

DRAFT



MEDIA STORMWATER MASTER PLAN BOROUGH OF MEDIA, PA

November 2016 | Prepared by T&M ASSOCIATES



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ABOUT MEDIA BOROUGH AND GROWING GREENER

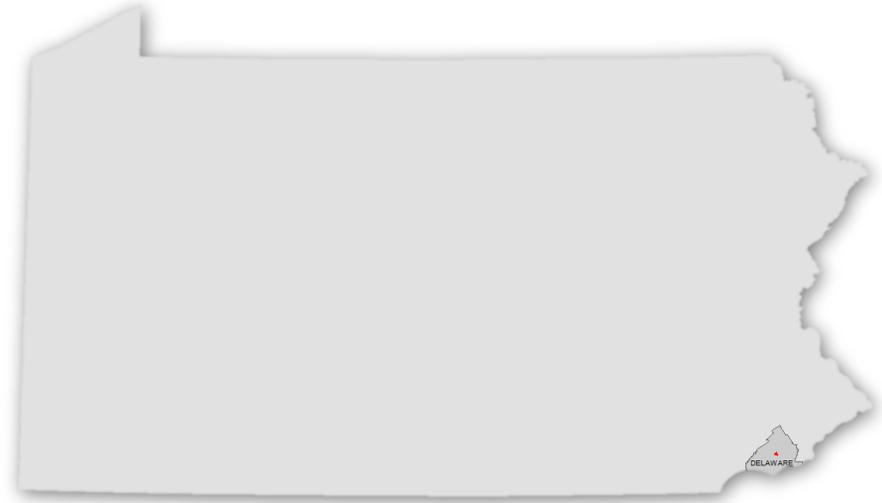
In January of 2014, Media Borough received a Growing Greener Watershed Protection grant from the Pennsylvania Department of Environmental Protection (PADEP) for the development of the Media Borough Stormwater BMP Master Plan.

The goals and deliverables identified for the Plan were:

- 1) Identification and mapping of runoff and flooding problems throughout the Borough.
- 2) Identification of where green infrastructure and best management practices could be built to help mitigate these issues.
- 3) Determine the degree of which storm sewers would need to be upgraded.
- 4) Develop preliminary plans that would address eleven (11) identified, acutely effected flood areas within the Borough.
- 5) A written report or Master Stormwater Masterplan to accompany preliminary design documents created through this effort.

ACKNOWLEDGEMENTS

- Media Borough Council
- Pennsylvania Department of Environmental Protection
- Delaware County Government
- Chester County Government
- Philadelphia Water Department
- Chester Ridley Crum Watersheds Association



ABOUT THE GROWING GREENER PROGRAM

DEVELOPMENT OF A STORMWATER MASTER PLAN FOR MEDIA BOROUGH

Growing Greener is the largest single investment of state funds in Pennsylvania's history to address Pennsylvania's critical environmental concerns of the 21st century. Growing Greener reduced the backlog of farmland-preservation projects statewide, protected open space, eliminated the maintenance backlog in state parks, cleaned up abandoned mines and restored watersheds, provided funds for recreational trails and local parks, helped communities address land use, and provided new and upgraded water and sewer systems.

Over the first five years of the program, Growing Greener invested \$645.9 million distributed among four state agencies: the Department of Agriculture to administer farmland preservation projects, the Department of Conservation and Natural Resources for state park renovations and improvements, the Pennsylvania Infrastructure Investment Authority for water and sewer system upgrades, and the Department of Environmental Protection (DEP) for watershed restoration/protection, abandoned mine reclamation and oil and gas well plugging.

The total dollar commitment to the Growing Greener Program was doubled from \$645 million to \$1.3 billion and extended through 2012 by a permanent dedication of a new \$4/ton municipal waste disposal fee to Growing Greener. DEP's portion of Growing Greener more than doubled to \$547.7 million over the newly extended life of the program, from \$241.5 million in the original five-year program. Amendments to the Environmental Stewardship and Watershed Protection Act, commonly referred to as Growing Greener II, were passed in July 2005. These amendments removed the 2012 sunset date on the \$4.25 tipping fee and provided additional funding for capital improvement projects through the passage of a bond approved by Pennsylvania voters.

