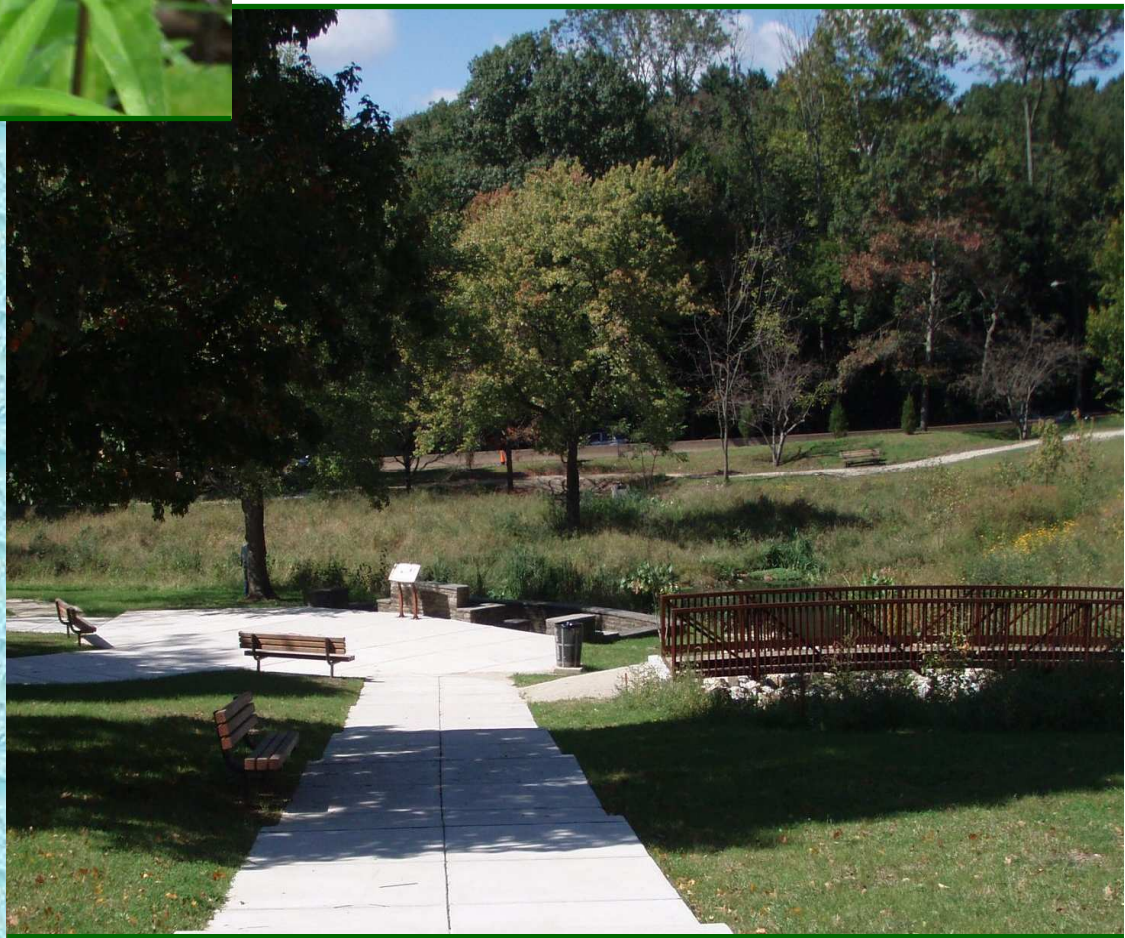
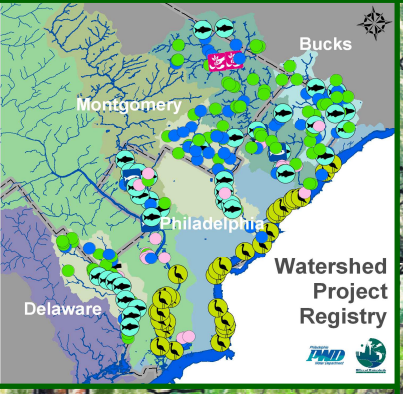
Wetland Creation

