

📍 **MUNICIPAL CASE STUDY**

Hamilton Township, New Jersey

Hamilton Township turned negative publicity on the township’s approach to managing stormwater to positive action by engaging the Rutgers Cooperative Extension Water Resources Program (RCE). Township staff embraced a new, proactive perspective, RCE has since completed numerous implementation plans, and the community is now interested and engaged in water quality issues.



By: Ryan Walker,
Natural Lands Trust

Background

Hamilton Township, located in Mercer County, New Jersey, adjoins Trenton to the east and might be described as a typical suburb, given the development patterns that characterize much of the township. However, in addition to the suburban landscape, western portions serve as an extension of Trenton’s more urban neighborhoods while areas to the south of NJ Route 130 contrast with a distinctly rural and agricultural character. Its central location between Philadelphia and New York make Hamilton an economic center, with nearly 50,000 jobs in the township as of 2015. It is also a transportation hub, with numerous highways crossing the township, including Interstates 195 and 295, and the New Jersey Turnpike.

The community is highly populous and is one of the five largest townships in New Jersey, with a population approaching 90,000. While modest population growth continues, it has leveled off sharply since the post-World War II boom. Housing stock reflects an older suburban community largely developed during that time. Hamilton’s median household income is about \$70,000.

In terms of natural features, a portion of Hamilton is located along the Delaware River where extensive wetlands remain. Numerous streams feed these wetland systems, including Crosswicks Creek flanking the township’s southern boundary. Assunpink Creek forms a portion of the town’s northern and western boundary. Township parks and open space are typically located near stream corridors. Greenway corridors have been established in particular along Crosswicks Creek, Doctors Creek, and Miry Run. Some farmland is preserved in the southern portion of Hamilton.

Quick Stats
Hamilton Township

Major adjoining water body:
Delaware River

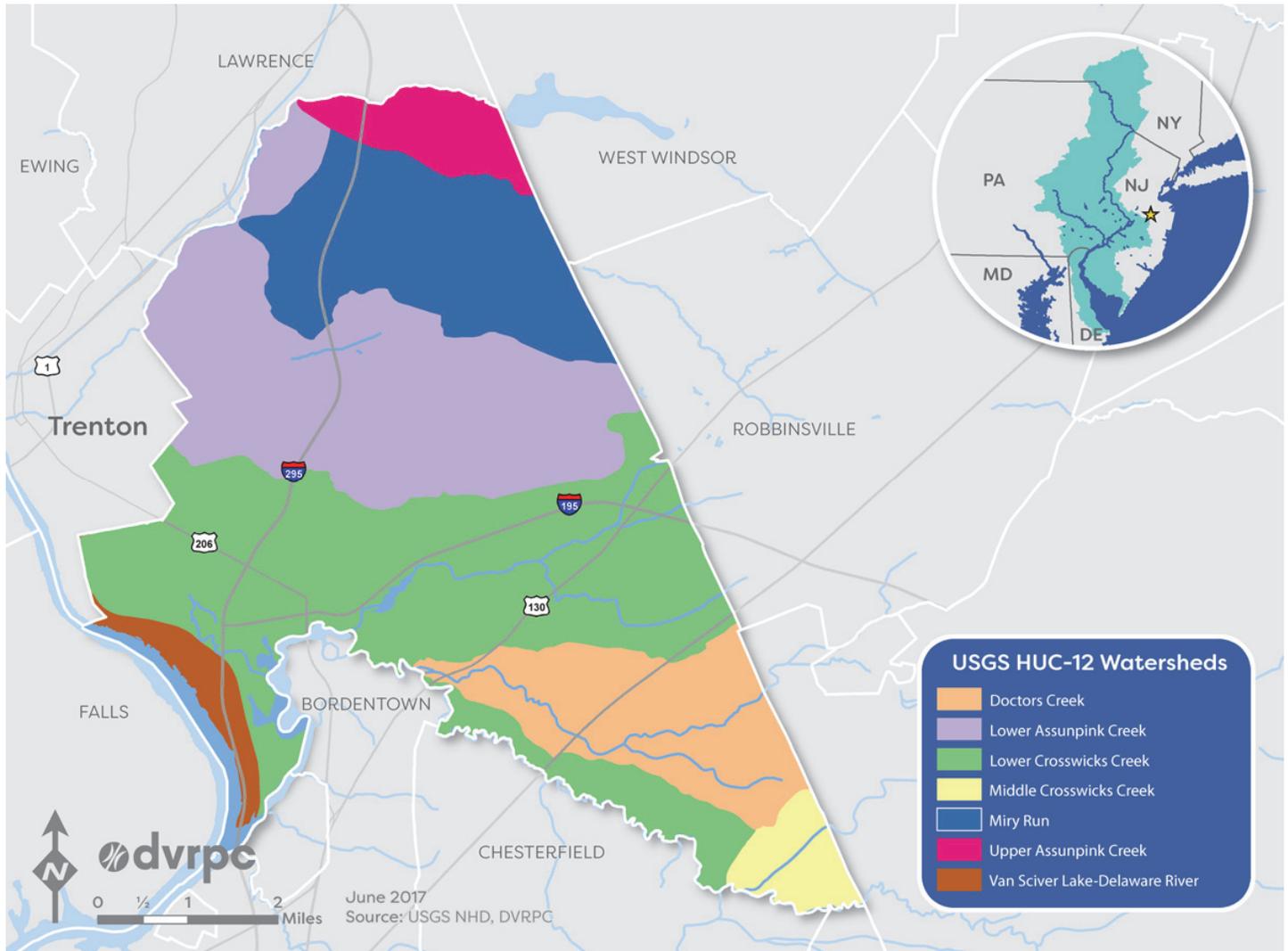
Major streams: Assunpink Creek, Pond Run, Miry Run, Crosswicks Creek, Doctors Creek

