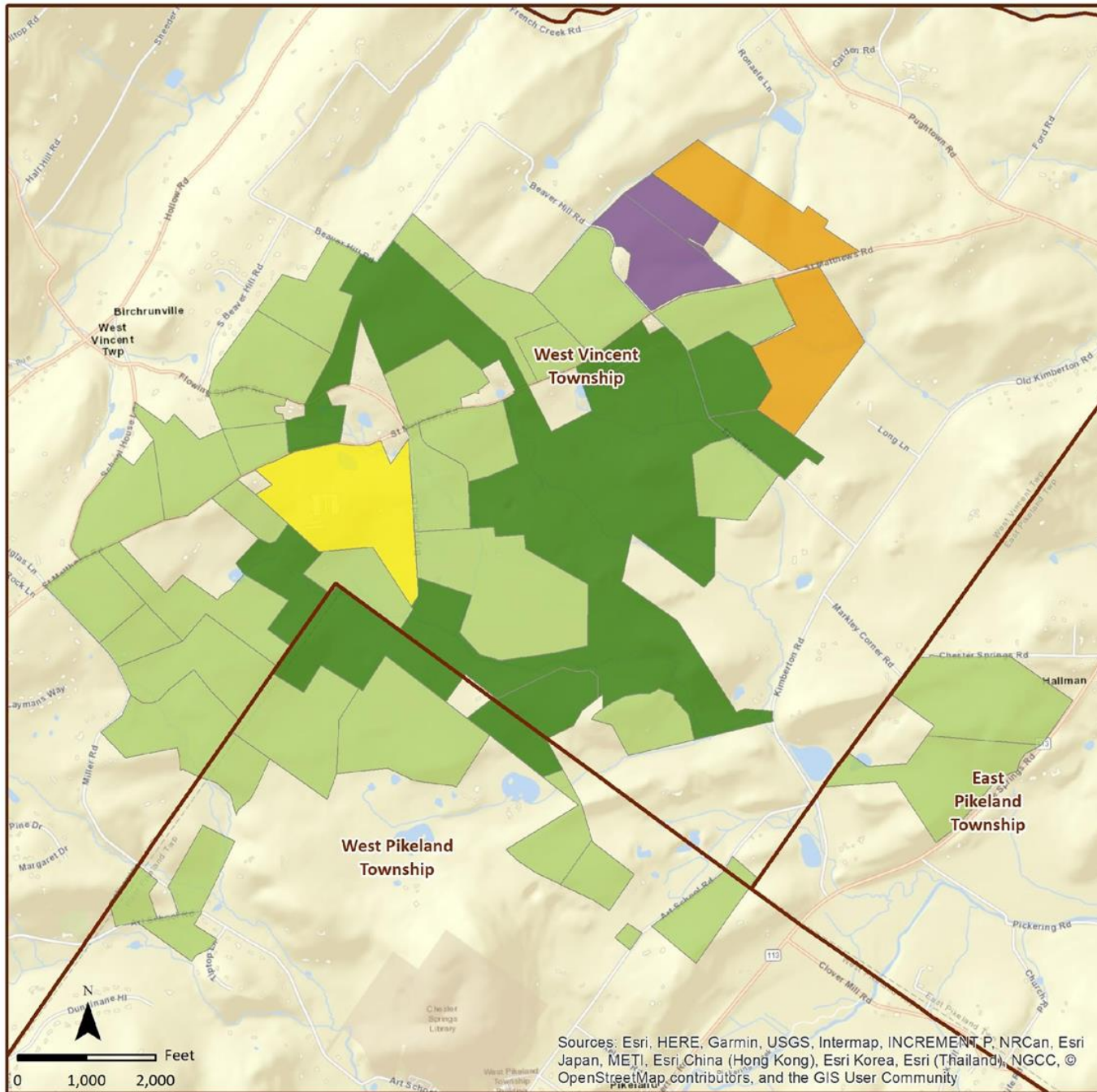
thank you.



Sixteen & Eighteen Years Conservation Easements

Pam Brown





Location

BRYN COED FARMS


18 YEARS, LLC

16 YEARS, LLC


West Vincent Township, Chester County, PA

 Municipal Boundaries

 16 Years, LLC

 18 Years, LLC

Bryn Coed Farms

 Conservation Lot

 NLT Preserve

 WVT Park



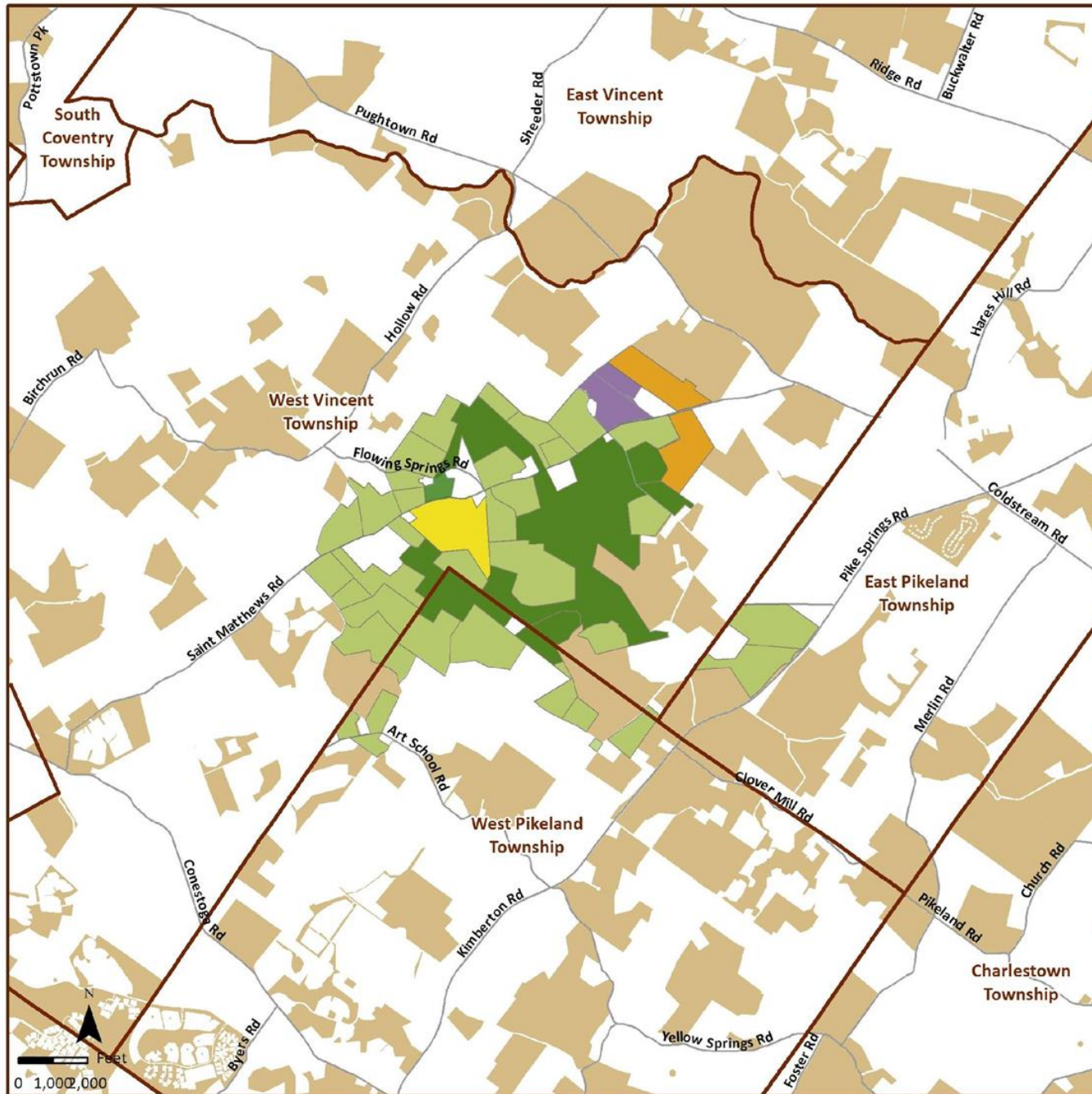
1031 Palmers Mill Road, Media, PA 19063
610-353-5587 | natlands.org