Overview

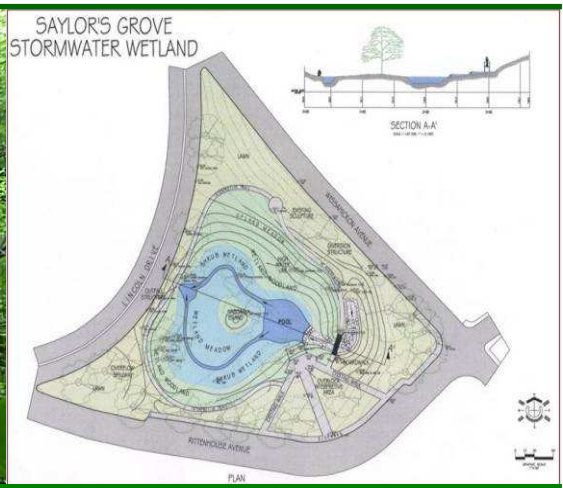
As the population of Philadelphia has increased over the years, naturally occurring wetlands have been drained or altered as a result of urban development. Until recently, wetland mitigation did not exist which resulted in the destruction of habitats and ecosystems. Now, several government agencies require mitigation when a development project affects existing wetlands. If a development project will impact an existing wetland, a new wetland must be created to offer the same functions of the existing wetland. Wetland functions are defined as a process or series of processes that take place within a wetland. Functions are extremely valuable for the wetland itself as well as for surrounding ecosystems. Functions can be grouped by habitat, biologic, hydrologic, physical, social, water quantity, or water quality. The value of a wetland often times is a result of all of the functions/processes working together to create and maintain the wetland. Examples of typical wetland functions are as follows: groundwater recharge, reducing total suspended sediment (TSS), reducing nitrogen, plant production, aquatic spawning habitat, reducing sediment load, and reducing erosion.





Due to the urbanization of the city, stormwater runoff from street intersections and the surrounding neighborhoods have accelerated the rate of erosion in our tributaries and creeks. In several locations throughout the City, the stormwater runoff has accelerated the formation of gullies. Stormwater runoff that travels through these gullies contains large amounts of sediment which are deposited into the creeks and its tributaries. Stormwater can be detained or diverted throughout the City to reduce further erosion and the deepening of the gullies.

Wetlands act as sponges by holding water for extended periods of time and slowly releasing it to receiving water bodies. A created wetland will hold water produced during wet weather events thus reducing the peak flow in the creek. A created wetland will also recharge groundwater in the area and increase the baseflow of the creeks and tributaries. Furthermore, wetlands act as filters by retaining suspended sediment, nutrients and pollutants originating from runoff.



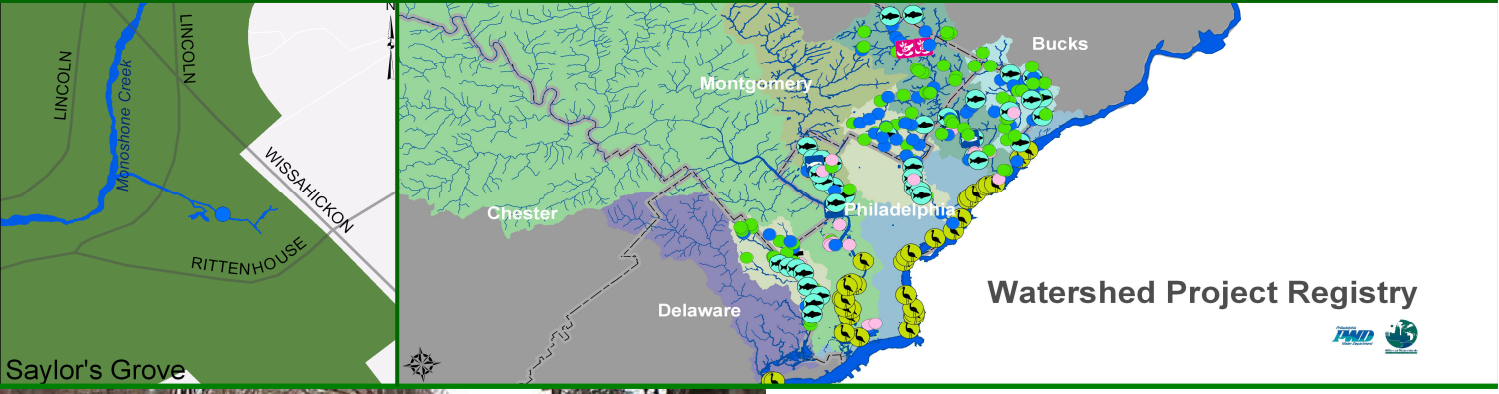
Fairmount Park
PHILADELPHIA'S PARK SYSTEM