Population: 89,055 (2015 Five-Year American Community Survey)

Land area: 25,733 acres

Water area: 870 acres (3.4%)

Map: Hamilton Township Watershed



Stormwater Challenges

The level of development and infrastructure within Hamilton Township hinders the township’s ability to handle and mitigate stormwater in the community. This is particularly apparent after large storm events, which cause extensive flooding in portions of the township. Assunpink Creek, a particular problem area, collects substantial volumes of stormwater before reaching Hamilton. The creek has its headwaters in Monmouth County, extends along much of Hamilton Township’s western border, and then travels through central Trenton before it empties into the Delaware River at Hamilton Township. Flooding in Trenton backs up into Hamilton, and residential, commercial, and industrial sectors are affected. Pond Run, an Assunpink Creek tributary located wholly within Hamilton Township, has significant flooding issues as well. Both Assunpink Creek and Pond Run are heavily channelized, in some cases with concrete spillways, which disrupt existing stream ecology and can result in more powerful and dangerous floods from higher velocities of stormwater.

A detention facility in Hamilton Township’s Veterans Park was installed many decades ago as a flood control measure for Pond Run, but there are now questions regarding its stability. The U.S. Army Corps of Engineers

(ASACOE), with assistance from the New Jersey Department of Environmental Protection (NJDEP), is assessing the Assunpink corridor and performing a feasibility study to determine the best flood reduction strategies. Completion of the study is anticipated in summer 2017.

While flash flooding on Assunpink Creek and Pond Run represent the greatest stormwater challenge in Hamilton Township, other waterways experience flooding, and all eight of Hamilton Township's streams are classified as impaired. Major threats contributing to flooding and poor water quality include stormwater runoff, ineffective and aging stormwater infrastructure, and the development and disturbance of land.

In general, water quality seems to be of lesser importance to residents compared to other concerns, such as fixing roads, or other environmental priorities, such as open space protection. This sentiment is slowly changing, however. Flooding catalyzed interest in water quality, particularly in the short term, and some long-term interest is burgeoning because of the ongoing community engagement described further in this case study.

A Critique of Hamilton's Stormwater Program

Stormwater Management Rules in the state of New Jersey require that major new development projects reduce flood damage and soil erosion, account for effective design and operation of stormwater management basins, minimize increases to total runoff, and protect groundwater recharge and water quality. The Stormwater Management Rules provide guidance and serve as the basis for the New Jersey Municipal Stormwater Regulation Program (NJ MSRP). In May of 2010, the Delaware Riverkeeper Network (DRN) published a report critiquing the NJ MSRP, specifically focusing on Hamilton Township's treatment of stormwater as part of new development projects and indicating that the township was not complying with Stormwater Management Rules.

