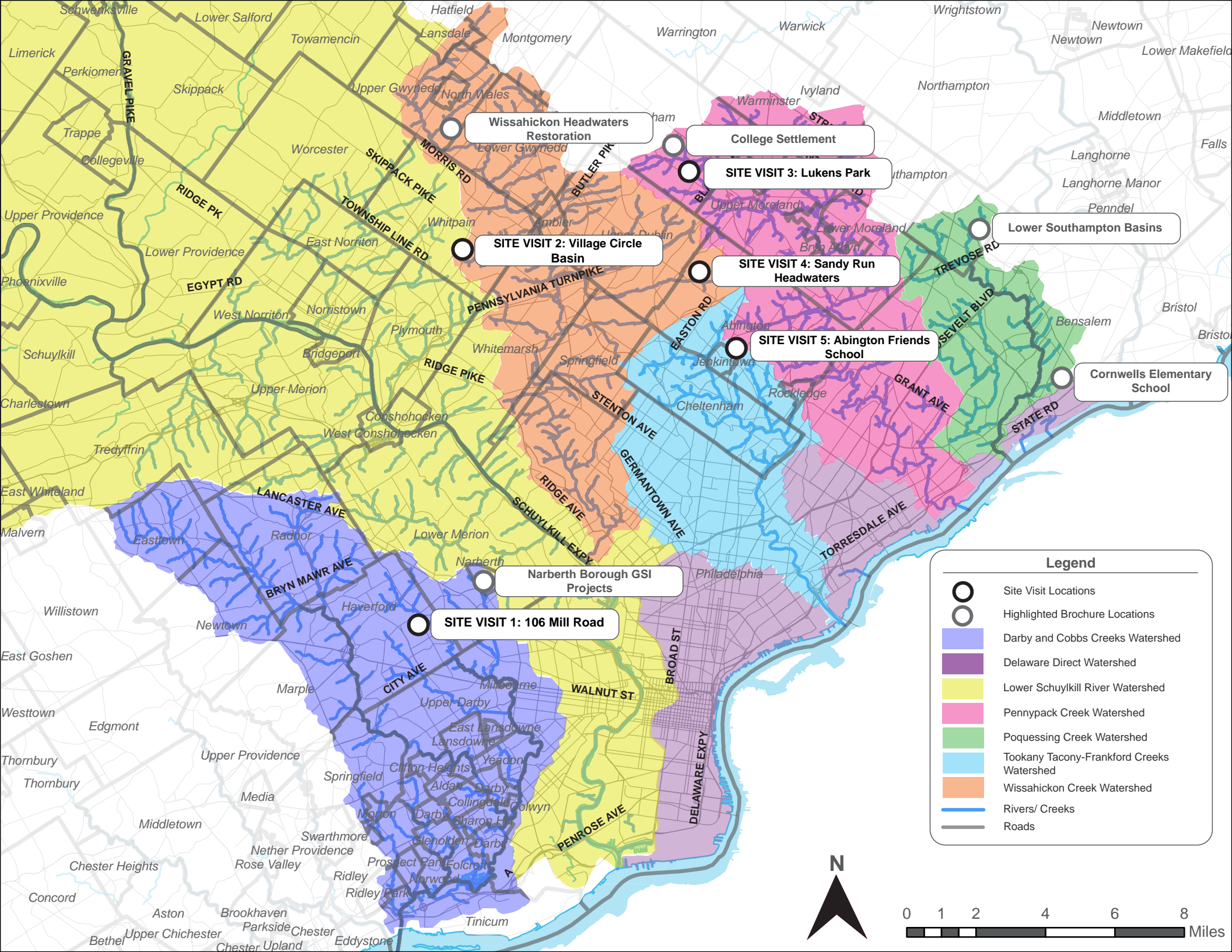


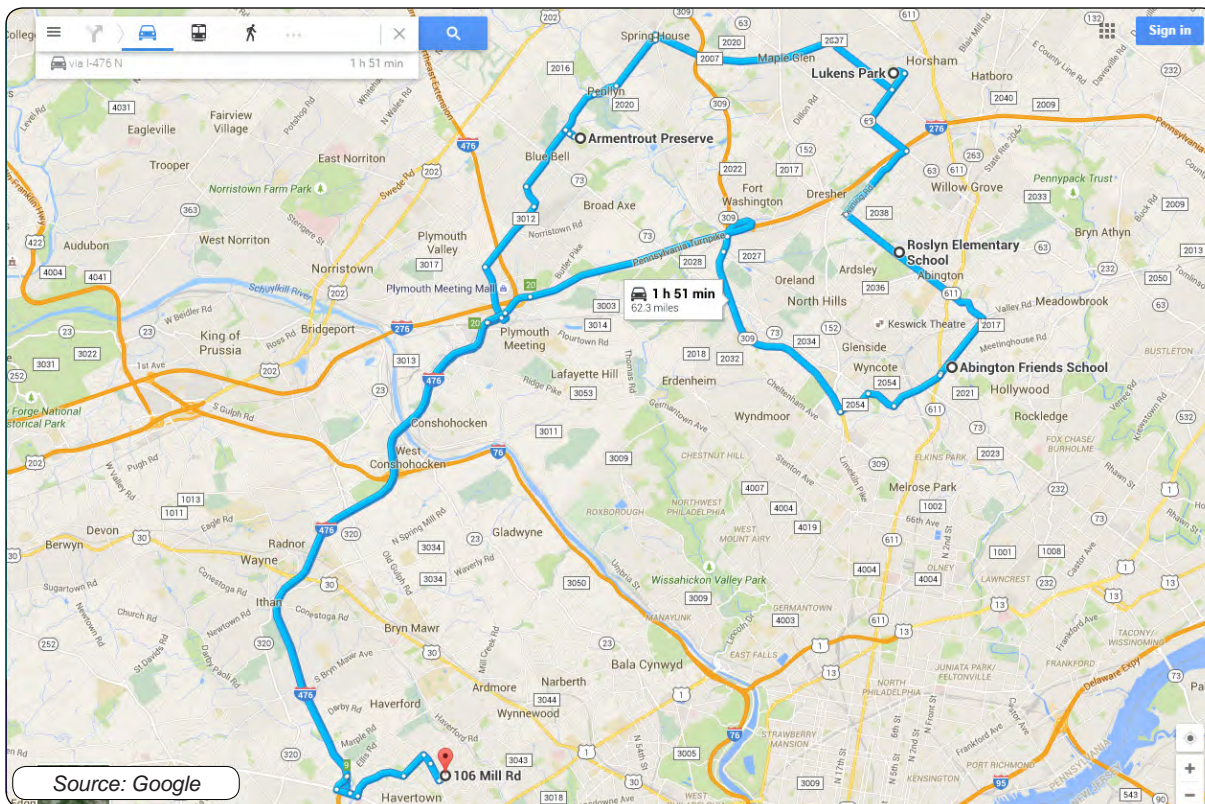
Upstream Suburban Philadelphia Cluster Challenges + Opportunities