Philadelphia
Water Department

Wetland Creation

Saylor Grove Stormwater Wetland

The Philadelphia Water Department (PWD), the Fairmount Park Commission (FPC), the Pennsylvania Department of Environmental Protection (PADEP) and its many partners have transformed Fairmount Park's parcel of park land - Saylor Grove - into Philadelphia's first stormwater treatment wetland in the Wissahickon Creek Watershed. Saylor Grove is located in between the intersections of Lincoln Drive, Wissahickon Avenue and Rittenhouse Drive in the Germantown section of Philadelphia. The one-acre wetland, which was completed in March 2006, helps to slow down stormwater runoff and filter polluted stormwater from approximately 156 acres of Germantown before it enters the Monoshone Creek, treating an estimated 70 million gallons of urban stormwater every year. Saylor Grove also has an educational mission, and includes a



trail around the wetland's perimeter, interpretive signage, historic memorials and sculptures previously located in the park and a renovated, beautified space for visitors to enjoy.

At Saylor Grove, the stormwater treatment wetland helps treat and detain the stormwater, which is piped to the stream, before the stormwater flows into the Monoshone Creek. The wetland also reduces the quantity of stormwater entering the Monoshone at any given time and helps improve the quality of the remaining stormwater runoff. Initial monitoring conducted at key points in the wetland have shown that bacteria levels entering the wetland are reduced prior to exiting the wetland and flowing into the Monoshone Creek. The Water Department is working with the Senior Environment Corp and Chestnut Hill College to continue wetland water quality monitoring into the future. This information will be extremely valuable in determining the feasibility and cost effectiveness of creating similar wetlands throughout the City.

BENEFITS:

- Filter approximately 70 million gallons of stormwater per year.
- Remove approximately 13 tons of total suspended solids from the Monoshone Creek
- Increase the total area of wetland habitat in the watershed.
- Improve the aesthetics of the Saylor Grove area.
- Improve the flow variability of storm related flows on the Monoshone Creek.
- Increase the biodiversity of the park area.
- Create two outdoor educational signs about the importance of wetlands and their functions.
- Implement action items of the Wissahickon River Conservation Plan.

- Help improve stormwater flows into an impaired water body.
- The wetland will increase biodiversity (vegetation and animals).
- The first 0.7 inches of every rainfall event will be sent to and treated at the wetland. According to the long-term historical record of the airport's rainfall data, 70% of all storms make up 0.7 inches or less of rainfall.
- Functioning wetland inhibit mosquito breeding due to the presence of wildlife that eat mosquitoes and the consistent flow of water through the wetland.