The DRN report found that from 2005 to 2008, township staff and engineering consultants failed to identify inaccurate information in development proposals. Hamilton Township received an average grade of 42 percent (on a 0–100 percent scale) with lower-average grades for certain factors, such as integration of non-structural stormwater elements. Additionally, the report mentioned that environmental organizations pushed back on the land use board with little response, thereby leading to litigation in some cases. DRN used this assessment to argue that municipalities should not be given additional responsibilities under Stormwater Management Rules and to recommend state-wide changes to the stormwater review process.

While the report stated that there are likely many municipalities not complying and that the issue extends state-wide, Hamilton Township was the only municipality highlighted. DRN emphasized Hamilton Township because of its large size, scale of development, and potential impacts to the historically flood-prone Assunpink Creek. However, Hamilton Township staff viewed the report as one-sided, with additional reservations because Hamilton was the only community analyzed. The report also caused friction between the township and NJDEP, which implements Phase II Stormwater Regulations. Nevertheless, township staff realized that stormwater management shortfalls existed and began looking at solutions.

Water Quality Solutions

Partnership with Rutgers Cooperative Extension

Ultimately, the DRN report and localized flooding problems motivated the township to look at improving its stormwater management practices and approvals. Rich Watson, Director of the Hamilton Township

Department of Water Pollution Control, saw a presentation on stormwater management held by the RCE Water Resources Program. The Water Resources Program is focused on tackling water issues across the state, including stormwater management. The township proceeded to engage RCE, specifically Dr. Chris Obropta, Associate Extension Specialist in Water Resources, and Jeremiah Bergstrom, Senior Research Project Manager.

Hydrologic Evaluation

The first task by RCE was a Hydrologic Evaluation, completed in September 2011, which serves as the basis for future stormwater management efforts. It contains an inventory of stormwater infrastructure, plans, and policies that will guide the township's stormwater management program. The report cost \$20,000, for which the township paid using funding set aside for stormwater management plan updates. The Hydrologic Evaluation found that impervious surface from new development is the primary reason for the township's stormwater difficulties. RCE recommended reducing new impervious cover, implementing green stormwater infrastructure within existing development, educating landowners, and retrofitting detention basins.

Watershed and Stormwater Management Implementation Plan

RCE followed the Hydrologic Evaluation by conducting a Watershed and Stormwater Management Implementation Plan, adopted in February 2012. This plan was funded by the township for \$40,000. The implementation strategies focus on community engagement and compliance with stormwater regulations.

Originally, the RCE partnership aimed at simply assessing and addressing flooding concerns, but these initial evaluations recommended a comprehensive suite of goals to tackle stormwater, which included engaging the community in water resource protection, managing water quality, minimizing localized flooding, implementing Phase II stormwater controls, and improving stormwater facility maintenance.

RCE presented these opportunities to Hamilton Township staff and elected officials in the winter of 2012. The township viewed them favorably and began work on two phases of its program—stormwater mitigation planning and a Green Communities Program—between 2012 and 2016. These two phases are discussed below.

Stormwater Management Planning

RCE completed various analyses, building upon the Hydrologic Evaluation, to bolster stormwater management planning in the township. The township's stormwater infrastructure and its attributes (for example, flow rate), are now mapped in a geographic information system (GIS). The township also assessed its impervious cover. It found that nearly 23 percent of its land area consists of impervious cover, with the Pond Run watershed having the greatest coverage at over 30 percent. RCE recommended a 10 percent reduction township-wide through the elimination of unnecessary impervious surfaces, the conversion of some necessary surfaces to

Key Partners

Rutgers Cooperative Extension Water Resources Program (RCE): RCE helps New Jersey residents improve their lives and communities through an educational process that uses science-based knowledge. The Water Resources Program is one of many specialty programs under RCE. Dr. Obropta created this program in 2002 and has developed it into an award-winning state-wide program dedicated to solving New Jersey's water resources issues in three categories: Agricultural Water Management, Stormwater Management & Green Infrastructure, and Watershed Planning & Restoration.

New Jersey Department of Environmental Protection (NJDEP): The state agency collects water quality data to determine the status of water quality impairments and assists Hamilton in meeting its regulatory requirements.

porous treatments, and the implementation of filtration mechanisms, such as rain gardens and swales. Along Pond Run, a 180-acre impervious surface reduction is required to meet the 10 percent reduction goal, which is about 3 percent of the nine-square-mile watershed.