pennsylvania environmental council







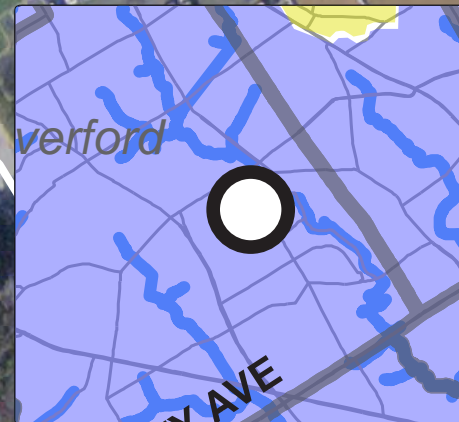
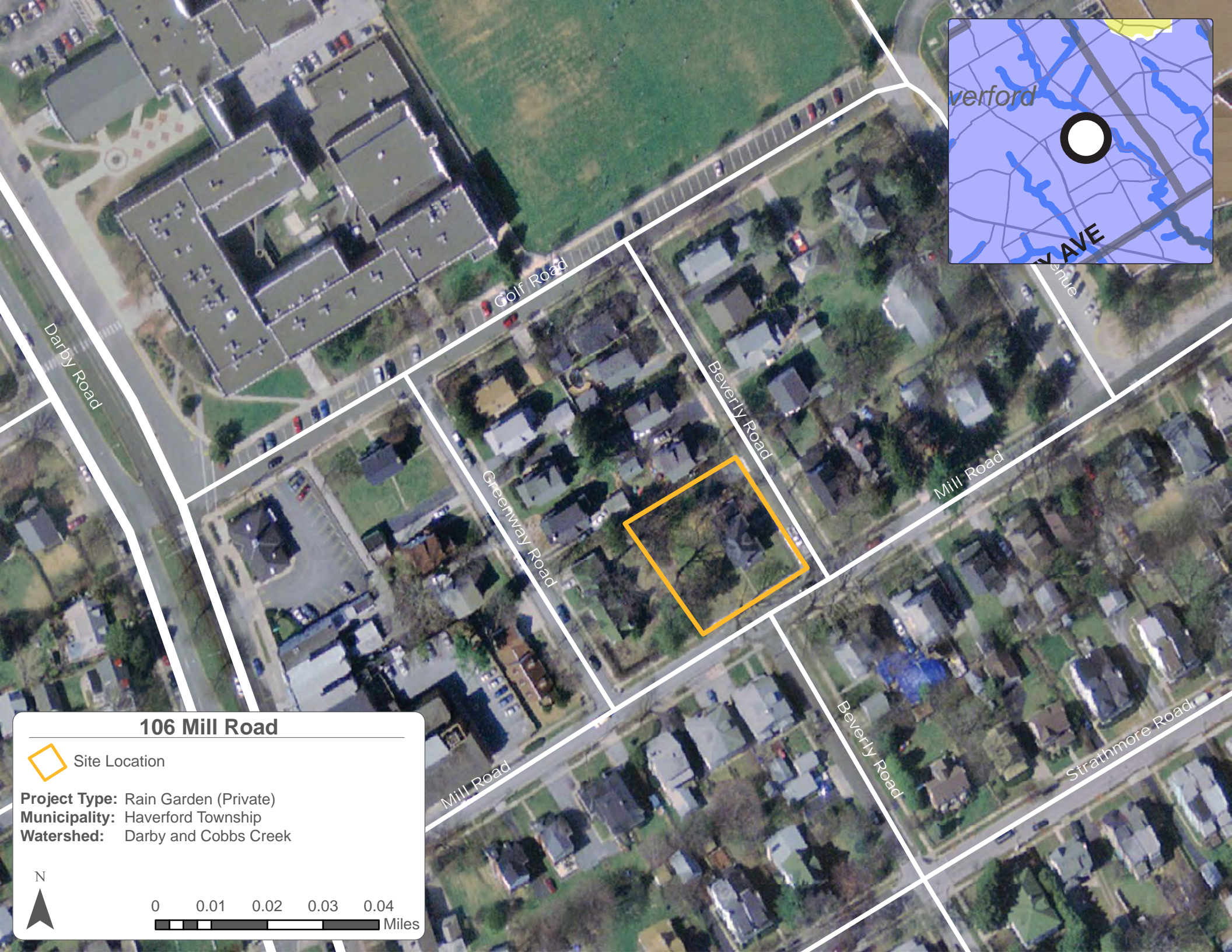
Tour Itinerary

9:00 AM: Meet at Haverford High School
9:15 - 10:00 AM: 106 Mill Road Rain Garden
10:45 - 11:25 AM: Village Circle Basin
11:45 - 1:00 PM: Lukens Park and Lunch
1:30 - 2:30 PM: Sandy Run Headwaters
2:45 - 3:45 PM: Abington Friends School
4:45 - 5:00 PM: Tour concludes at Haverford High School

*Transit riders will be provided shuttle service to Ardmore Station

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106 Mill Road



Site Location

Project Type: Rain Garden (Private)

Municipality: Haverford Township

Watershed: Darby and Cobbs Creek

N



0 0.01 0.02 0.03 0.04

Miles

106 Mill Road

Rain Gardens

106 Mill Road, Haverford Township
Darby and Cobbs Watershed

Total project costs:
\$52,290.00

Considered Funding Sources:

Grants (*NFWF Delaware River Restoration Innovation Grant and Ethel Sergeant Clark Smith Memorial Foundation Grant*)

Partners:

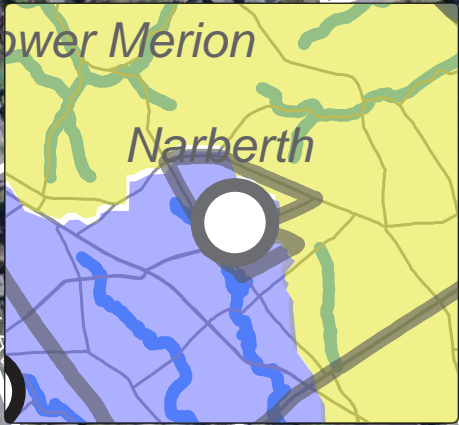
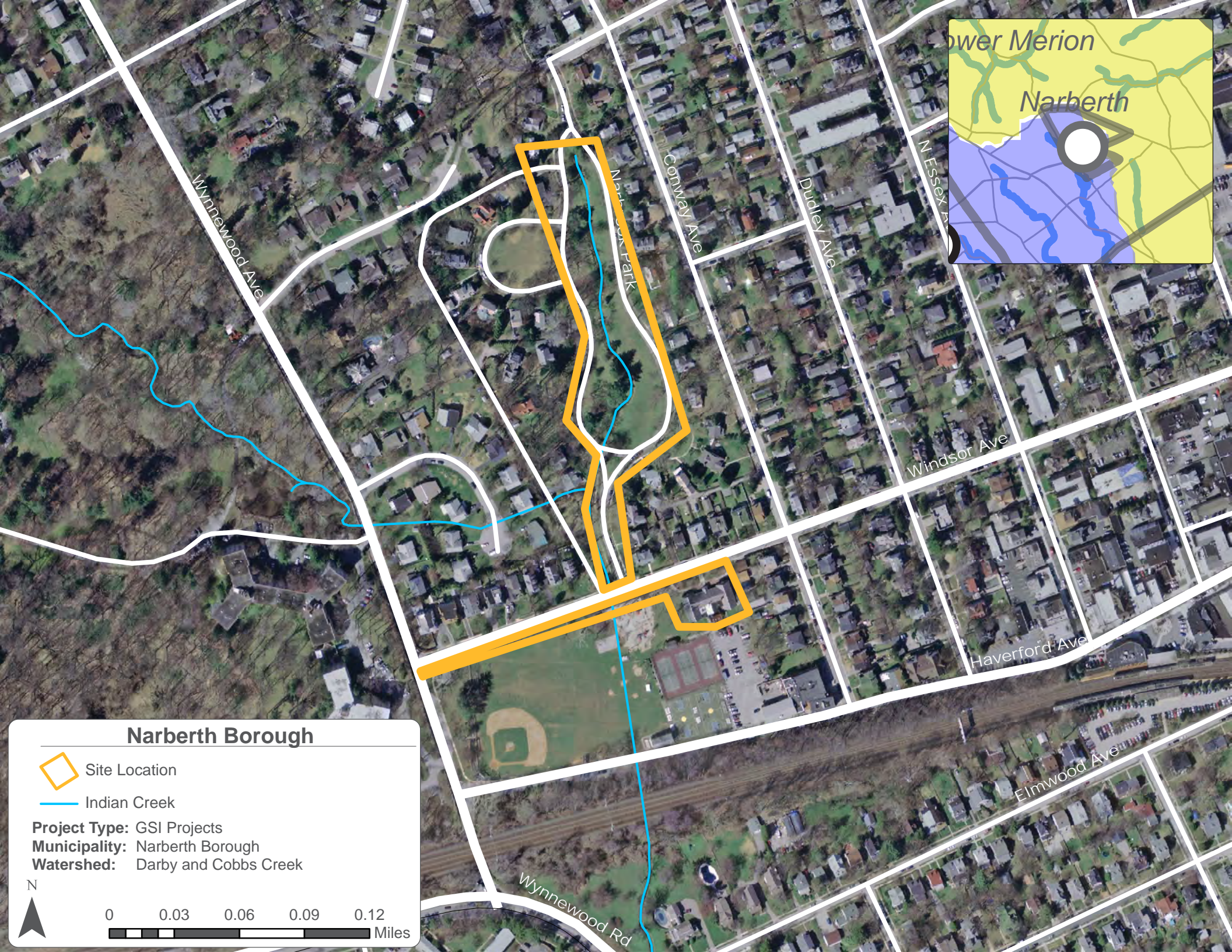
Eastern Delaware County Stormwater Collaborative
Municipalities, Haverford Township, Haverford EAC, Haverford
Community Gardeners, Darby Creek Valley Association

