MUNICIPAL ACTIONS to PROTECT and IMPROVE WATER QUALITY IN THE DELAWARE RIVER WATERSHED

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

MUNICIPAL CASE STUDY

City of Newark, Delaware

Driven by the need to fully fund repairs and maintenance to its stormwater system, the City of Newark is working to establish a stormwater utility, and is a regional leader in this regard. The city is focusing its proposed utility on repairing its existing gray stormwater infrastructure system. However, it has yet to craft a comprehensive and complementary funding program for green stormwater infrastructure best management practices (BMPs). While repairs to the gray system are necessary and will address localized flooding concerns, they will likely not do much to limit the volume and velocity of stormwater entering local streams that is a major source of surface water quality impairments.

By: Lyn O'Hare
SSM Group

Background

The City of Newark is an urbanized municipality located in New Castle County, Delaware, and is home to the University of Delaware. The city straddles two sub-basins of the Delaware River Basin: the White Clay Creek Basin and the Christina River Basin. These two basins converge downstream of the city, before emptying into the Delaware River. Lower portions of the White Clay Creek and Christina River are under tidal influence, and both waterways serve as habitats to a wide range of aquatic wildlife. Waterways within the Christina Basin are used for recreation and fishing purposes; however, portions of these waterways have been identified as impaired and may contain harmful pollutants. The city has a backlog of maintenance on its stormwater system, recurring flooding problems that have caught the public eye, and concerns with meeting regulatory requirements around stormwater management.

Quick Stats
City of Newark

Annual average rainfall: 46 inches

Major adjoining water body: White Clay Creek

Population: 31,454 (2010)