1. Property boundary from Chester County and Nave Newell, Inc.

Compiled By: MEB 11/11/19

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Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community



Location

BRYN COED FARMS

18 YEARS, LLC

16 YEARS, LLC

West Vincent Township, Chester County, PA

- Municipal Boundaries
- Other Protected Land
- Roadways
- 16 Years, LLC
- 18 Years, LLC
- Bryn Coed Farms**
- Conservation Lot
- NLT Preserve
- WVT Park



1031 Palmers Mill Road, Media, PA 19063
610-353-5587 | noland.org

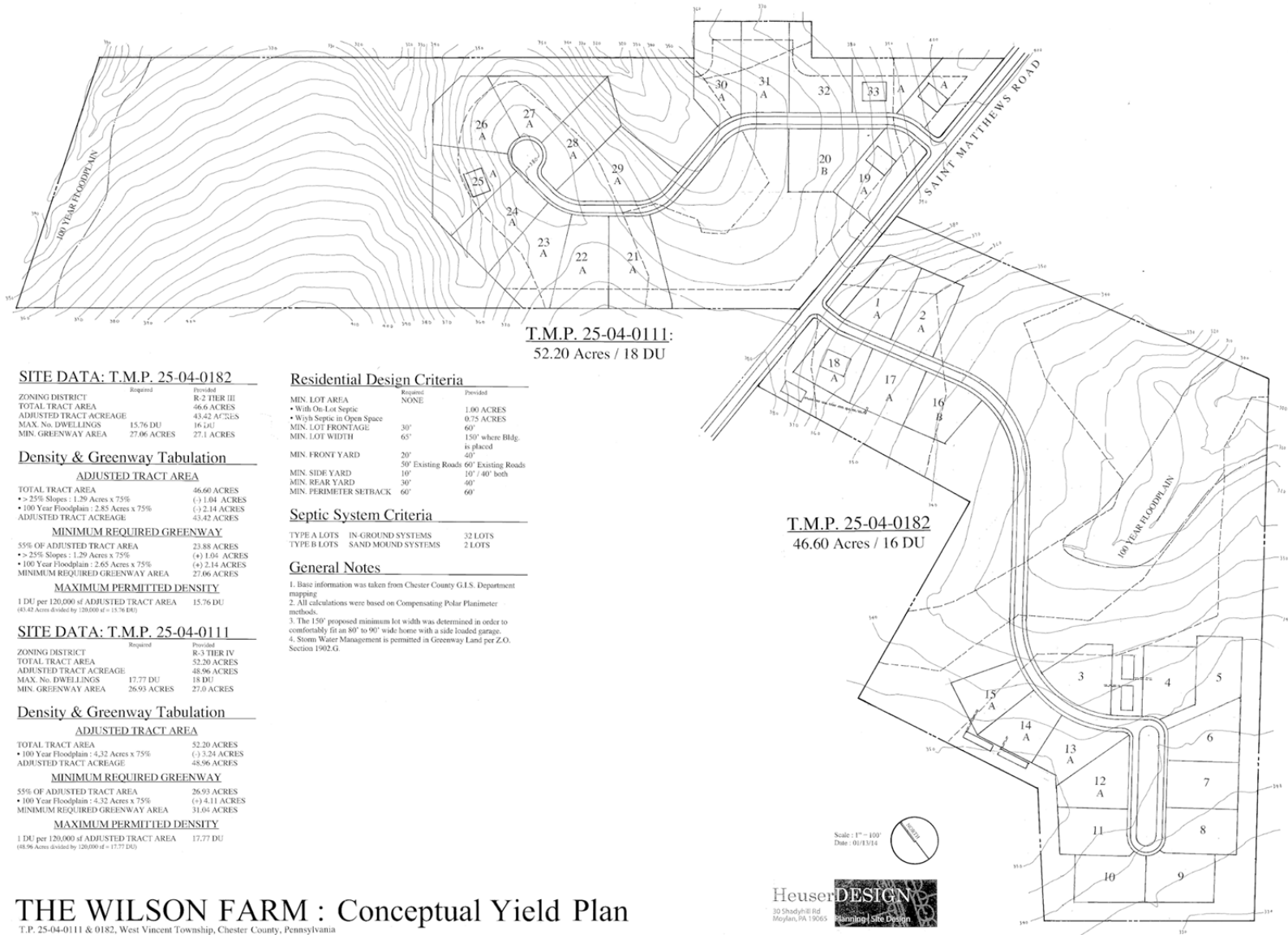
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18
Years





T.M.P. 25-04-0111:
52.20 Acres / 18 DU

SITE DATA: T.M.P. 25-04-0182

Required	Provided
ZONING DISTRICT	R-2 TIER III
TOTAL TRACT AREA	46.6 ACRES
ADJUSTED TRACT ACREAGE	43.42 ACRES
MAX. No. DWELLINGS	16 DU
MIN. GREENWAY AREA	27.1 ACRES

Density & Greenway Tabulation

ADJUSTED TRACT AREA	
TOTAL TRACT AREA	46.60 ACRES
>= 25% Slopes : 1.29 Acres x 75%	(-) 1.04 ACRES
100 Year Floodplain : 2.85 Acres x 75%	(-) 2.14 ACRES
ADJUSTED TRACT ACREAGE	43.42 ACRES

MINIMUM REQUIRED GREENWAY	
55% OF ADJUSTED TRACT AREA	23.88 ACRES
>= 25% Slopes : 1.29 Acres x 75%	(+) 1.04 ACRES
100 Year Floodplain : 2.85 Acres x 75%	(+) 2.14 ACRES
MINIMUM REQUIRED GREENWAY AREA	27.06 ACRES

MAXIMUM PERMITTED DENSITY	
1 DU per 120,000 sf ADJUSTED TRACT AREA	15.76 DU
(43.42 Acres divided by 120,000 sf = 15.76 DU)	

SITE DATA: T.M.P. 25-04-0111

Required	Provided
ZONING DISTRICT	R-3 TIER IV
TOTAL TRACT AREA	52.20 ACRES
ADJUSTED TRACT ACREAGE	48.96 ACRES
MAX. No. DWELLINGS	18 DU
MIN. GREENWAY AREA	26.93 ACRES

Density & Greenway Tabulation

ADJUSTED TRACT AREA	
TOTAL TRACT AREA	52.20 ACRES
100 Year Floodplain : 4.32 Acres x 75%	(-) 3.24 ACRES
ADJUSTED TRACT ACREAGE	48.96 ACRES

MINIMUM REQUIRED GREENWAY	
55% OF ADJUSTED TRACT AREA	26.93 ACRES
100 Year Floodplain : 4.32 Acres x 75%	(+) 4.11 ACRES
MINIMUM REQUIRED GREENWAY AREA	31.04 ACRES