The Pennsylvania Resources Council (PRC) received funding to create 10 high-visibility rain gardens on public and private lands in the Darby and Cobbs watershed. The rain gardens will serve as important demonstration projects and catalysts for capacity building on watershed stewardship BMPs. The public gardens will be installed in parks, on school properties, municipal buildings and libraries. Each garden will be designed to be simple structurally so that they could easily be replicated by residents on private property.



Educational workshops will support the creation of a trained Rain Garden Resource Team that will assist in the creation of additional public and private rain gardens. The goal of the Darby Cobbs Rain Garden Initiative is to educate and engage residents on stormwater management and focuses on getting residents to install rain gardens on their properties. The NFWF grant will provide the seed money to plant the first 10 of 100 rain gardens on private residential properties.

The end result of the grant is to begin creating a shift in how property owners, both public and private, manage stormwater on their land from one of directing it towards our streams as quickly as possible to managing it on their property through green infrastructure such as rain gardens. It is only through getting to this “new normal” that we can begin to mitigate past impairments to the Darby and Cobbs Creeks from stormwater pollution and begin to see improvement in the health of our local streams.

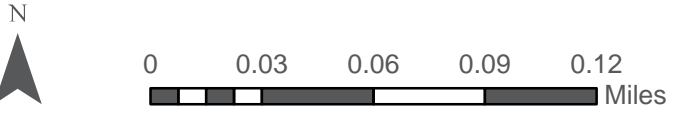




Narberth Borough

-  Site Location
-  Indian Creek

Project Type: GSI Projects
Municipality: Narberth Borough
Watershed: Darby and Cobbs Creek



Narberth Borough

Rain Gardens and Stream Bank Restoration

Narberth Borough
Darby and Cobbs Watershed

Estimated total project costs:

\$395,000 (\$200K for Library Terrace & \$180K for Windsor Ave. Gardens, and \$15K for Narbrook Park)

Considered Funding Sources:

Grants (NFWF)
Borough of Narberth

Partners:

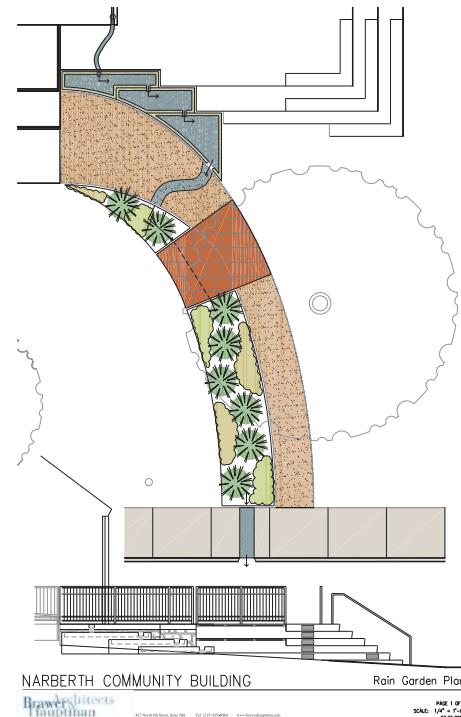
Narberth Borough, Narbrook Park Homeowners Association, and Villanova University

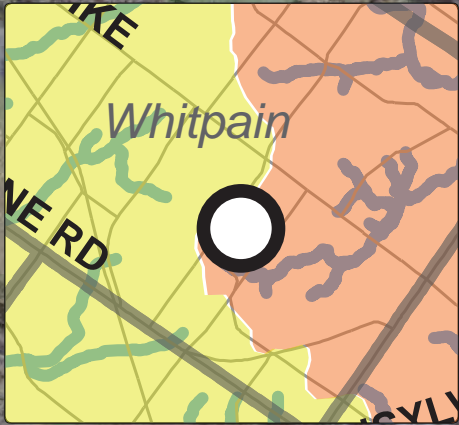
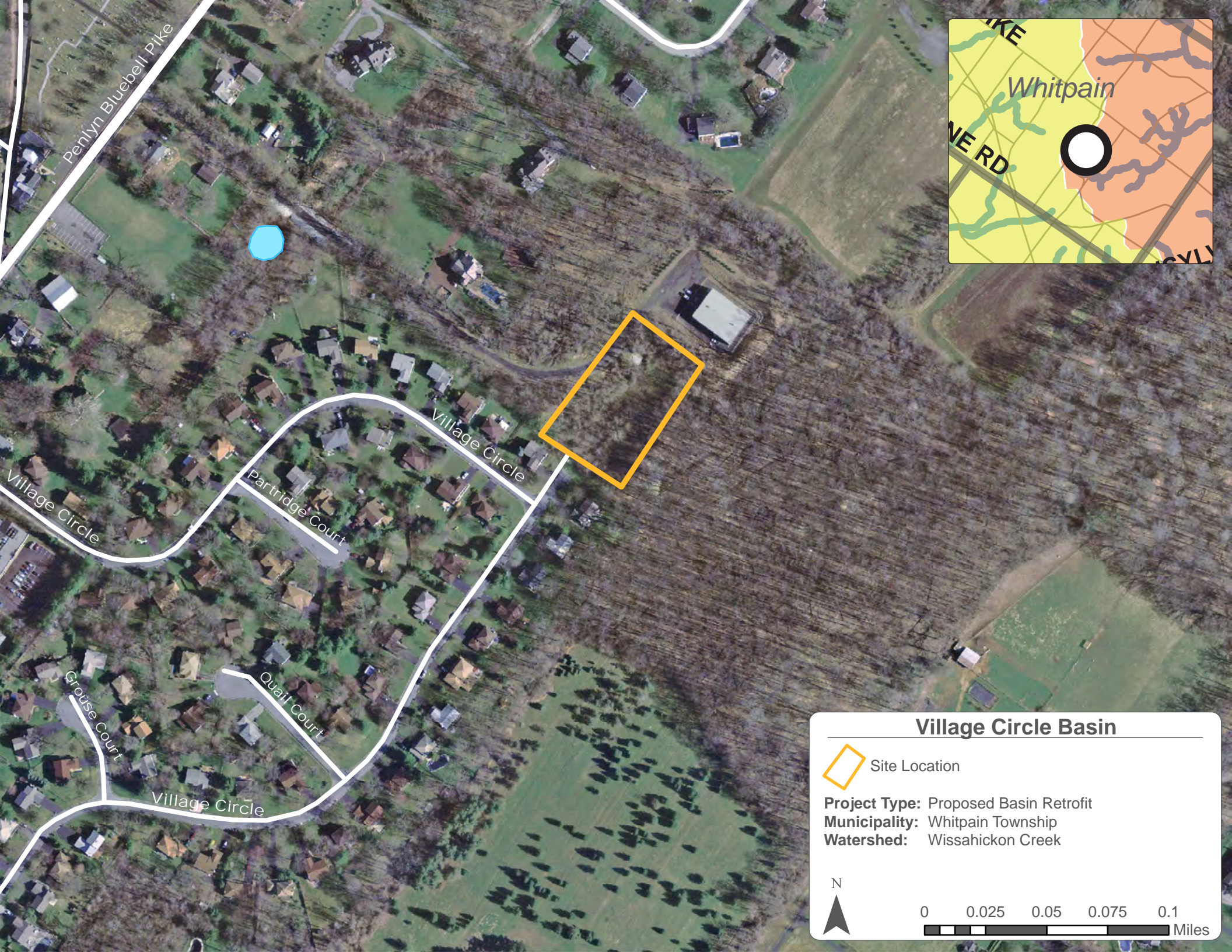
In 2014, the Lower Merion Conservancy was awarded a grant from the National Fish and Wildlife Foundation to improve water quality of Indian Creek by working together with the Borough of Narberth and Narbrook Park, a private residential neighborhood within the Borough. The project includes three parts: installing a rainwater management device at the Narberth Library; installing a series of rain gardens that will run along a stretch of land between the ball field and a street where rain water accumulates; and working closely with Narbrook Park residents to improve a stretch of the stream that runs through the neighborhood.