Sewer system: MS4

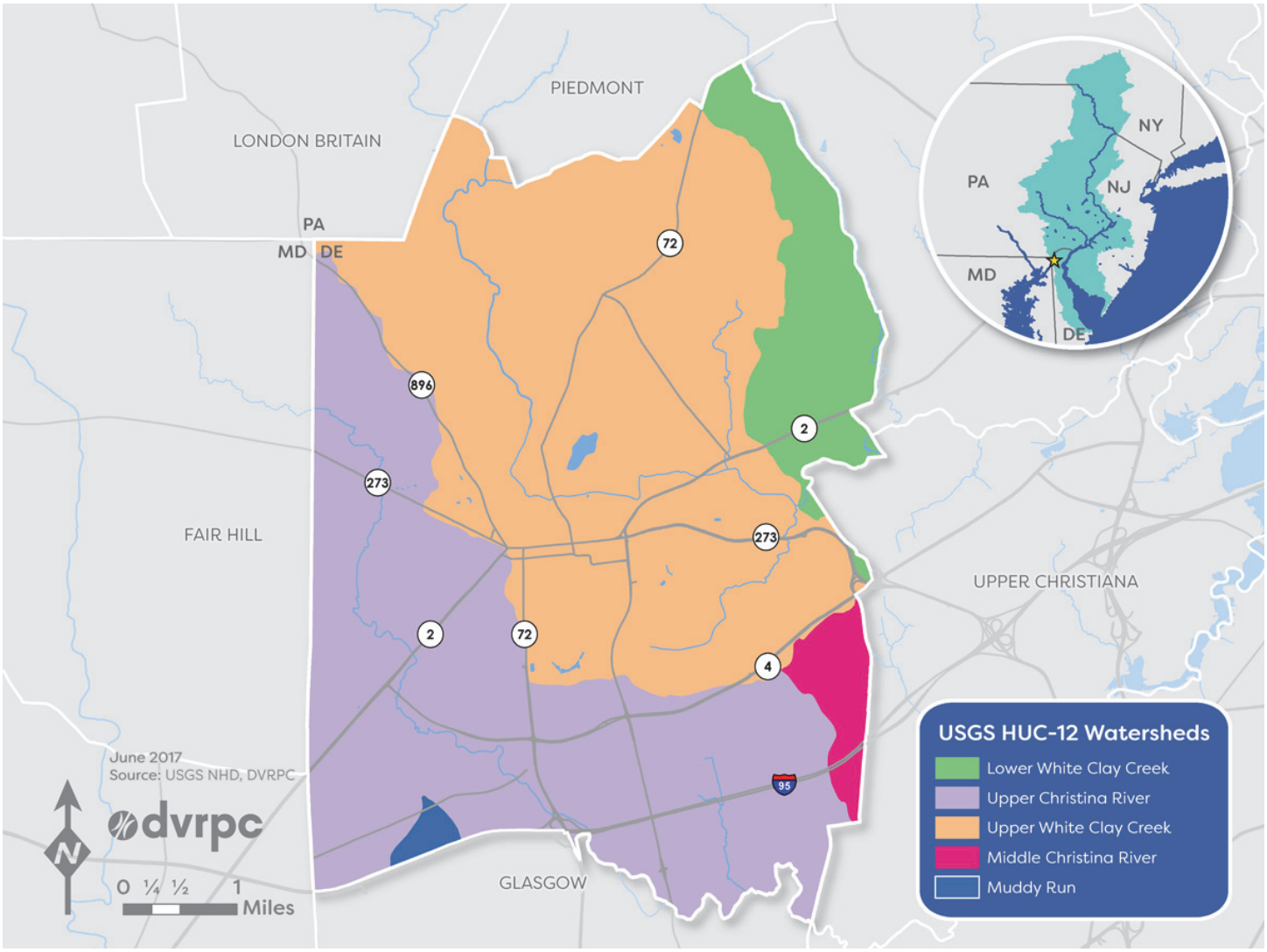
Land area: 9.3 square miles

Surface Waters

The White Clay Creek's headwaters originate in Pennsylvania and flow southward through Delaware before contributing to the Christina River. In 2000, 190 miles of the White Clay Creek and its tributaries were added to the National Wild and Scenic Rivers System. The ground and surface waters of the basin provide drinking water to a population of more than 120,000, including residents of the City of Newark.

The headwaters of the Christina River Basin originate in Pennsylvania and Maryland and flow through Delaware before draining directly into the Delaware River. The Christina River Basin is the most urbanized basin of the larger Christina Basin, which also includes the White and Red Clay Creek Basins, and the Brandywine Creek Basin.

Map: City of Newark, Delaware Watershed



Water Quality Problems

The White Clay Creek has been identified as having high levels of bacteria and zinc, for which Total Maximum Daily Loads (TMDLs) exist for the creek. Zinc in the White Clay Creek originates from the currently inactive National Vulcanized Fiber site and surrounding stream sediments. This facility is located in Newark.

TMDLs for bacteria, sediment, low dissolved oxygen, and nutrients, including nitrogen and phosphorus, have been set for the Christina River. Pollutant sources are varied but include point sources from industrial and municipal discharges, agriculture runoff, suburban and urban runoff, and runoff from Superfund sites.

Water Quality Solutions

The City of Newark has a Municipal Separate Storm Sewer System (MS4) permit, which means it must meet a number of minimum control measures, including maintenance of the stormwater system, good housekeeping practices at municipal facilities, public education, sampling throughout the system and streams, and illicit discharge detection and elimination. These minimum control measures assist in improving water quality, but

they cannot begin to solve the impairments in the White Clay Creek and Christina River on their own. For this to happen, significant reductions in pollutant and nutrient loadings will need to occur throughout the watershed, outside and upstream of Newark's municipal boundaries. As a result, the city decided to assist in the funding of projects in the upstream reaches of the watershed. These projects included stream bank fencing and manure management on upstream farms. These types of projects help to reduce sediment, nutrients, and bacteria in agriculture-adjacent waterways, and can also have economic benefits for the farmers. However, the authors were not able to ascertain how much funding was contributed by the city to these projects.

Aging Stormwater Infrastructure

The City of Newark has about $350 million of utility infrastructure underground, much of it in need of maintenance, repair, or replacement. Underperforming and/or ill-maintained stormwater infrastructure has led to localized flooding within the city. Inlets and pipes clogged by sediment, litter, and plant overgrowth; inadequate stormwater pipe capacities and inlet or outlet sizes; and eroded and collapsing drainage ways, have all led to poor drainage and localized flooding problems. As a result, maintaining and repairing stormwater infrastructure has become a priority for the city. However, the city does not have enough capital funding to bring its stormwater system up to a state of good repair, a problem further compounded by the need to maintain its drinking and waste water systems.

Stormwater Utility

Newark views its inability to keep up with and fund repairs of its stormwater infrastructure as a major problem. It has also been the major driver in Newark's desire to create a stormwater utility that would charge fees for the management of stormwater, thereby raising revenue to help fund the maintenance backlog. In 2009, the University of Delaware conducted a feasibility study on creating a stormwater utility to address stormwater problems in the municipality. The study determined that the City of Newark could generate anywhere from $716,000 to $1,432,000 annually, based on the rate charged per square foot of property. The utility would be responsible for identifying and managing issues where stormwater is not being conveyed to a discharge point properly and efficiently, and for raising funds to conduct stormwater management efforts. These funds would need to come from fees paid by all users in the municipality, including residents, business owners, and large facilities, such as industrial sites and institutions. It is important that the funds come from fees (as is the case with all utilities), as opposed to taxes, since some of the largest impervious surfaces in the municipality are owned or operated by tax-exempt facilities.