Fairmount Park
PHILADELPHIA'S PARK SYSTEM

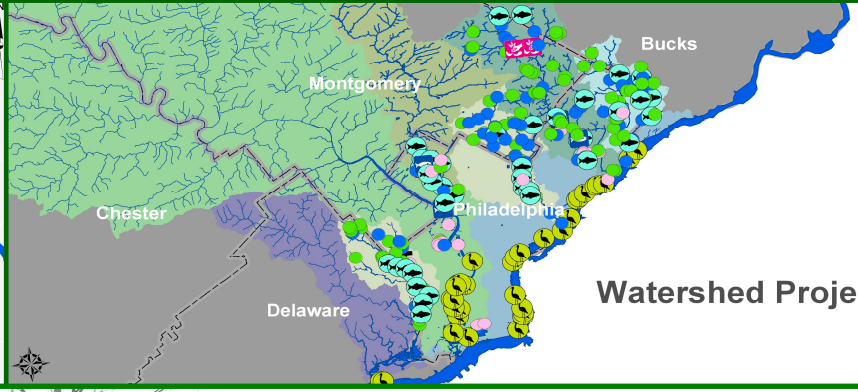
Philadelphia
Water Department

Wetland Creation

Wises Mill Run Stormwater Wetland

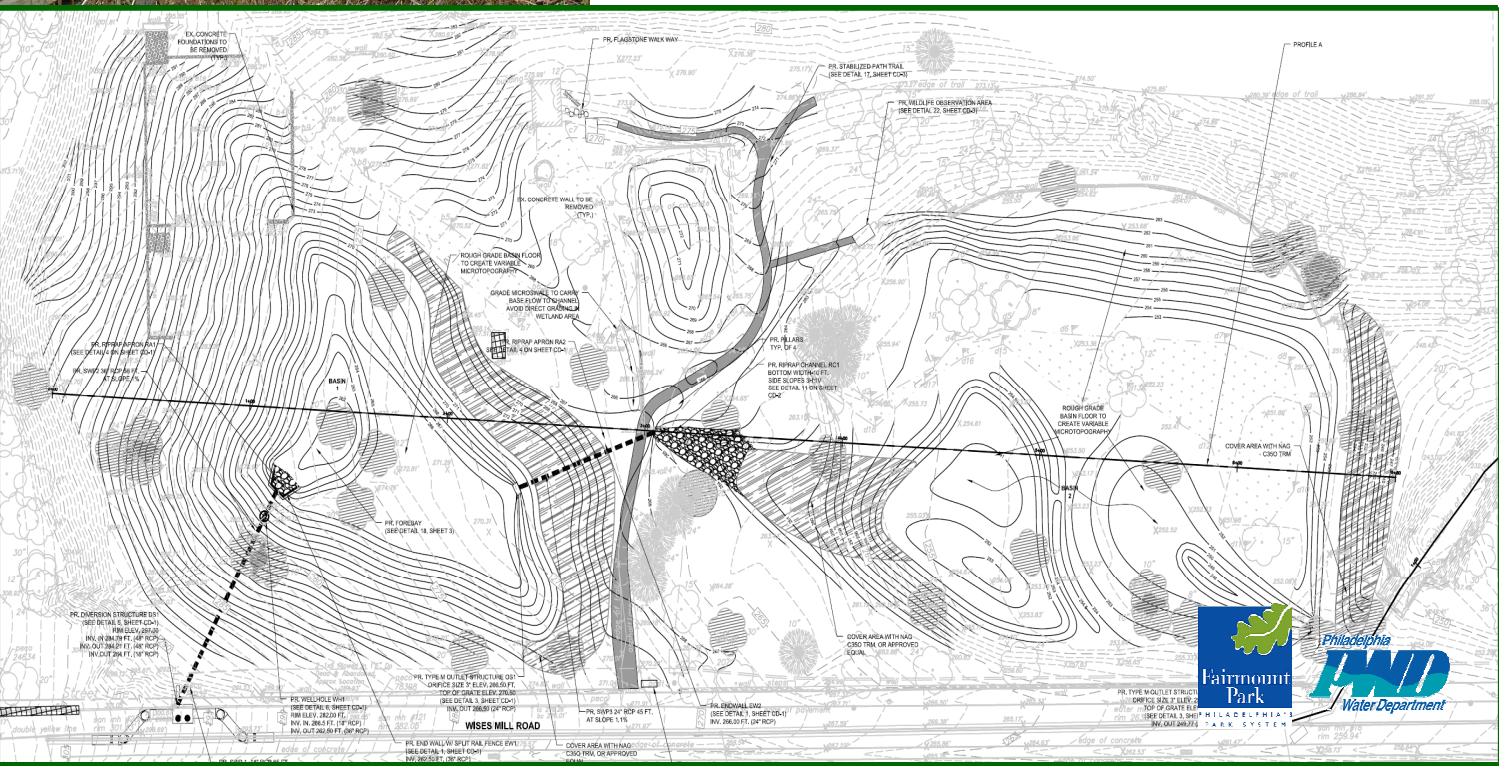
The influences of urbanization have had significant impacts on the Wises Mill watershed. Since the late 1950's, the contributing watershed has been fully developed. The residential neighborhood's storm sewers collect stormwater from the 261 acre area that eventually discharges into Wises Mill Run, a tributary of Wissahickon Creek. Over the last 50 years, the accelerated stormwater flows have severely impacted the receiving creek bed. These effects have been significantly exacerbated over the last ten years during which the stream has been exposed to several large storm events.

The Philadelphia Water Department (PWD) is very interested in implementing stormwater Best Management Practices (BMPs) throughout Philadelphia. BMPs will help to control water quantity and quality. A perfect opportunity for BMP implementation has been identified at the headwaters of Wises Mill Run located at the intersection of Wises Mill Road and Henry Avenue. The direct cause of the active erosion of Wises Mill is clearly the flow regime which is currently occurring. While the ability to reduce storm flows at their source may be limited, an opportunity to reduce flows prior to entering the southern branch of Wises Mill Run does exist. By creatively rerouting storm flows, a stormwater treatment wetland could be created thereby reducing the peak flows experienced downstream. The wetland would discharge into approximately 1,300 linear feet of restored stream prior to its confluence with the northern branch.