In June, a foundation test was conducted at the Library to determine its structural viability for a stormwater retrofit and the Borough's engineer conducted a soil test to detect nutrient content and drainage. Plans for the redesign are currently being drawn by architect David Brawer and will include a stormwater drainage system that will allow rainwater to flow from the existing gutter system onto a terrace to be diverted to rain gardens. The plans will be sent out for bid during the third week in August, with construction anticipated to begin early next spring.


The second part of the project to install a series of rain gardens along the south side of Windsor Avenue between N. Wynnewood and Borough Library will help to manage stormwater, serve as a stormwater demonstration feature, and enhance a pedestrian corridor and various entrance points to the community's park and ball field. Installation of the gardens is anticipated to begin next spring.

The third piece of the project is to work with the residents of Narbrook Park to improve the quality of the stretch of stream that runs through it by installing streamside buffers, increasing native habitat and engaging a community of residents committed to green solutions to runoff problems.





Village Circle Basin


 Site Location

Project Type: Proposed Basin Retrofit


Municipality: Whitpain Township

Watershed: Wissahickon Creek

N



00.0250.050.0750.1

 Miles

Village Circle Basin

Basin Retrofit

Whitpain Township
Wissahickon Watershed

Estimated total project costs:
\$100,000 - \$160,000

Considered Funding Sources:
Whitpain Township

Partners:
Whitpain Township, LandConcept, Wissahickon Valley Watershed Association (WVWA) and Temple University

The Village Circle Basin was built in 1977, when our relationship with stormwater was to remove it from a neighborhood as quickly as possible. Now, in 2015 the approach to stormwater has changed to holding it up to 72 hours to allow infiltration and a slow release of stormwater into the watershed. With this new approach, Whitpain Township has retrofitted a number of their existing basins, and the Village Circle Basin is next. The Village Circle Basin retrofit, as the result of the basin's large size and location, enables the new design to include a forbay to allow sediment to settle out, serpentine flow pattern to slow the flow of stormwater through the basin, infiltration pits to recharge groundwater and a smaller outflow structure to minimize peak discharge during storm events. An additional benefit is the streambank restoration that will occur directly downstream of the outflow structure to reduce further erosion caused by the conditions.

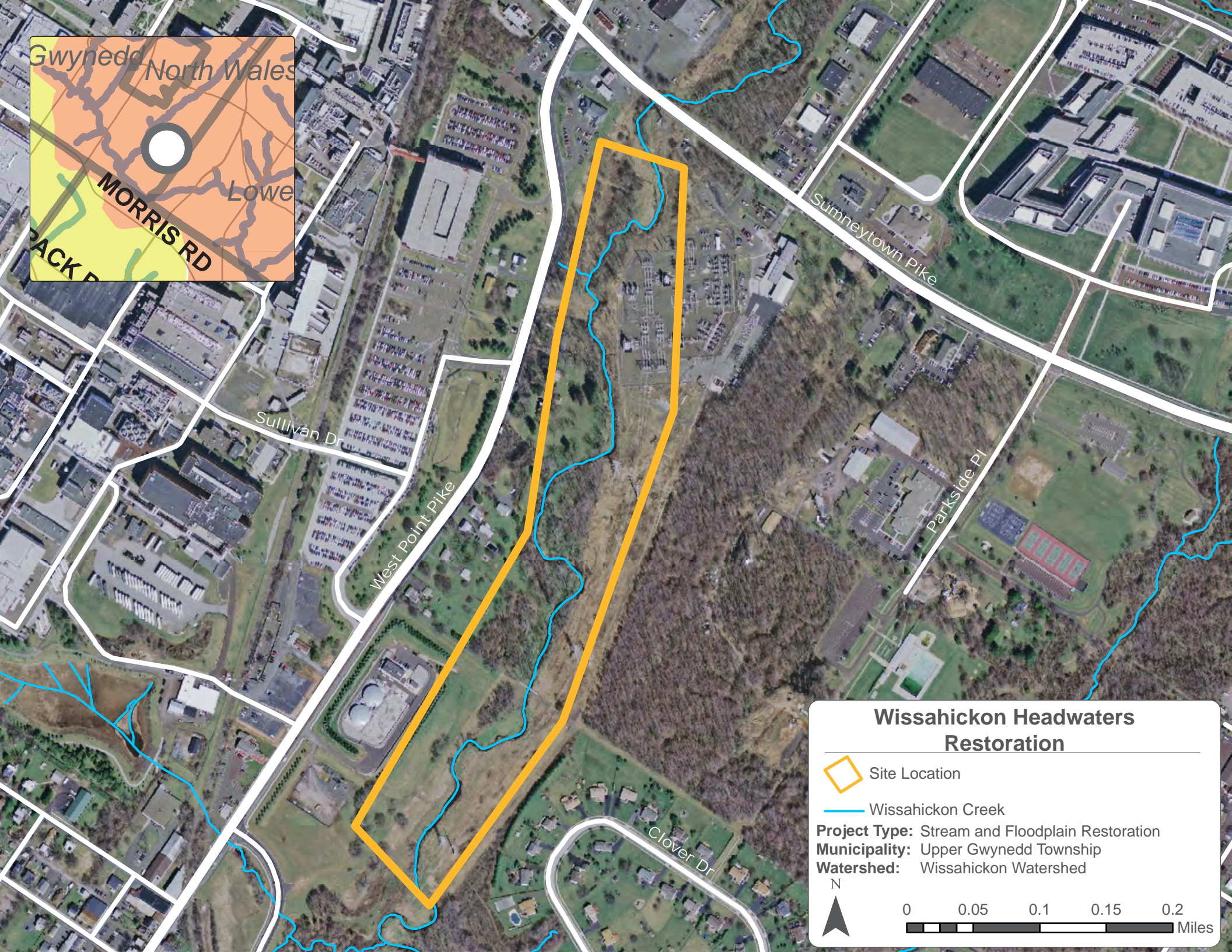
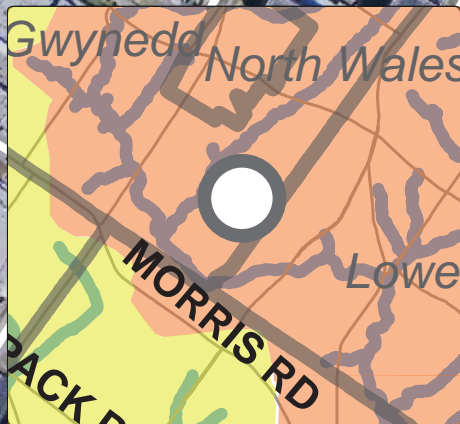
The Village Circle Basin improvements created a unique opportunity to monitor and capture the water quality improvements from a basin retrofit by monitoring the basin both before and after the retrofit. This partnership between Whitpain, WVWA and Temple University includes three levels of monitoring:

Temple University: Two continuous data loggers for temperature, water level, conductivity, and turbidity. Records date back greater than one year.