MAXIMUM PERMITTED DENSITY	
1 DU per 120,000 sf ADJUSTED TRACT AREA	17.77 DU
(48.96 Acres divided by 120,000 sf = 17.77 DU)	

Residential Design Criteria

Required	Provided
MIN. LOT AREA	NONE
• With On-Lot Septic	1.00 ACRES
• With Septic in Open Space	0.75 ACRES
MIN. LOT FRONTAGE	60'
MIN. LOT WIDTH	150' where Bldg. is placed
MIN. FRONT YARD	20'
MIN. SIDE YARD	50' Existing Roads 10' / 40' both
MIN. REAR YARD	30'
MIN. PERIMETER SETBACK	60'

Septic System Criteria

TYPE A LOTS	IN-GROUND SYSTEMS	32 LOTS
TYPE B LOTS	SAND MOUND SYSTEMS	2 LOTS

General Notes

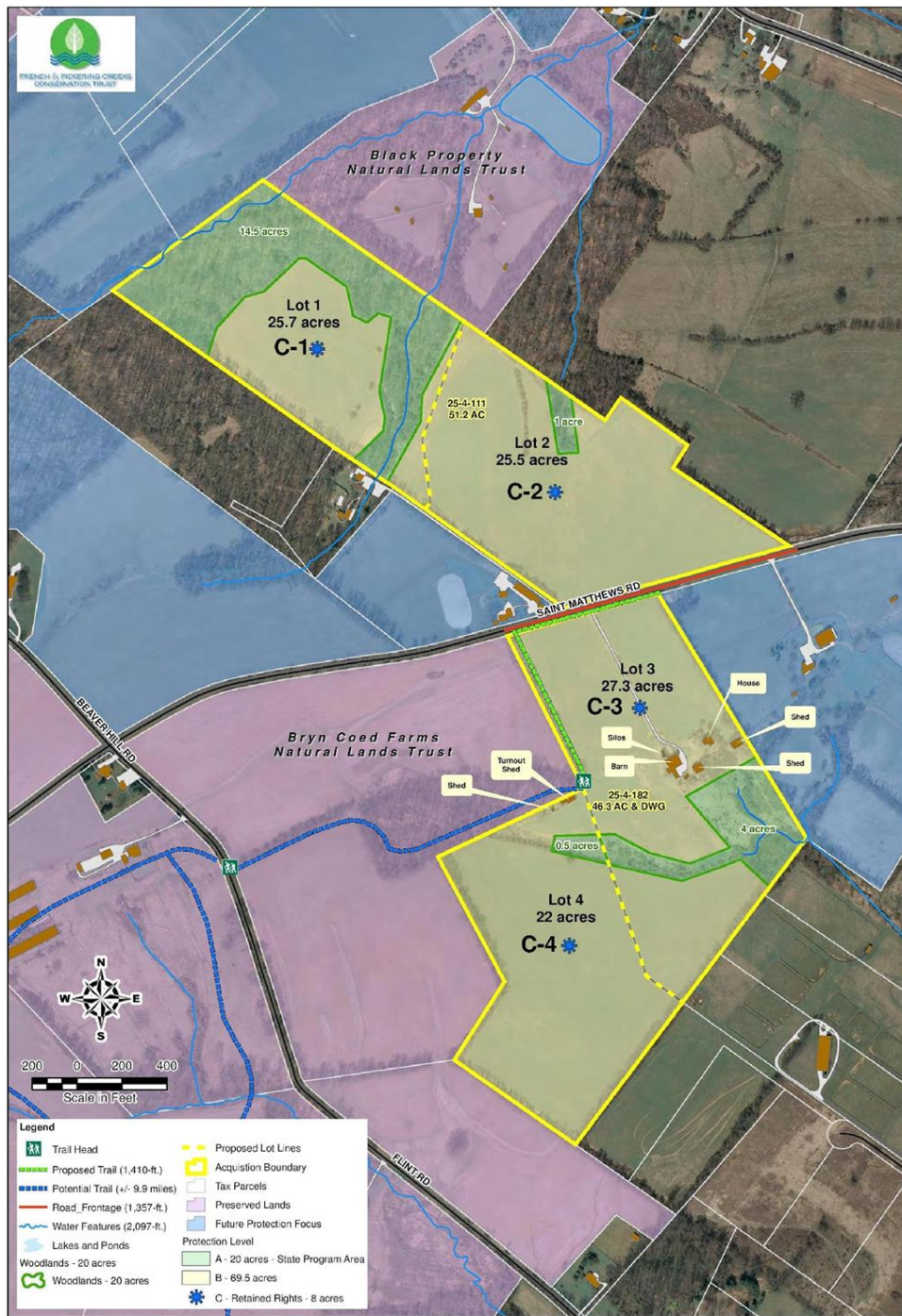
1. Base information was taken from Chester County G.I.S. Department mapping.
2. All calculations were based on Compensating Polar Planimeter methods.
3. The 150' proposed minimum lot width was determined in order to comfortably fit an 80' to 90' wide home with a side loaded garage.
4. Storm Water Management is permitted in Greenway Land per Z.O. Section 1902.G.

T.M.P. 25-04-0182
46.60 Acres / 16 DU

Scale: 1" = 100'
Date: 01/13/14

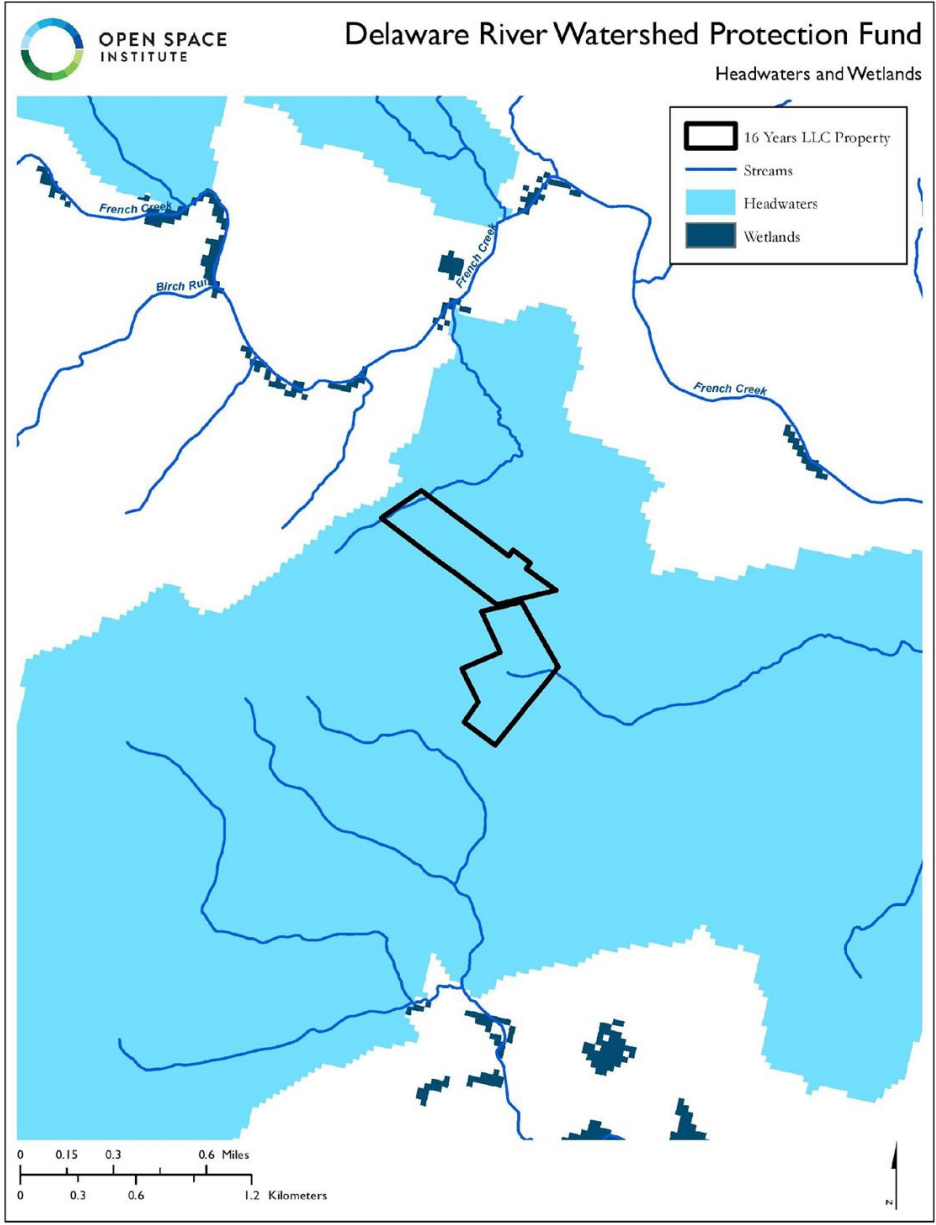
HeuserDESIGN
30 Shadyhill Rd
Moylan, PA 19065
Planning | Site Design