The township also developed a hydrologic model that can estimate stormwater runoff rates, and reduction thereof, at a sub-watershed level. The tool, which cost \$50,000 to initiate, is used by township staff to inform its land use board. While the model does not have the ability to easily detect the effect that most individual stormwater mitigation projects have on the township's stormwater quality, it can estimate the impact of multiple projects within a larger area, such as in a developed corridor.

The township completed a Stormwater Mitigation Plan (SMP) in June 2014 that looks at potential public and private properties in each sub-watershed of the township that may provide opportunities for reducing impervious surfaces through green stormwater installations or naturalization. The SMP also includes site-specific estimates for impervious coverage, construction costs, and reduction in stormwater runoff volume. Mitigation projects must prevent additional volumes of pollutants from entering the township's waterways and help add water back into the township's groundwater system and underlying aquifer.

The SMP cost \$40,000 to complete. It is an optional element of a Municipal Stormwater Management Plan, but it is required if a municipality wishes to grant variances for design and performance standards when a developer cannot meet them because of property constraints. The SMP has not yet been adopted by Hamilton Township but is under review by the township engineer.

Green Communities Program

The second element of the RCE partnership is the Green Communities Program, which focuses on engagement of residents and municipal officials in stormwater planning, assessment, and management.

Detention Basin Assessments

As one component of this program, the township conducted a detention basin assessment program between 2011 and 2014. Over 300 basins were assessed for a cost of \$30,000. The resulting data was entered into GIS mapping software for use by township staff and officials. The data identifies the sites most in need of retrofits. One-third of the basins in Hamilton are in good condition, while nearly half require maintenance. Many of these latter basins need more significant repair.



Source: Watson & Bergstrom, 2016
Basin assessment.

Implementation following the assessments focused on reduced mowing within and around basins. Increased plant growth around the basins absorbs more stormwater runoff than mown grass and can also trap sediments and pollutants carried by the stormwater. As a result of this change in maintenance strategy, however, township staff received many complaints from residents about the basins being unsightly. Meetings with homeowners, as well as community sessions held by RCE, mitigated the negative feedback somewhat. Informational media, such as brochures, supplemented the outreach.

Stormwater Outfall Assessments

The township followed this project with a stormwater outfall assessment project in 2015. This project involved locating and assessing outfalls at over 200 locations, with a focus on those draining directly to streams, for a cost of \$15,500. The data produced by the assessment was entered into a GIS map.

Riparian Assessments

RCE led riparian investigations with assistance from community volunteers to identify the highest-value stream corridors in regard to existing conditions and future conservation value. Visual assessments were conducted. As with the basin and outfall assessments, the data are now integrated into the township GIS mapping system. The assessments were followed by a township stream monitoring program. In 2015, the township held sessions for elected officials and the general public to promote the stream monitoring. The township is now working to recruit additional participants.

Rain Barrel Workshops

In addition to data collection and assessment, education and training is an integral part of the Green Communities Program. The township budget includes \$5,000 per year for education programs, such as for rain barrels and rain gardens. The township and RCE have held five rain barrel workshops since 2014, which have educated residents on the utility of rain barrels. Residents purchase barrels for \$25 and construct them at the workshop; over the span of this program, Hamilton residents have constructed over 200 barrels.

Rain Gardens

Between 2015 and 2016, the township provided rain garden information to 45 residents, and RCE developed conceptual designs for 12 properties from that group of attendees.



Source: Watson & Bergstrom, 2016
Rain garden training session.



Source: Rutgers Cooperative Extension
Steinert High School rain garden before and after.

The township has also installed rain garden demonstration projects at all three of its high schools. Installations at Steinert High School and Nottingham High School were completed in 2013, while a rain garden at Hamilton West High School was finished in 2014. In all cases, the rain gardens were installed in partnership with RCE, Hamilton Township, and students within the science curriculum or related clubs.

Training

RCE offered training programs for Hamilton Township land use board members in 2014, and similar sessions will be held when there are newly elected officials. The two-day sessions focus on what to look for in development plans regarding stormwater management. According to RCE, municipal officials learn what questions they may ask of developers and what they can require in development proposals. Following the workshops, officials are better equipped to require development projects to be compliant with stormwater regulations. It is RCE's belief that training is critical to giving officials tools to make informed decisions.