WVWA: Two continuous data loggers that monitor temperature, conductivity, and water depth. Records date back greater than one year.


Citizen Monitoring: A WVWA "Creek Watcher" is monitoring the downstream of the Village Circle Basin with test kits for nutrients and visual monitoring.





Wissahickon Headwaters Restoration

 Site Location

 Wissahickon Creek

Project Type: Stream and Floodplain Restoration
Municipality: Upper Gwynedd Township
Watershed: Wissahickon Watershed

N

0 0.05 0.1 0.15 0.2 Miles

Wissahickon Headwaters Stream and Riparian Restoration

Floodplain Reconnection, Riparian Buffer Restoration, and In-Stream Restoration

Upper Gwynedd Township
Wissahickon Watershed (WPF priority)

Estimated total project costs:
In Development Stages

Considered Funding Sources:
NFWF Funded for Design

Partners:
Upper Gwynedd Township, PECO, Temple University, and WVWA

The Wissahickon Headwaters Stream and Riparian Restoration site is located in Upper Gwynedd, an area of the Wissahickon that is impacted by suburban sprawl and stormwater run-off. To address this, the WVWA proposed restoring the first segment of the Wissahickon that has continuous flow in Upper Gwynedd Township along the PECO Right of Way and at the start of the WVWA's Green Ribbon Trail that buffers nearly the entire Wissahickon Creek to Philadelphia. In 2015 NFWF funded the concept and construction drawings for restoring 4,300 linear feet, and design drawings and permit applications for the first reach of 1,775 linear feet.

The Wissahickon Creek's need for restoration in this area is evident with macroinvertebrate surveys, conducted by the WVWA, which identified a community that is simplified and reduced to species that can tolerate a harsh habitat, disturbances, and poor water quality conditions. The harsh environment is from the unstable habitat, including 5-10 foot vertical eroding banks that threaten PECO infrastructure and reduce water quality by releasing sediment and nutrients into the system with every rainfall. The proposed restoration method, known as floodplain reconnection, will fix the issues at this site by modifying the stream channel morphology so that it is shallower. The shallower stormwaters would reduce the erosive forces, stabilize the habitat and riparian buffer, and improve water quality.

Figure 1
Project Location Map
Wissahickon Creek Restoration, West Point Reach
Upper Gwynedd Township, Montgomery County, Pennsylvania





Sandy Run Headwaters



Site Location



Sandy Run Headwaters

Municipality: Abington Township
Watershed: Wissahickon Creek

N



0 0.025 0.05 0.075 0.1

Miles

Sandy Run Headwaters

Challenges of Channelized Streams

Abington Township
Wissahickon Watershed

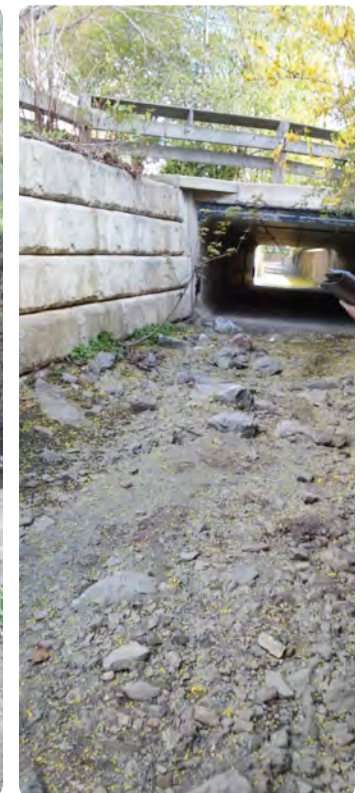
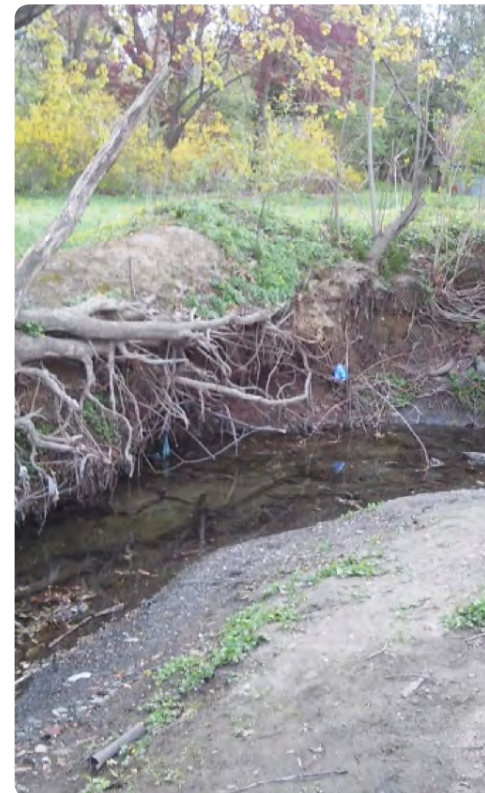
Estimated total project costs:
In Development Stages

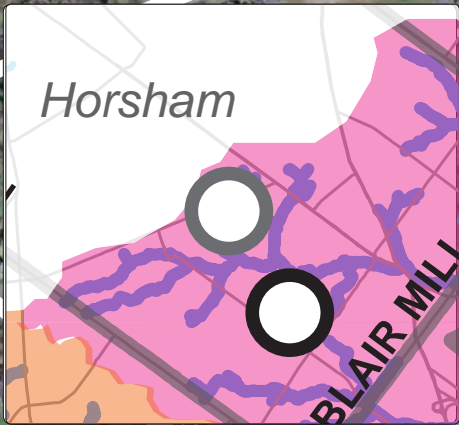
Considered Funding Sources:
In Development Stages

Partners:
Abington Township, Abington School District, Wissahickon Valley Watershed Association and Temple University


The Sandy Run Creek is a headwaters tributary to the Wissahickon Creek and a priority micro-watershed of the Upstream Suburban Philadelphia Cluster Implementation Plan. The tributary begins in Abington Township and runs in a southwesterly direction through parts of Upper Dublin, Springfield and before joining the main stem in Whitmarsh Township. The Sandy Run Watershed encompasses approximately 12.6 square miles and includes both the Sandy Run Creek and Pine Run Creek Tributaries. The issues facing this watershed are similar to those being addressed in many of the Upstream Suburban Philadelphia watersheds. The majority of the watershed was developed prior to modern stormwater management practices resulting in flooding, stream erosion and stream bank destabilization. This particular section illustrates the extreme channelization measures employed to protect adjacent properties from persistent and frequent flooding events.


Over the years, Abington Township has installed/constructed seven (7) stormwater management projects along the Sandy Run ranging from retention basins to stream bank stabilization and riparian buffer enhancements. Five additional projects are currently proposed in Abington's recently approved TMDL plan which include additional stream bank stabilization measures, basin retrofits and meadow construction. Township and School District officials will provide an overview of redevelopment and TMDL projects.