16
Years



18
Years













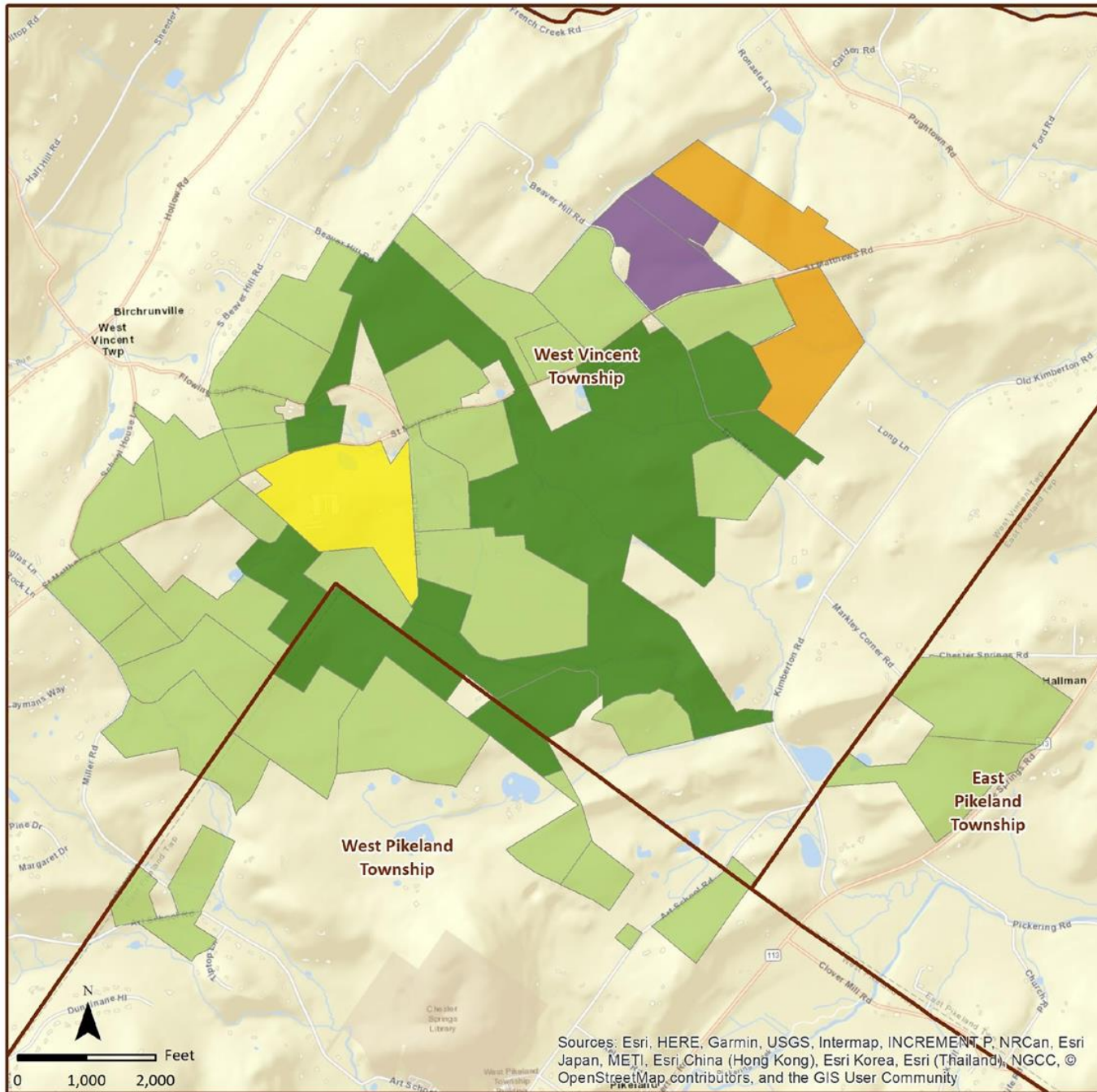




Sixteen & Eighteen Years Conservation Easements

Pam Brown





Location

BRYN COED FARMS
18 YEARS, LLC
16 YEARS, LLC
 West Vincent Township, Chester County, PA

-  Municipal Boundaries
-  16 Years, LLC
-  18 Years, LLC
- Bryn Coed Farms**
-  Conservation Lot
-  NLT Preserve
-  WVT Park