Just southwest of the current location of W-076-13 are approximately four acres of relatively flat land which is owned by the City of Philadelphia and managed by the Fairmount Park Commission (FPC). This area is lightly forested and is adjacent to Wises Mill Road where the 48-inch storm sewer runs prior to discharging from the outfall. This project proposes to disconnect and bulkhead the 48-inch storm sewer from its current outfall location and move it upstream roughly 450 feet along Wises Mill Road. The storm sewer will then outfall into a stormwater treatment and retention wetland which will act to reduce the flows and improve water quality downstream.

PWD is presently designing the stormwater treatment wetland. Using the current topography, the design will call for a two-stage wetland with a step-pool or drop structure connecting the two pools. Moderate grading would allow for the creation of roughly 2-3 acres of wetland/meadow area. The upper section will serve as water quality pool that will allow for pollutant settling. This pool will then discharge into the lower pool which will provide further pollutant removal and flow reduction. Low flow channels will be gently sloped to convey dry-weather flow and small storm flows through both pools of the wetland. During larger events, storm flow will be able to access higher stages of the upper pool and spillover into the lower pool area. The outflow from the wetland will be regulated by an outlet control structure and emergency spillway.

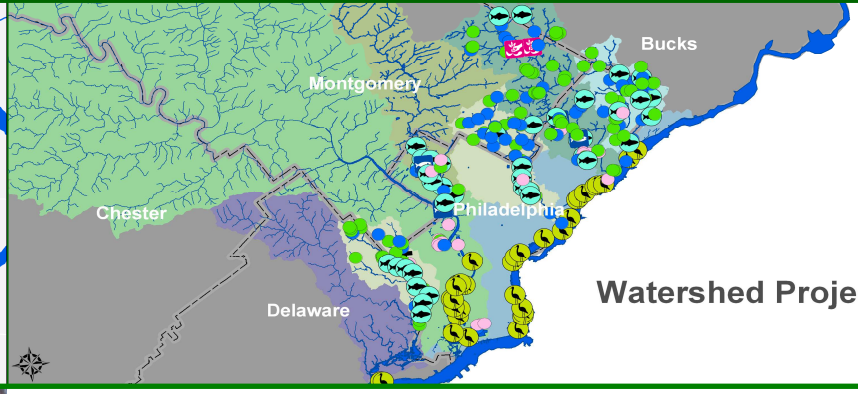


Wetland Creation

Cathedral Run Stormwater Wetland

Cathedral Run is a small first order tributary to the Wissahickon Creek. The stream originates from springs downstream of Courtesy Stables near the intersection of Cathedral and Glen Campbell Roads. Cathedral Run then travels approximately 2,500 ft through a wooded section of Fairmount Park before entering Wissahickon Creek. The stream is relatively steep with an average gradient of 8.5%; however, the downstream half of the tributary is visibly steeper than the upstream reach.

The watershed is highly developed with 31% impervious cover and 361 homes. The natural drainage area is 116 acres; however two outfalls collect stormwater from an additional 40 acres. Baseflow is low and was measured to be 0.06 cfs during August 2005. One outfall (W-076-01) located at the headwaters of the tributary drains approximately 91 acres of residential and commercial property.



PWD will implement a Best Management Practice (BMP) at the headwaters of Cathedral Run located near the intersection of Cathedral Road and Glenn Cambell Roads. PWD is designing a stormwater treatment wetland just west of the current location of W-076-01. The wetland will be located in a natural depression area that is owned by the City of Philadelphia and managed by the Fairmount Park Commission (FPC). This area is lightly forested and is adjacent to Cathedral Road where the 48-inch storm sewer runs prior to discharging from the outfall. This project proposes to divert most storm flow from the 48-inch storm sewer from its current outfall location and move it upstream along Cathedral Road. The diverted flow will then outfall into a stormwater treatment/ sediment basin. This pool will then discharge through an outlet pipe into the lower pool which will provide further pollutant removal and flow reduction. The stormwater wetland creation will achieve the following goals:

- Reduce downstream sediment loading
- Increase water and habitat quality
- Increase base flow
- Improve diversity of in-stream biological community
- Maintain and enhance recreational use/aesthetics
- Reduce shear stress in channel
- Ensure wetland drains within 72 hours