College Settlement


 Site Location

 Pennypack Creek


Project Type: Stormwater Treatment Wetland

Municipality: Horsham Township

Watershed: Pennypack Watershed

 N

00.080.160.240.32



Miles

College Settlement

Stormwater Treatment Wetland

600 Witmer Road, Horsham Township
Pennypack Watershed

Estimated total project costs:
\$249,715

Considered Funding Sources:
Grants (*NFWF and Match*)

Project Sponsor:
Pennypack Ecological Restoration Trust

Partners:
College Settlement of Philadelphia, Horsham Township, Upper
Moreland Township

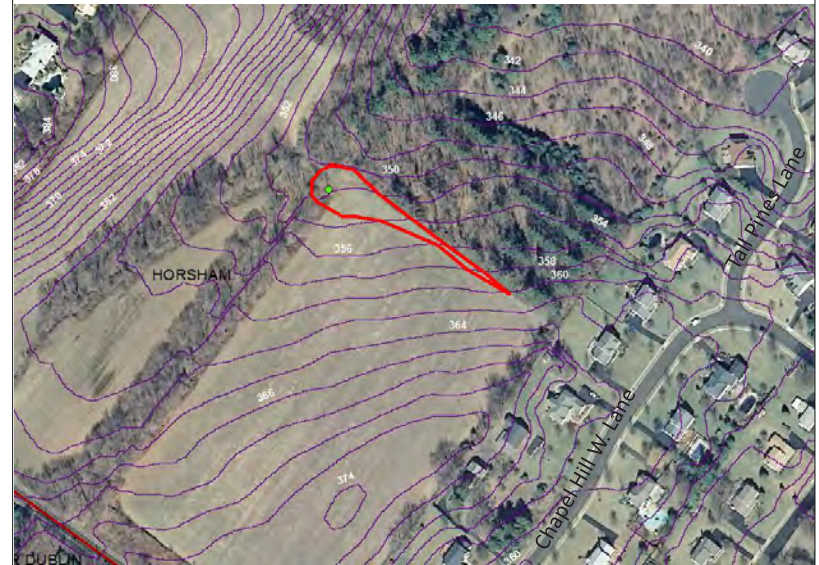
This project will construct a stormwater treatment wetland on a headwater tributary of the Pennypack Creek in Horsham Township. The site is located in a portion of the College Settlement Camp that is maintained and managed as meadow. Drainage to the site consists of approximately 40 acres of upgradient residential subdivisions, and approximately 20 acres of meadow and woodlands on the College Settlement Property. The residential developments were constructed without any stormwater management features to protect down gradient land on College Settlement from erosion. Stormwater from the streets, driveways and roofs is collected in underground pipes and is discharged directly onto the Camp's property and has eroded a channel across the property.

The project will consist of a constructed stormwater treatment wetlands (STW) basin to intercept and manage the stormwater flows from the eroded channel. The wetland is designed to capture and retain the runoff from the 2-inch precipitation event. This STW will remove multiple surface water contaminants through a variety of biotic and abiotic processes. The stormwater that is retained within the STW will eventually leave by means of infiltration or evapo-transpiration.

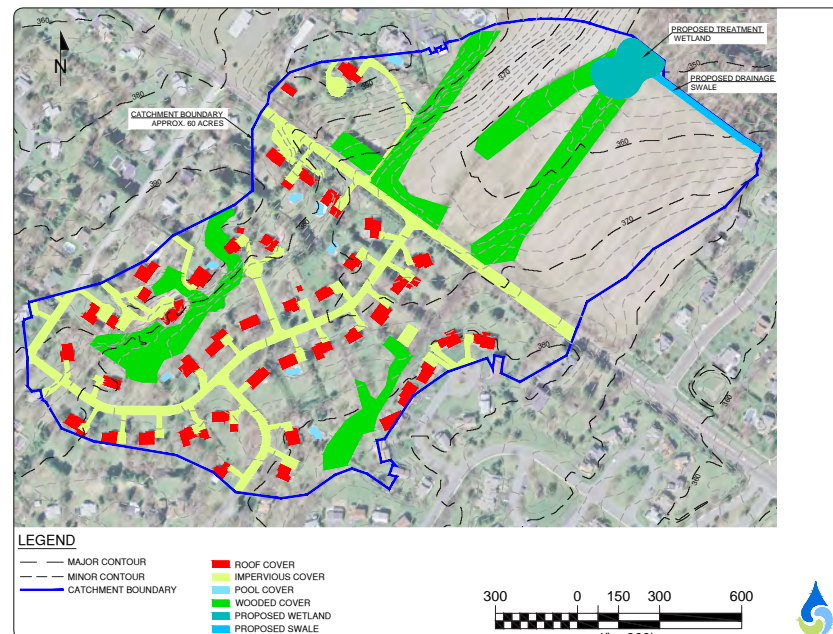
The approach will provide the following water quality benefits:

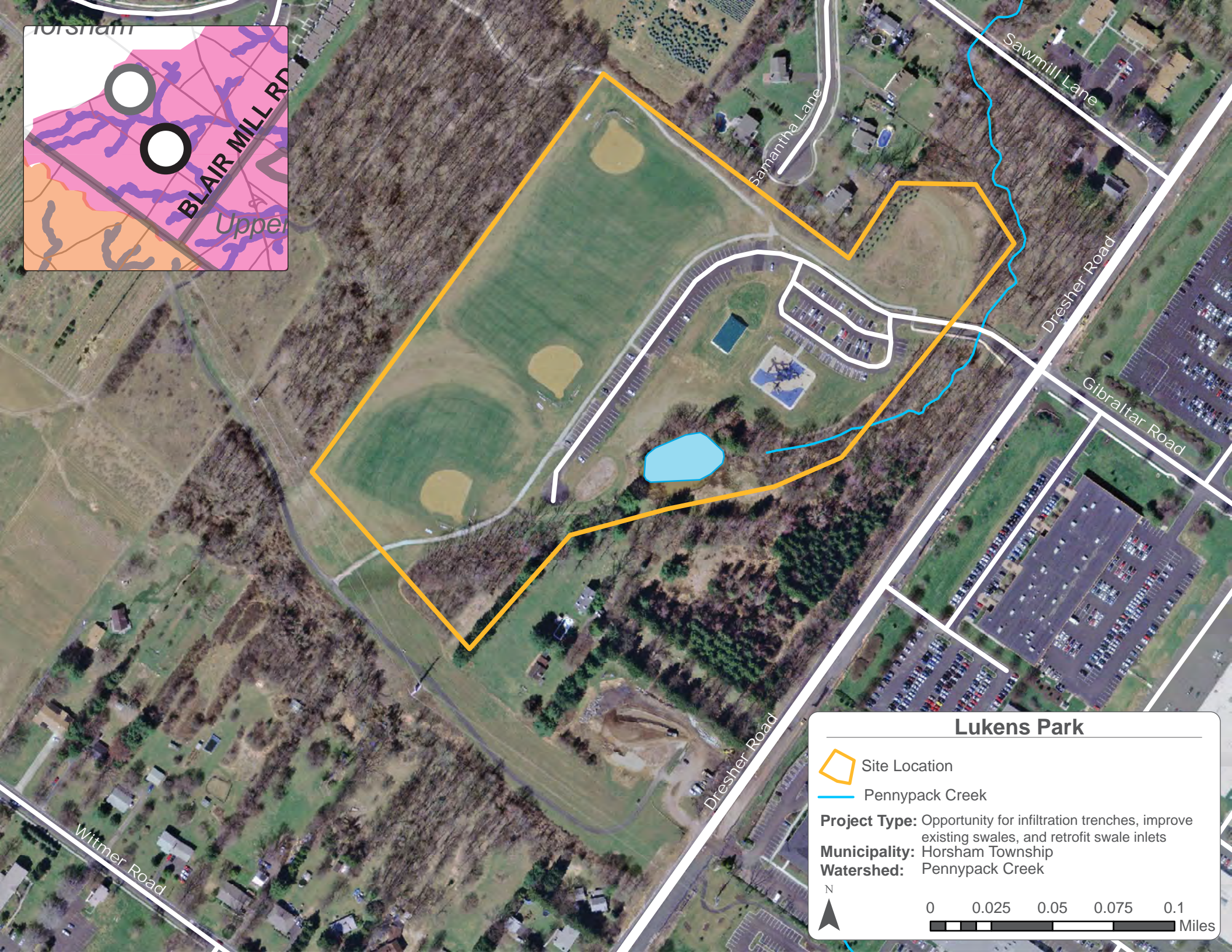
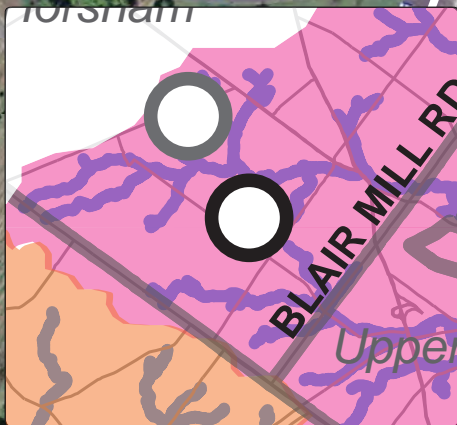
- Reduction in water pollutions, through the removal and transformation of dissolved nitrogen, phosphorous, sediment, organic pollutants, pet waste contaminants
- Reduction in downstream erosion, peak flows, total stream volume, and water temperatures reaching downstream waters and Pennypack Creek
- Improved riparian habitat
- Improved baseflow downstream
- Removal of and management for non-native invasive vegetation