Progress to Date

The city's first attempt to establish a stormwater utility in 2009 was unsuccessful, as was a second attempt in 2013. These two failed attempts can be attributed mostly to a lack of education of the residents about the utility fee and a small, very vocal group in opposition to the utility, which influenced the city council to vote in their favor. Without being properly educated on the purpose and extent of the utility, the general public had a negative view of what they thought would be a "rain tax" and were not given the chance to associate these new fees with a better quality of life. In addition, the failure of the second attempt at implementing a utility could be attributed to the rate structure which was established. This attempt would have implemented a flat rate fee, as opposed to a fee based on the size of a property and its impervious surfaces. Members of the community were also unaware that the fee for residents would be minimal, about $40 per year. The first attempt at a stormwater fee was mainly aimed at covering the cost of street sweeping and basic MS4 permit requirements, while the second attempt was more directly tied to improvements in and maintenance of the aging stormwater system that has been largely responsible for flooding problems in the municipality.

Key Partners

Delaware Department of Natural Resources and Environmental Control (DNREC): Newark is open to partnering with upstream communities on water quality initiatives outside of Newark's municipal boundaries but will need support and approval from DNREC so that all participants can receive full credit for such activities under state rules.

William Penn Foundation: The foundation is funding the Healthy Watershed Fund for the Brandywine Creek. If successful, this could be a model for the Christina River Basin.

Upstream municipalities: Cooperation with upstream municipalities is needed to implement basin-wide approaches to improving water quality.

Currently, the city is planning its third attempt at implementing a stormwater utility and fee. It has hired a consultant, Black and Veatch, who was responsible for planning the now successfully implemented stormwater utility in nearby Wilmington, Delaware. This firm is modeling Newark's new utility after the one adopted by Wilmington. In addition, the municipality has conducted extensive education efforts aimed at the public in an attempt to change public perception about the purpose of the utility and associated fees. Newark expects the planned utility model to be complete by the end of 2016, so that the city council can vote on it for the upcoming year. The fee would be used for a variety of stormwater related activities, such as the correction or repair of identified problem areas throughout the stormwater infrastructure system, ongoing maintenance of the system, which could include street sweeping, cleaning storm drains, and upgrading any degraded infrastructure, and other activities as required by the MS4 permit. The city is currently keeping track of all stormwater-related expenses separately, so as to create a realistic budget when the stormwater utility is implemented.

Stormwater System Repairs

In order to begin stormwater infrastructure improvements, the City of Newark has identified major areas of concern throughout its stormwater system, where infrastructure has failed, is inadequate, or is in a state of disrepair. Each area of concern was evaluated, estimating repair costs and feasibility of repair, and several projects have been completed. These projects include grading and surface restoration, repair of failed stormwater basin embankments, reinforcing inadequate and failing infrastructure, addressing major areas of erosion, and stream restoration projects. An example of one of these projects is the Ridgewood Glen Stormwater Pond. In 2013, the embankment for the pond failed, due to failure of the outfall pipe which traverses through the embankment. In the fall of 2013, the existing corrugated metal pipe was removed and replaced with reinforced concrete, and the embankment was repaired. The project cost about $75,000.

Lessons Learned

The stormwater and water quality story in the City of Newark is still being written. Currently, it is not yet a success or failure. If the city's third attempt at the creation of a stormwater utility is successful, it appears that most of the funds will go to the repair and maintenance of the existing conventional stormwater system. Maintaining the stormwater system to prevent backups and localized flooding should be a priority, but it will not fully ameliorate the water quality impacts associated with high-volume and velocity stormwater runoff entering creeks and streams. In fact, an "improved" gray infrastructure system could even *increase* the volume and velocity of stormwater discharges that lead to water quality impairments by conveying water more efficiently and quickly to creeks and streams. To improve water quality, the city will need to embark on a comprehensive program of green stormwater BMPs, while also repairing and maintaining its system of pipes, inlets and drainage ways. Stream restoration was mentioned by the city as one possible project to be funded by a stormwater fee. Stream restoration projects can help immensely with water quality, but the city would still need

to couple these projects with a comprehensive green stormwater infrastructure BMPs to capture, store, and infiltrate stormwater where it falls. The installation of green stormwater infrastructure BMPs throughout the city is not a priority for the proposed stormwater utility at this time. Perhaps this will change if the stormwater utility is successful and the city is able to overcome its gray infrastructure maintenance backlog.

In addition, regardless of what the city does to manage, store, and treat stormwater within its boundaries, improvements in stormwater management must be made upstream to effectively improve water quality in the wider Christina River Basin. Many of the impairments across the watershed are traceable to upstream development and agricultural uses, and these impairments need to be addressed at their source. Newark should be commended for its efforts help manage nonpoint source water pollution in upstream communities. While further study is needed, it could be possible that investing in upstream stormwater controls, as opposed to green stormwater BMPs within Newark's municipal limits, could be a more cost-effective way to improve water quality in the Christina River Basin as a whole. However, this needs to be balanced with the knowledge that Newark residents have expressed negative opinions about the city spending funds to improve areas outside city limits, as well as the many regulatory restrictions which prevent the city from being able to assist with water quality issues in other municipalities.