On the heels of the 2014 sessions in Hamilton, RCE has now developed an e-learning portal for municipal officials across New Jersey to address stormwater requirements and provide answers to commonly asked questions.

Partnership Moving Forward

Building on their current momentum, Hamilton Township and RCE renewed their partnership with a commitment to continue engagement with the general public and schools, as well as to focus on developing a comprehensive implementation strategy to manage flooding and enhance stormwater infrastructure. The 2016 renewal totals \$62,000 in fees. A Characterization Study (\$24,000) of stormwater infrastructure and flooding will use the previous studies to develop detailed priorities, with associated costs, for implementation by the township. A Stormwater and Flood Management Improvement Plan (\$28,000) will identify and prioritize stormwater management alternatives, such as green stormwater infrastructure. These products are currently in progress. A "Stormwater Management in Your Backyard" program (\$10,000) will continue many elements of the Green Communities Program, such as rain barrel and rain garden workshops, with a focus on engaging the township environmental commission and other boards.

Moving forward, the township is looking to expand its implementation strategies and build on funding sources. The goal of renewed planning work with RCE is to outline a five-year plan for Hamilton Township to update its stormwater infrastructure and management practices. One strategy may involve stormwater mitigation for development projects, as outlined in the township's 2014 Stormwater Mitigation Plan. In addition, the township would like to build on the Hydrologic Model with more predictive modeling so that an individual development proposal can be modeled to determine its potential stormwater impact. Hamilton Township now dedicates between

Motivating Factors

Flooding and Runoff: As a mature suburb, much of Hamilton developed before environmental regulations were in place, and localized flooding problems were common.

Bad Publicity: The DRN produced a critical report on Hamilton's handling of stormwater from a structural and political perspective. The township viewed the report as one-sided but realized that stormwater management shortfalls existed and began looking for solutions.

Regulatory: The U.S. Environmental Protection Agency and NJDEP discharge regulations requiring water quality improvements.

Partners: Rutgers Cooperative Extension Water Resources Program and NJDEP.

Unifying Issues: Flooding, lack of stormwater management plans, ordinances and funding.

\$50,000 and \$80,000 per year from the general fund for the stormwater management partnership.

The partnership has also been highly beneficial for the RCE Water Resources Program. According to Jeremiah Bergstrom, it was rare in prior years for RCE to work one-on-one with a municipality because it was rare to find a local champion in municipalities with a direct connection to community leadership who also understood stormwater issues. Hamilton Township has local champions in Rich Watson and the Department of Water Pollution Control. Following the Hamilton Township experience, RCE Water Resources Program is now working with other communities through local champions, such as the Association of New Jersey Environmental Commissions, local watershed groups, and local collaboratives formed in urban areas known as Municipal Action Teams. RCE is now working with Camden, Jersey City, Newark, Paterson, Perth Amboy, Philipsburg, Pilesgrove, Trenton, Upper Deerfield, and Woodstown on stormwater management issues. The RCE Water Resources Program looks to continue building interest across the state.

Factors in Success

Hamilton Township's experience with stormwater evolved greatly since 2011 and continues to do so. In a relatively short time following the DRN report criticizing Hamilton Township, the township made significant progress, particularly on those critiques regarding the knowledge base of land use boards and other officials. Township staff have noted a change in how land use boards approach development projects in the context of stormwater during the past five years, taking into account information gained from the RCE partnership.

The leadership of Rich Watson brought about the new perspective. As a former member of the Planning Board, he understands the position of elected officials. As flooding issues kept getting worse, and with the release of the DRN report, there was a realization that something needed to change. Watson understood that what the township really needs is expertise. They cannot do it on their own, so he involved RCE. It has turned out to be a mutually beneficial partnership.

Engagement of the broader community bred success in Hamilton. Township staff found the niche that interests citizens in issues of stormwater management and water quality protection, whether it is students constructing rain gardens or residents interested in rain barrels. Municipal training sessions have given municipal officials information they need to make informed and effective decisions regarding the development process. While there is still much to do, Hamilton Township is in a stronger position than it was regarding stormwater. Therefore, Hamilton Township turned adversity into a productive partnership for addressing water quality.

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