Pennypack Ecological Restoration Trust
Location of College Settlement Constructed Wetland
Horsham Township, Montgomery County, PA





Project boundary locations are approximate with site area expected to be less than 1 acre.

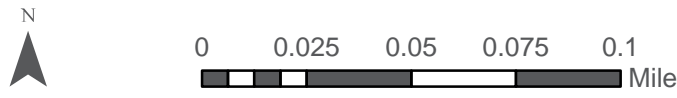




Lukens Park

-  Site Location
-  Pennypack Creek

Project Type: Opportunity for infiltration trenches, improve existing swales, and retrofit swale inlets
Municipality: Horsham Township
Watershed: Pennypack Creek



Lukens Park

Proposed Infiltration Trenches and Rain Garden

540 Dresher Road, Horsham Twp
Pennypack Watershed

Estimated total project costs:

\$143,000 Construction & Design

Considered Funding Sources:

Grants (*NFWF/ DRWI and Growing Greener*)
Municipality

Partners:

Horsham Township, Montgomery County
Conservation District, PERT

Infiltration Trench

Two swales exist which convey drainage from athletic fields and parking lot (Labeled 1 and 2). Drainage from both swales is conveyed to the basin through the storm system. The existing swales could be modified to provide subsurface stormwater storage capacity. Subsurface stone trenches would be installed below swales to provide storage and to promote groundwater recharge.

Rain Garden

Swale 2 terminates at the existing inlet identified as location 3 on aerial. This inlet could be easily retrofitted to accommodate a rain garden at this location. The top of grate elevation could be raised 3" and surrounding area excavated to provide a planting bed with amended soils and native perennials and scrubs. The rain garden could be designed to manage the first inch of runoff by providing extended detention, filtration, and increased evapotranspiration rates.





Abington Friends School



Site Location



Jenkintown Creek

Project Type: Riparian Buffer and Rain Garden

Municipality: Abington Township

Watershed: Tookany/Tacony-Frankford Creeks



0 0.025 0.05 0.075 0.1

Miles

Abington Friends School

Phase 1(Abington Friends School): Rain Garden, Bioswale, and Riparian Buffer

Phase 2(Abington Friends Meeting): Biorentention/Bioinfiltration Swale, Riparian Buffer, and Rain Garden

575 Meetinghouse Road, Abington Township
Tookany Watershed

Estimated total project costs:

\$168,000 for Phases 1 & 2

Considered Funding Sources:

Grants (*NFWF, TreeVitalize, and Washington Gas Energy Services through the PA Carbon Fund*)

Partners:

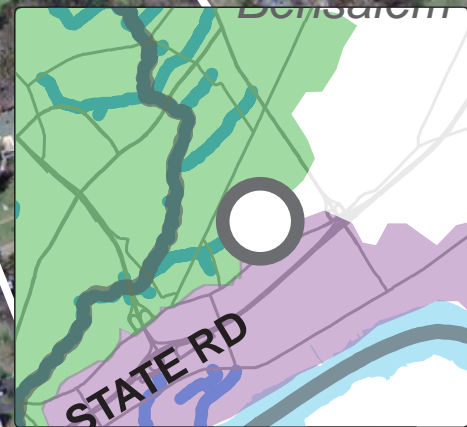
Abington Friends School, Abington Friends Meeting, Abington Township Environmental Advisory Council, PEC

The Jenkintown Creek originates behind Abington Friends Lower School, flows through athletic fields and Abington Meeting property, enters a culvert under Meetinghouse Road, flows through Abington Township's Alverthorpe Park, and meets the main stem of the Tookany Creek at Jenkintown Road. The **Tookany Act 167 Stormwater Management Plan and Abington Township Open Space Plan** recognize that this watershed is extensively developed with few opportunities for headwater protection and prioritize the protection of these streams through the restoration of natural features to reduce erosion and runoff.



Since 1697, the Meeting has been committed to caring for this historic campus. This project is being coordinated with the installation of a new Headwaters Playground at the Lower School. AFS has been an enthusiastic partner, integrating watershed education into classroom and after school activities including Science Nights and Eco Fest. We will continue to utilize this site as a community watershed education classroom, building upon the momentum of the buffer planting ribbon cutting event, which featured the active participation of Township Commissioner Jones and Pennsylvania Representative Dean.

The Jenkintown Creek Project is a milestone opportunity to utilize stream protection measures such as buffers alongside green stormwater infrastructure features. In the fall of 2014, a 25,000 square foot riparian buffer of over 400 native trees, shrubs, and perennials was planted along 500' of the creek at an average width of 20' on both sides. The rain garden and swale are in design and will be constructed and planted this fall; these features will manage the first inch of runoff from approximately 17,000 square feet of adjacent asphalt impervious surface. This project site is included in the Cluster Water Quality Monitoring Program.





Cornwells Elementary School

-  Site Location
-  Poquessing Creek Tributary

Project Type: Proposed Basin
Municipality: Bensalem Township
Watershed: Poquessing Creek



0 0.025 0.05 0.075 0.1
Miles

Cornwells Elementary School

Proposed Basin, Constructed Wetland and Riparian Buffer

2215 Hulmeville Road, Bensalem Township
Poquessing Watershed

Estimated total project costs:

\$1.07 million + value of the land

Considered Funding Sources:

Grants (*CFA and GG grants, not funded by NFWF this round*)
Township capital dollars