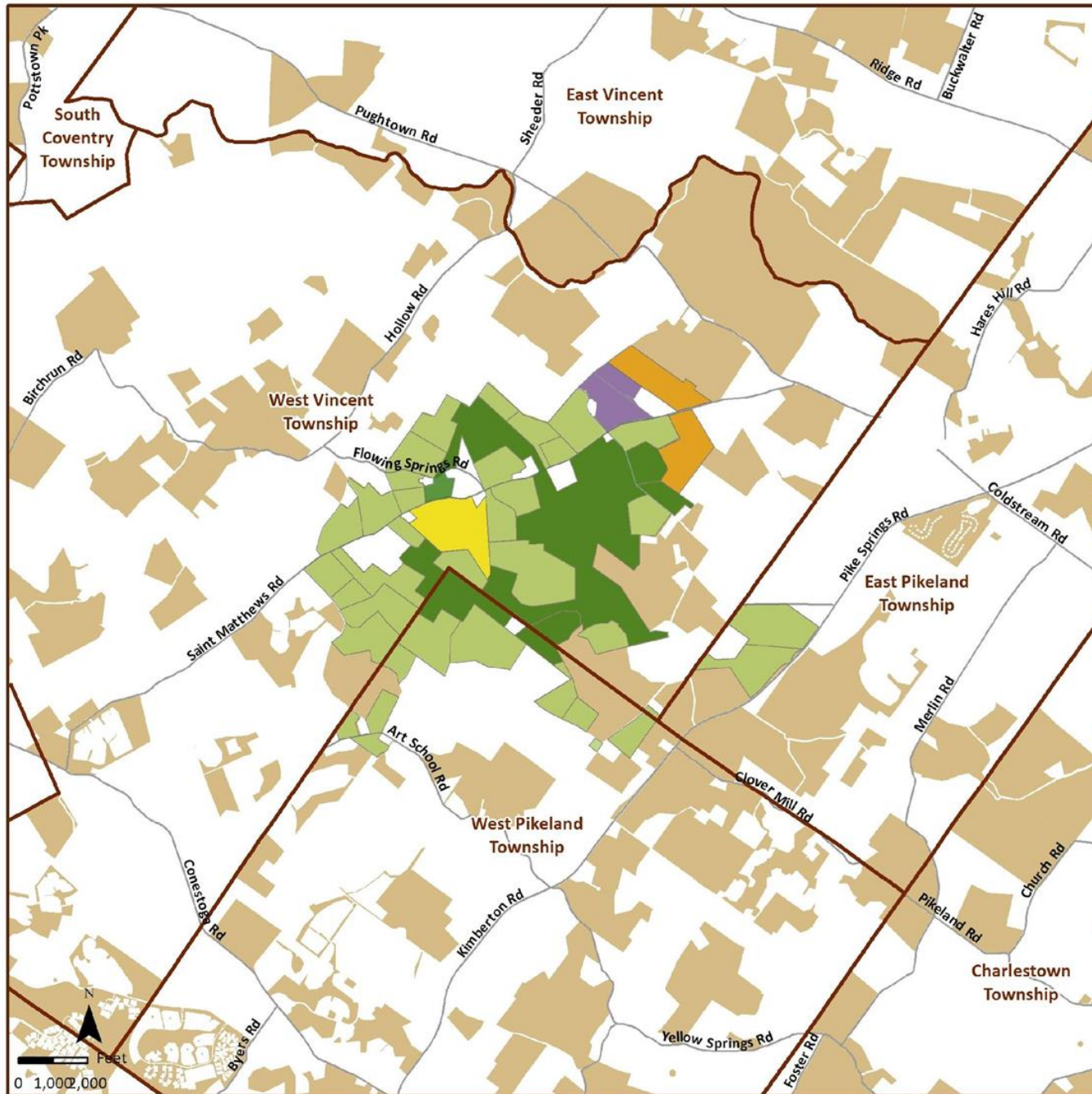
1031 Palmers Mill Road, Media, PA 19063
 610-353-5587 | natlands.org

1. Property boundary from Chester County and Nave Newell, Inc.

Compiled By: MEB 11/11/19

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Location

BRYN COED FARMS

18 YEARS, LLC

16 YEARS, LLC

West Vincent Township, Chester County, PA

- Municipal Boundaries
- Other Protected Land
- Roadways
- 16 Years, LLC
- 18 Years, LLC
- Bryn Coed Farms**
- Conservation Lot
- NLT Preserve
- WVT Park



1031 Palmers Mill Road, Media, PA 19063
610-353-5587 | noland.org

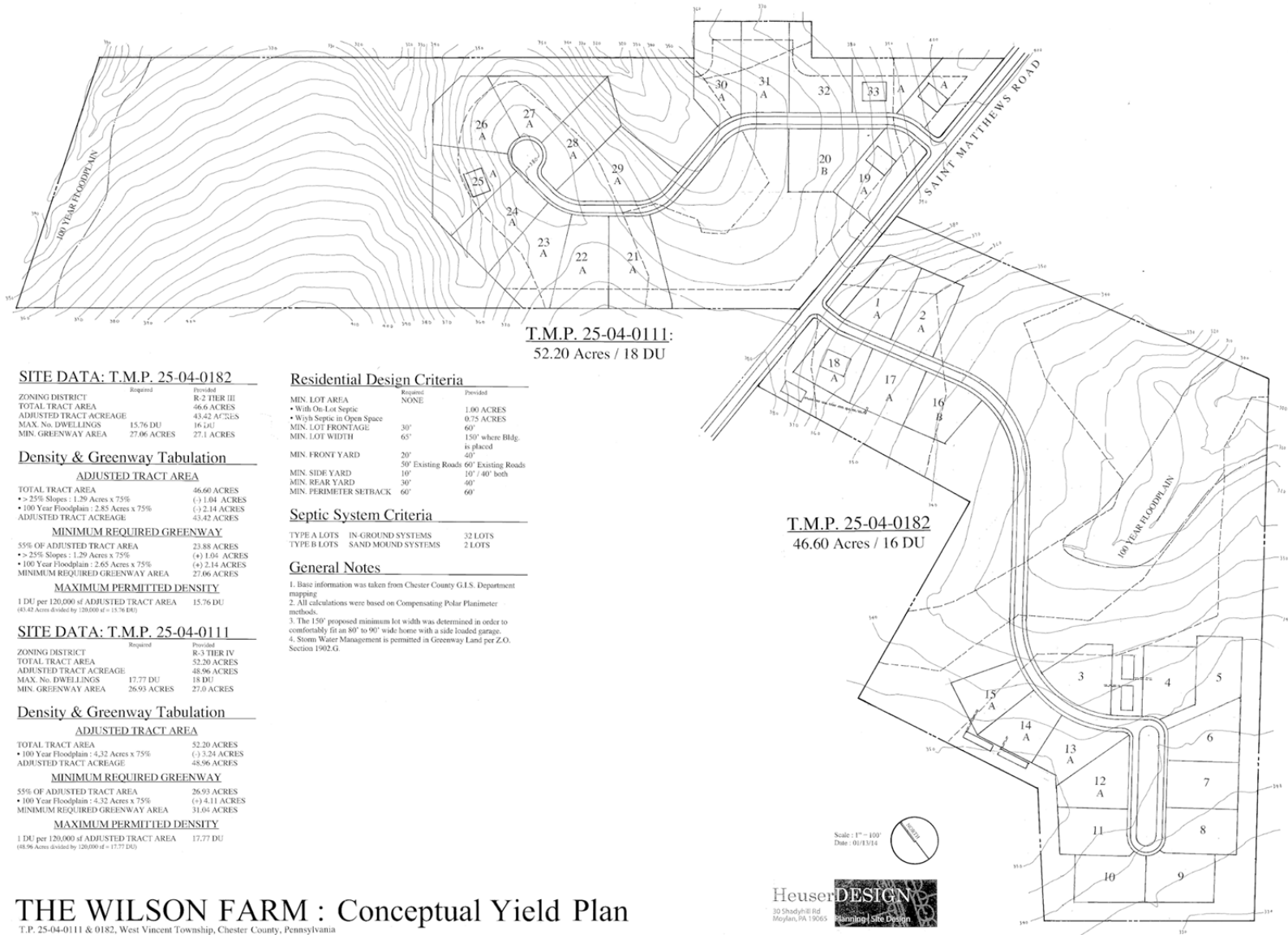
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18
Years





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SITE DATA: T.M.P. 25-04-0111

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Density & Greenway Tabulation