Along these lines, The William Penn Foundation, along with other partners, is working to create a Healthy Watershed Fund for the Brandywine Creek Watershed, which would pool funding from MS4 permittees to make water quality improvements throughout the watershed where they achieve the greatest benefit. This could be a model for the Christina Basin as well. However, the city is unsure whether DNREC will allow individual permittees to receive credit for these efforts toward their MS4 permit requirements. Receiving credit for MS4 requirements is necessary to enable municipalities to justify spending local funding outside of their own community. Regulatory uncertainties such as this example are one reason these regional partnerships, while they may have great advantages, may not work. If the Healthy Watershed Fund for the Brandywine Creek Watershed is successful, it could be replicated on the White Clay Creek.

Motivating Factors

Failing stormwater infrastructure: Lack of funds to repair and maintain the existing gray stormwater system.

Flooding: Severe storms are leading to localized flooding in developed areas due to the improperly functioning stormwater system.

Water quality impairments and MS4 permit requirements: The city is aware that surface water quality is impaired and that stormwater from the city (along with other locations) contributes to the problem.

Potential for basin-wide partnerships: The city is open to working with upstream communities on basin-wide strategies to maximize the "water quality bang" for their buck.

Plans for the Future

The City of Newark plans to move forward with its newest stormwater utility model. If properly implemented, the city expects the utility to relieve its overworked and underfunded departments of some of the overwhelming stormwater and localized flooding issues they currently face. This will allow the city to turn its attention to other issues impacting water quality. For example, it will be able to turn its attention toward participating in partnerships aimed at improving water quality in the Christina Basin waters and continue to work toward attaining its MS4 permit goals.

Sources

City of Newark, Delaware. "Stormwater Fund for the City of Newark." *City of Newark, Document Center*, n.d. http://cityofnewarkde.us/DocumentCenter/View/4682 (accessed August 10, 2016).

———. "Stormwater Infrastructure Community Responsibility." *City of Newark, Document Center*, n.d. http://cityofnewarkde.us/DocumentCenter/View/4650 (accessed August 10, 2016).

———. *Upper Christina River Restoration Project.* n.d. http://www.cityofnewarkde.us/index.aspx?nid=896 (accessed September 19, 2016).

———. "Watershed Map." *City of Newark, Document Center*, n.d. http://cityofnewarkde.us/DocumentCenter/View/4647 (accessed August 10, 2016).

Coleman, Thomas. Director of Public Works and Water Resources, City of Newark. Interview by Christopher Linn, Delaware Valley Regional Planning Commission, August 29, 2016.

Delaware Watersheds, State of Delaware; University of Delaware. *Christina River.* n.d. http://delawarewatersheds.org/piedmont/christina-river/ (accessed August 29, 2016).

———. *White Clay Creek.* n.d. http://delawarewatersheds.org/piedmont/white-clay-creek/ (accessed August 29, 2016).

Kauffman, Gerald. Director, University of Delaware Water Resources Center. Interview by Carolyn O'Hare, September 8, 2016.

State of Delaware. *Total Maximum Daily Load (TMDL) For Zinc in the White Clay Creek.* Technical Background and Basis Document, Department of Natural Resources and Environmental Control, Division of Water Resources, Watershed Assessment Section, New Castle County, 1999, 37 http://www.dnrec.delaware.gov/swc/wa/Documents/TMDL_TechnicalAnalysisDocuments/24_WhiteClayZincTMDLAnalysis.pdf (accessed August 29, 2016).

U.S. Environmental Protection Agency. *Revisions to Total Maximum Daily Loads for Nutrient and Low Dissolved Oxygen Under High-Flow Conditions, Christina River Basin, Pennsylvania, Delaware, and Maryland.* Technical Background and Basis Document, USEPA Region III. Philadelphia, Pennsylvania: U.S. Environmental Protection Agency, 2006, 135 http://www.dnrec.delaware.gov/swc/wa/Documents/WAS/TMDL%27s/Christina%20Low-Flow%20NutrientTMDL%20TechReport%20Revised%202006.pdf (accessed August 29, 2016).

———. *Total Maximum Daily Loads for Bacteria and Sediment in the Christina River Basin, Pennsylvania, Delaware, and Maryland.* Technical Background and Basis Document, USEPA Region III. Philadelphia, Pennsylvania: U.S. Environmental Protection Agency, 2006, 135 http://www.dnrec.delaware.gov/swc/wa/Documents/Xia/Christina_High-Flow_BactTMDL_TechReport_2006.pdf (accessed August 29, 2016).

U. S. Geological Survey. *Chlorinated Solvents Contamination.* April 14, 2016. http://toxics.usgs.gov/investigations/chlorinated_solvents.html (accessed August 29, 2016).

Published to web: August 11, 2017