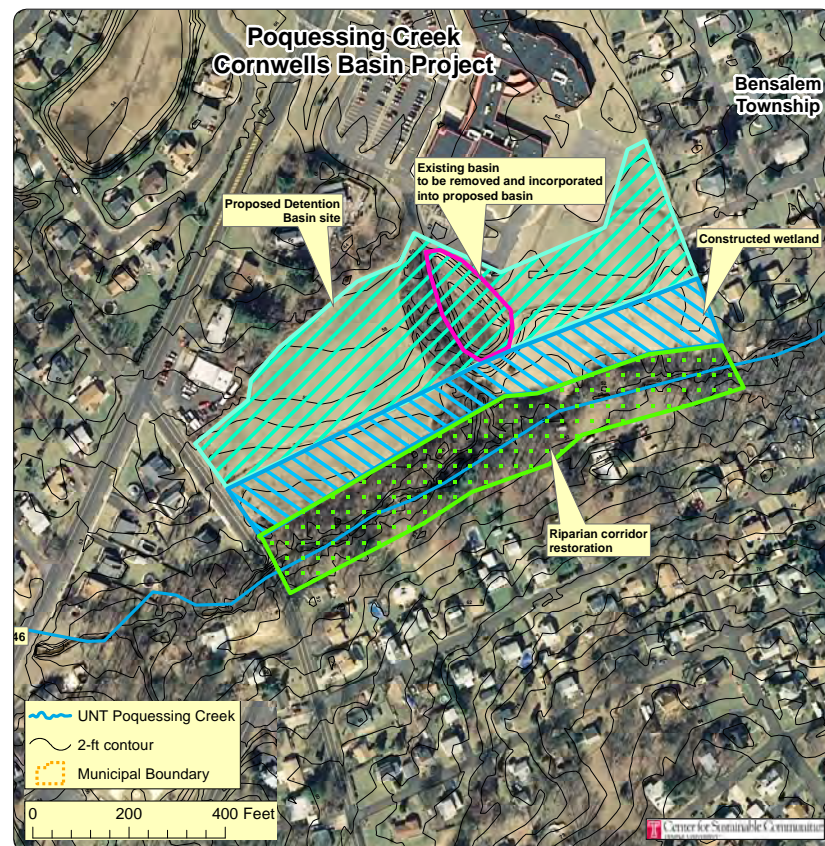
Partners:

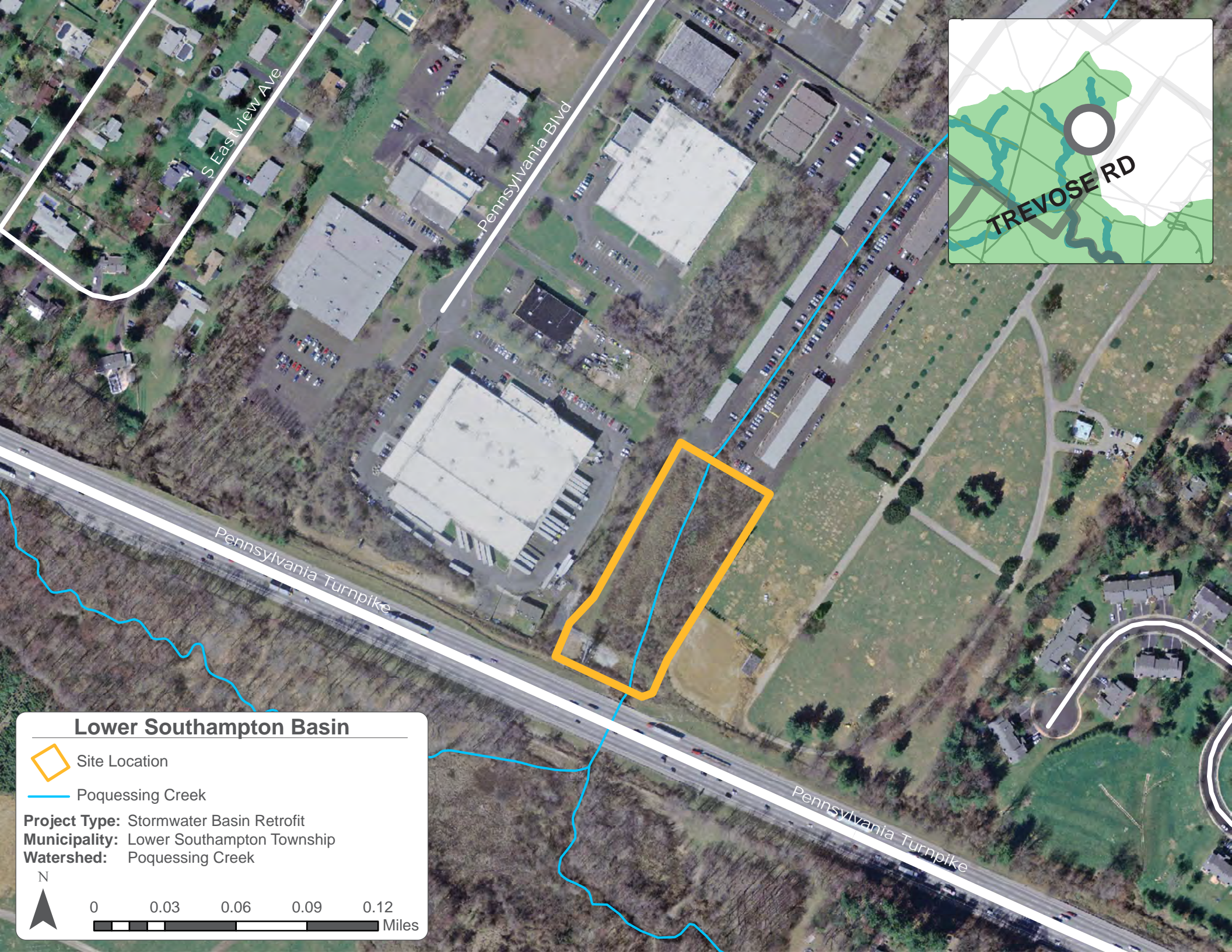
Bensalem Township, PEC, Bucks County Conservation District, Friends of Poquessing, Bucks County Planning Commission, Bensalem School District

The Poquessing tributary streams originate in and flow through Bensalem Township before entering the main stem of Poquessing Creek, which serves as the boundary between the Township and the City of Philadelphia. The **Poquessing Act 167 Stormwater Management Plan** identifies new and existing basin retrofit project in these tributaries, to detain and retain run off and provide water quality benefits. This includes the Cornwells Elementary School project.

The **Cornwells Project** is an excellent opportunity for a stormwater control measure “treatment train”, where a new naturalized basin can be linked to a constructed wetland and restored riparian buffer. This relatively large (9 acre) site is on land that will be transferred from the Bensalem School District to the Township. The Township is leading the project effort, with support from Council President (Tony Belfield) and Mayor Joseph DiGirolamo. This investment will provide over 11 acre-feet of storage and additional water quality and habitat benefits.

The School District is collaborating with Friends of Poquessing on the integration of watershed and watershed curriculum materials into school programs including project related activities. The project site (up and downstream) is included in cluster water quality monitoring program.





S East View Ave

Pennsylvania Blvd

Pennsylvania Turnpike

Pennsylvania Turnpike

TREVOSE RD

Lower Southampton Basin

 Site Location

 Poquessing Creek

Project Type: Stormwater Basin Retrofit

Municipality: Lower Southampton Township

Watershed: Poquessing Creek



0 0.03 0.06 0.09 0.12 Miles

Lower Southampton Basin

Stormwater Basin Retrofit

Between Street Road and I-276, Lower Southampton Twp
Poquessing Watershed

Estimated Total Project Costs:

\$63,000 per basin

Considered Funding Sources:

Grants (*Growing Greener*)

Partners:

Lower Southampton Township, PEC, Bucks County
Conservation District, Friends of Poquessing, Bucks County
Planning Commission

The Poquessing Act 167 Stormwater Management Plan identified stormwater basin retrofits as a priority stormwater control measure. Lower Southampton Township is located in the headwaters of Poquessing Creek. Site control associated with Township-owned basins makes them ready to implement projects.

The Pennsylvania Boulevard basin is a large (2.5 acre) township-owned stormwater basin. The basin manages runoff from an 80-acre industrial park. A small Poquessing Creek headwater tributary flows through the basin. The center portion of the basin has “self-naturalization” with woody vegetation; small fish/frogs were observed during a spring 2015 site visit.

Recommendation made to naturalize the rest of the basin floor and walls with meadow grasses. Construction of a forebay and naturalization of the upstream channel (800 feet) also proposed to address watershed quality issues associated with surrounding industrial park.

The township is project management lead. It is a good opportunity to engage the Township; other Township-owned basins could be retrofitted. Lower Southampton represents a large portion of Poquessing headwaters.



Aerial view of basin. Areas of proposed meadow identified as 1a and 1b. The channel enters the basin at the location identified as 2.