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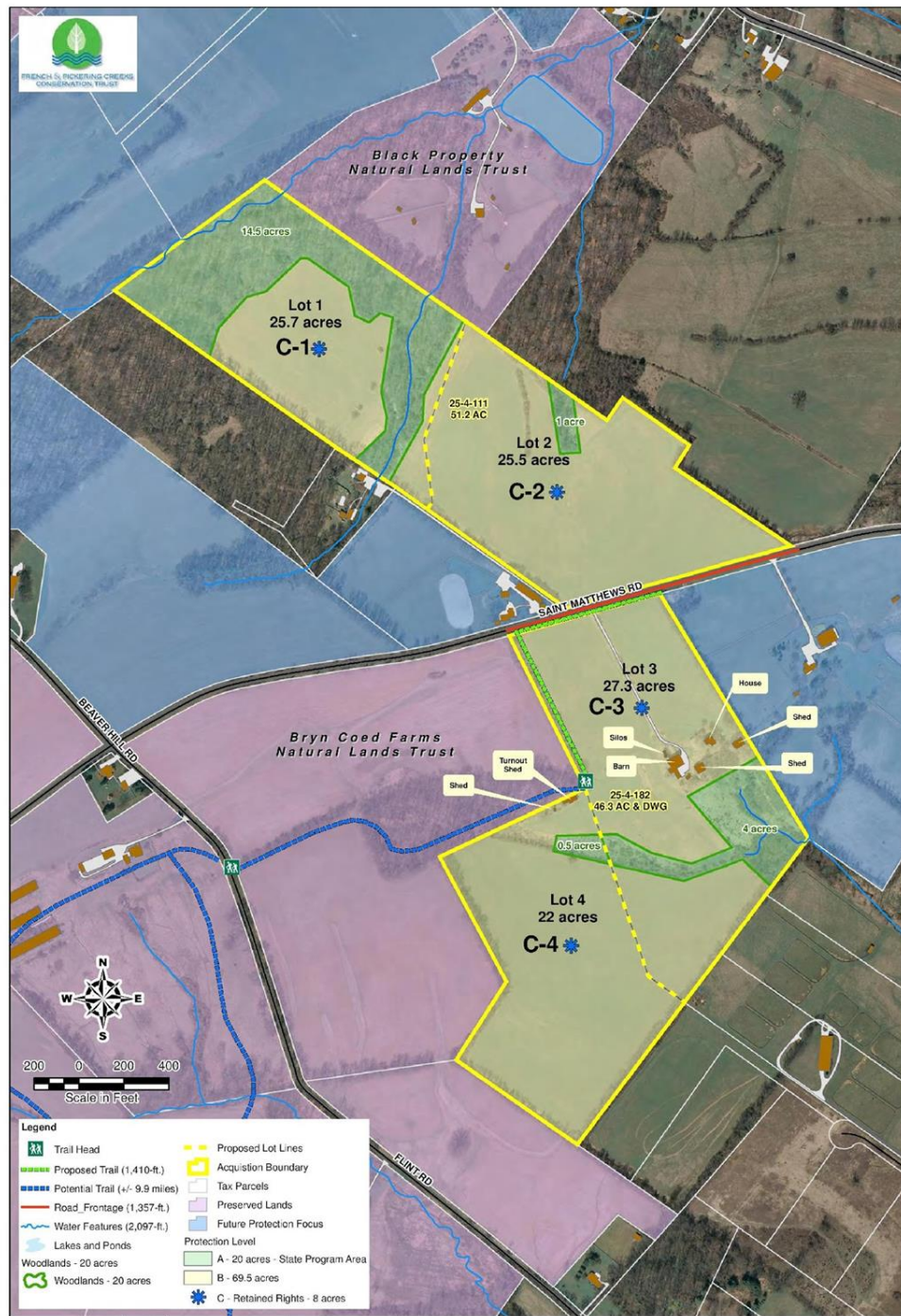
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THE WILSON FARM : Conceptual Yield Plan

T.P. 25-04-0111 & 0182, West Vincent Township, Chester County, Pennsylvania

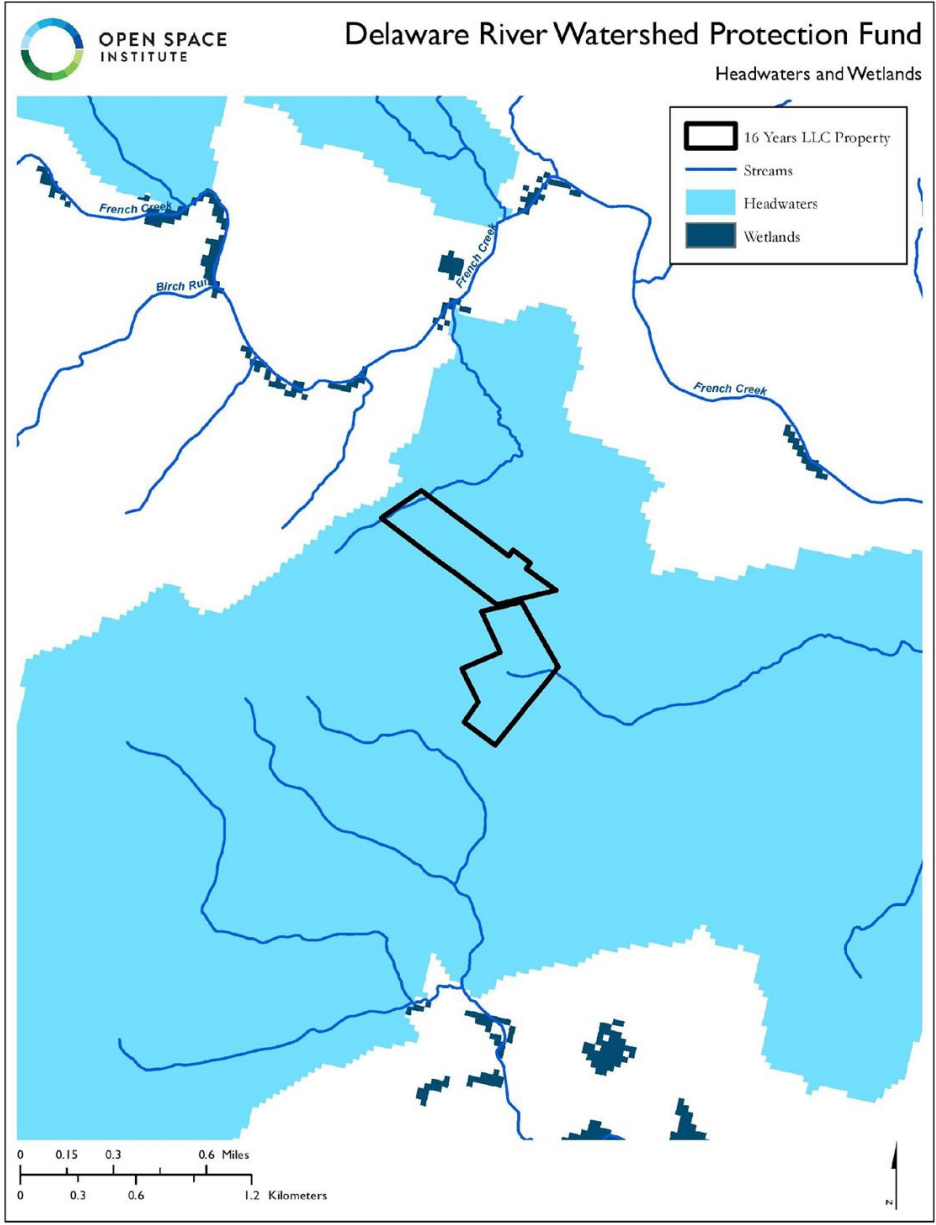
Heuser DESIGN
30 Shadyhill Rd
Moylan, PA 19065
Planning | Site Design

16
Years



18
Years







SIXTEEN YEARS, LLC

FUNDING SOURCES

CONSERVATION EASEMENT APPRAISAL	\$ 790,400
CHESTER COUNTY PPP	\$ 400,000
WEST VINCENT TOWNSHIP	\$ 200,000
OPEN SPACE INSTITUTE	\$ 80,000
LANDOWNER DONATION	\$ 110,400

EIGHTEEN YEARS, LLC

FUNDING SOURCES

CONSERVATION EASEMENT APPRAISAL	\$ 536,826
CHESTER COUNTY PPP	\$ 268,413
WEST VINCENT TOWNSHIP	\$ 55,000
OPEN SPACE INSTITUTE	\$ 80,813
PA DCNR	\$ 132,600











SCHUYLKILL

 ACTS & IMPACTS 

AN EXPEDITION TO INSPIRE WATERSHED ACTION

PROGRAM PARTNERS:

SCHUYLKILL HEADWATERS ASSOCIATION

FAIRMOUNT WATER WORKS

STROUD WATER RESEARCH CENTER

WHAT IS "SCHUYLKILL ACTS AND IMPACTS"

a weeklong watershed expedition along
the 120-miles of the Schuylkill River,
from headwaters to lower Schuylkill in
Philadelphia

2020 is 7th year

WHO PARTICIPATES

High school students from 5 counties in the watershed

Students complete a series of short-essays and phone interview process

PROGRAM FOCUS

Focus on legacy of coal mining

Agricultural impacts

Land preservation

Urban water systems

Stormwater runoff and green
infrastructure

PROGRAM OBJECTIVES

to inspire

to learn

to apply knowledge through service projects

to practice leadership skills

to learn about career pathways

to make new friends

to develop a long-term relationship with environmental stewardship

PROGRAM HIGHLIGHTS

Students conduct water quality testing each day using Stroud Water Research Center's WQ App. At the end of the week, the data is uploaded, compiled and analyzed and compared with previous years of data.

Kayaking, camping, hiking, invasive species removal, early morning guided walk at John Heinz National Wildlife Refuge, visit to a former coal mine (museum)

FUNDING

All costs for students are underwritten by partner organizations Schuylkill Headwaters Association, the Fairmount Water Works, and Stroud with smaller grants from local organizations and individuals

Cost: \$1,000 per student

SCHEDULE BASICS

Breakfast

Tour/Program

Lunch

Tour/Programs

Dinner

Set up camp

Reflection around campfire and journaling























STUDENT TESTIMONIALS

“We did water testing that was much more intense than my AP Environmental Studies class. They made me rethink my dislike for chemistry. I usually dislike it, but these hands-on tests I find really cool. I’m proud of myself for knowing what the tests do and what they mean to the water and organisms.”

“I always forget how beautiful PA is. Kayaking is so peaceful and I really felt like I was experiencing something special. It was really rewarding to finish the 15 miles. It was something I didn’t quite know I was capable of.”

STUDENT TESTIMONIALS

“Went to the farm. His operation really impressed me because it changes my perception on all farms’ treatments of their cows. The cows were well fed, had room to move, were taken care of, the machines that milked the cows were not painful and the cows actually liked being milked. The machine was fascinating to watch. It was amazing how my perceptions on farming, especially with cows, is not what I believed it to be. Especially after taking AP Environmental Science and learning about the negative environmental impacts and poor conditions livestock face. I was shocked to see how happy the cows seemed.”

STUDENT TESTIMONIALS

“Crow’s Nest - I enjoyed hearing about Dan’s background and how he came to work for Natural Lands – it was also reassuring that he was able to major in English and still find a career in a completely different field after college. I plan to look into any volunteering opportunities offered by Natural Lands in my area.”

STUDENT TESTIMONIALS

“It has been so fun to be on this trip. I hope I have the amazing opportunity to do this again. It made me realize how much of an impact we (humans) make on the watershed. I want to help with this anyway I can. It is so amazing!!!”

“Overall, I think this program has opened up a lot of new doors for me such as a new possible career path in environmental science. It also taught me a lot of things I didn't know before. It opened up a lot of connections and friendships.”

STUDENT TESTIMONIALS

“This program is amazing. I learned that water is not just going to get clean by itself, but we as people have to do our part, even if we are not a scientist or an environmental teacher. Just us as normal people, we need to start doing our part and get our environment much better. This program was a whole new world to me and I am happy about it. My lifestyle is surely going to change based on this program. I am really grateful.”

QUESTIONS?



Alexa Smith
Natural Resource Conservationist
Schuylkill Conservation District

Phone: 570-391-3336

Email: akramer@co.schuylkill.pa.us

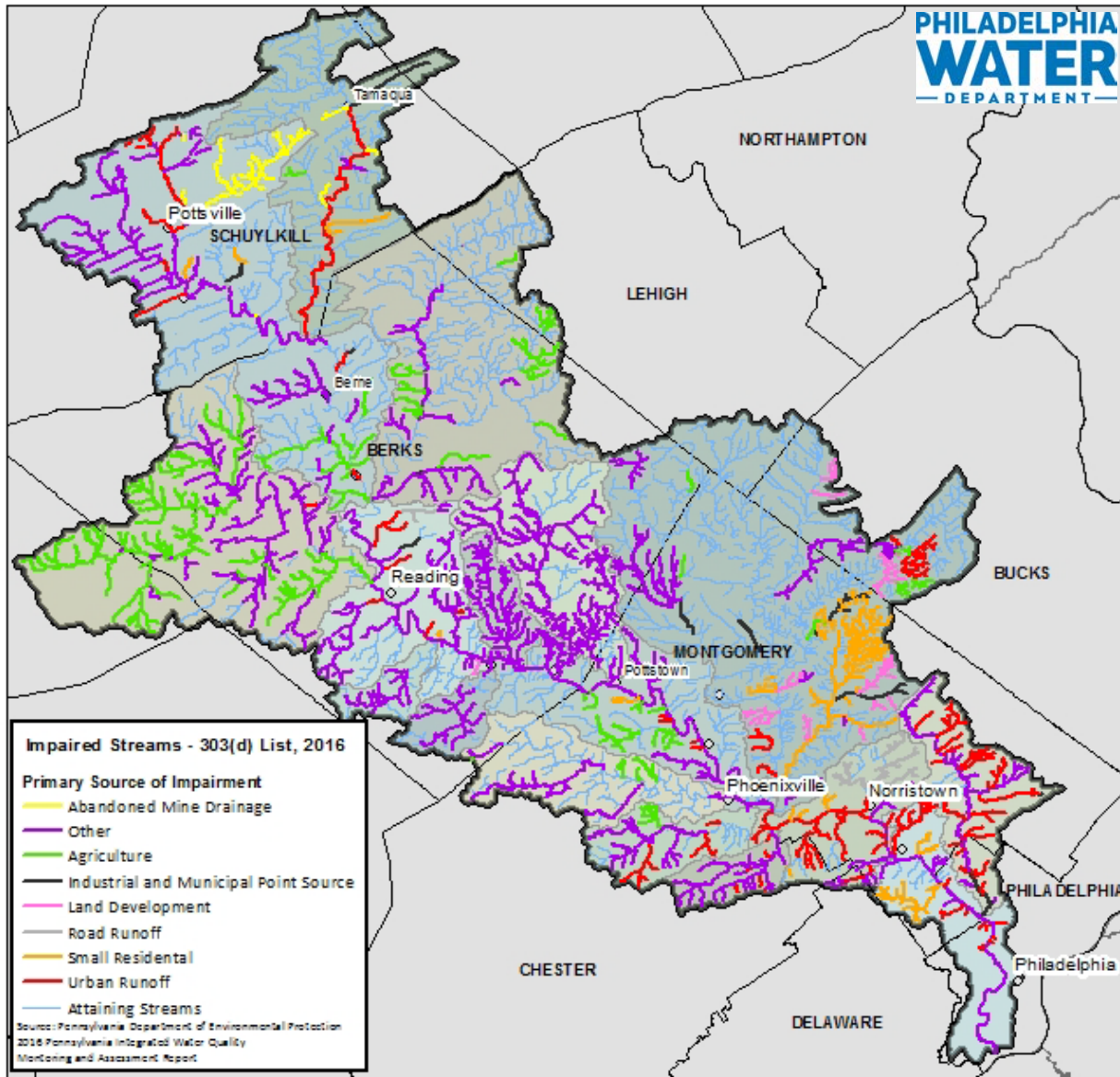
OR outreach@schuylkillheadwaters.org

Ellen Freedman Schultz
Associate Director for Education
Watershed Curriculum, Training, and
Partnerships
Fairmount Water Works Interpretive
Center

Phone: 215-685-0721

Email: Ellen.Schultz@phila.gov

Appendix E: 303(d) List Map of Impaired Streams



303(d) Listed Streams for Impairment in the Schuylkill River Watershed by Primary Source of Impairment (PADEP 2016)

This map shows the primary source of impairment for streams on the 2016 303(d) list. Portions of the Perkiomen Creek (5.6 miles) and unnamed tributaries to the Perkiomen Creek (1.5 miles), originally listed in 2016, were delisted for impairments from pathogens in 2016 (PADEP, 2016).

Appendix F: WCP Program Change Approval – March 2016



Debra McCarty, Water Commissioner

Ms. Zahra Nucci
Safe Drinking Water Program Manager
Southeast Regional Office
Pennsylvania Department of Environmental Protection
2 East Main Street
Norristown, PA 19401

February 29, 2016

Dear Ms. Nucci,

In compliance with the Environmental Protection Agency National Primary Drinking Water Regulations: Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR), Philadelphia Water (PWD) submitted a Watershed Control Plan (WCP). The WCP was approved in December 2012, and the third of five implementation years was completed in 2015. In accordance with 40 CFR §141.716 which states, "If a system determines during implementation that making a significant change to its approved watershed control program is necessary, the system must notify the State prior to making any such changes," Philadelphia Water is requesting to make a change to the approved WCP.

In the WCP, control measures to reduce *Cryptosporidium* in Philadelphia's source watershed are identified for implementation during the five-year timeline. The table below lists the control measures.

WCP Control Measure	Project Description
Wastewater Treatment Plant (WWTPs) Upgrades	Track ultraviolet disinfection installation at two WWTPs
Farm Best Management Practices (BMPs)	Manure storage basins at five farms
	Riparian buffers at five farms
Comprehensive Nutrient Management Plans	Comprehensive Nutrient Management Plans for five farms
Riparian Buffer Planting	Riparian buffer planting at one site
Waterfowl Management	Waterfowl management at priority sites in Philadelphia for five years

Philadelphia Water requests a minor wording change to the farm BMP control measure obligation, which presently includes "**supporting the installation of manure storage units on at least five separate farms; [and] supporting the installation of vegetated buffers on at least five separate farms**" (WCP, Appendix A, page 9). PWD is requesting a change to the farm BMP control measure obligation to include "**supporting the installation of manure storage basin(s) AND/OR riparian buffer(s) at ten separate farms.**" This change will maintain the same level of source water protection achieved through the WCP by implementing BMP control measures at ten farms. To date, PWD has supported implementation of six manure storage basins in the source watershed. With this change, PWD is requesting the flexibility to implement more manure storage basins if projects become available. PWD believes this change should be made for the following reasons:

- 1. Experts in stormwater and nutrient management on farms recommend a holistic approach to BMP implementation.**

PWD implements agricultural BMPs by leveraging funding through the Schuylkill River Restoration Fund and expertise from Schuylkill Action Network (SAN) partners including the Natural Resource Conservation Service, Berks Nature and Berks County Conservation District. These experts, on whom PWD relies to select projects with the greatest positive

impact on the watershed, take a holistic approach when implementing BMPs on a farm. A holistic approach controls animal waste and stormwater on a farm by choosing a combination of BMPs that address all nutrient and stormwater management issues.

2. Manure storage basins protect groundwater from contamination in addition to surface waters.

Many farms entering into agreements for the implementation of BMP projects on their property are identified by the SAN as priority farms but do not have streams and riparian corridors directly on the property. This does not make animal waste and stormwater management on the site any less important. With manure stored in open piles or earthen lagoons, both surface water and groundwater are at risk for contamination. The karst and limestone geology in the Berks County region allows groundwater to move quickly beneath the ground surface. Groundwater contaminated by improperly stored manure on a farm may be contributing flow to nearby creeks making surface waters not on the property vulnerable to contamination as well. It is critical that contaminants to ground and surface waters are controlled at the source: the location the manure is produced and stored.

3. When compared, manure storage basins and riparian buffers provide equivalent removal of *Cryptosporidium* from stormwater.

*As part of the WCP, PWD provided a quantitative assessment of the relative impact of contamination sources and source water protection initiatives on water quality at the Queen Lane intake (WCP, Appendix A, page 17). The assessment estimates that manure storage basins detain 100% of *Cryptosporidium* on site, and riparian buffers filter 99% of *Cryptosporidium* from stormwater before it enters the stream. For this reason, PWD considers both manure storage basins and riparian buffers on farms in Berks County to provide an equivalent removal of *Cryptosporidium* from stormwater.*

In line with these three justifications, PWD has supported the implementation of manure storage basins on farms for the first three years of WCP implementation, and wishes to continue to support the BMPs recommended by the expertise of SAN partners. A change in the requirements to allow implementation of manure storage basin(s) AND/OR riparian buffer(s) at ten separate farms will best reflect the holistic approach taken by experts and provide flexibility for best addressing nutrient and stormwater management issues at selected priority farms.

If you have questions, please do not hesitate to contact us. We look forward to your review of the requested change to the PWD WCP.

Sincerely,

Kelly Anderson
Source Water Protection Program
Office of Watersheds
1101 Market Street, 4th Floor
Philadelphia, PA 19107
(215) 685-6245

CC:

Chris Crockett
Marc Cammarata
Kevin Smith
Elizabeth Ventura



March 9, 2016

Ms. Debra McCarty, Water Commissioner
Philadelphia Water Department
1101 Market Street
Philadelphia, PA

Re: Philadelphia Water Department – Queen Lane Intake
Watershed Control Program Plan 2016 program change letter
PWSID 1510001

Dear Ms. McCarty:

Thank you for submitting to the Pennsylvania Department of Environmental Protection a copy of your letter indicating a program change, dated February 29, 2016, regarding the Watershed Control Program Plan for the Queen Lane Intake. Please be advised that your submission satisfies Philadelphia Water Department's obligation related to Chapter 109, Safe Drinking Water regulations, Section 109.1204(b)(4)(i), and this information has been made part of the file.

If you have any questions regarding this matter, please contact Mr. Kevin Smith of our office at 484.250.5131.

Sincerely,

A handwritten signature in blue ink that reads "D. J. Bolig".

David J. Bolig, P.E., P.L.S.
Environmental Engineer Manager
Safe Drinking Water

Cc:

Ms. Kelly Anderson - PWD
Mr. Smith-SDW
Mr. Bolig - SDW
File (kr16sdw) 067-2

Southeast Regional Office