DEP was authorized to allocate these funds in grants for:

- Watershed restoration and protection
- Abandoned mine reclamation
- Abandoned oil and gas well plugging projects

A wide variety of organizations are eligible for current Growing Greener grants. Counties, local governments, council of governments, authorities, conservation districts, watershed associations, and other nonprofit groups involved in watershed restoration and protection may apply for several categories of watershed projects that can be funded through Growing Greener:

- Organization of a watershed group

- Watershed assessments
- Development of a watershed restoration or protection plan
- Implementation of watershed restoration or protection practices
- Demonstration, education and outreach projects

In 2014, the Borough of Media was awarded \$127,192 in Watershed Restoration and Protection funds from the Growing Greener program to *assess stormwater problems in a one-square-mile urban borough, to prepare a Master Plan for addressing stormwater problems, and to prepare ten construction-ready designs for stormwater projects.*

Growing Greener continues to represent a historic opportunity for Pennsylvanians to protect and restore the environment. The success of the program is contingent upon coordination and communication at all levels – volunteer watershed groups, community and business leaders, and local, state and federal government agencies. Only with the involvement of all of these partners can the state truly benefit from this landmark program and help Pennsylvania “grow greener”.

FUNDING ACKNOWLEDGEMENT

This project was funded in part by a Growing Greener Grant provided by the Pennsylvania Department of Environmental Protection. The views expressed herein are those of the authors and do not necessarily reflect the views of the Department of Environmental Protection.

EXECUTIVE SUMMARY

Acute flooding and stream water quality concerns led Media Borough to evaluate their stormwater infrastructure system to identify deficiencies contributing to local flooding and create a plan to address stormwater problems.

The first step was to inventory and map the existing stormwater infrastructure in order to understand the existing system's layout and function. An integrated computer model of the existing stormwater system and Borough land cover was built to model various approaches to fixing local flooding hotspots.

The model evaluated alternatives and strategies that could increase the effectiveness of the stormwater system to reduce the frequency and extent of flooding in the Borough and to determine the best alternatives for correcting deficiencies within the system.

In addition to evaluating 'grey infrastructure' solutions, stormwater BMPs, or green infrastructure

strategies, that aligning with the Borough's goals for flood reduction and water quality improvements to the Borough's impaired waters (Broomall Run and Gayley Run) were also evaluated.

This Stormwater Master Plan presents the preferred alternatives identified for five (5) distinct drainage-sheds and discusses the theoretical benefit and estimated costs of those potential solutions.

A prioritized plan for construction of the improvements was developed. Improvements are proposed over a 10 year period and were prioritized for implementation based on factors including overall costs, flood reduction and water quality benefits, ownership, land suitability indexes and fundability.

Potential funding sources for program implementation could include general obligation funds, grants, P3 agreements, incentive zoning, revisions to its subdivision and land development ordinances.



Impervious Areas in Borough



Critical Drainage-Sheds in Borough

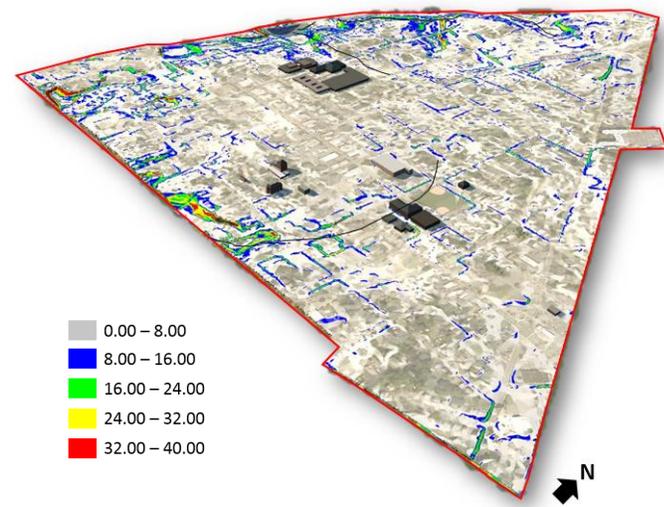
PART 1 | PROGRAM BACKGROUND

NEEDS ASSESSMENT

Media Borough is a suburb of Philadelphia located in Delaware County, Pennsylvania. As with many older urban communities, Media Borough was fully built-out before standard practice dictated that runoff from paved surfaces (roads, roofs, parking lots, etc.) should be detained in order to mitigate potential flooding along streets and onto properties.



Impervious Areas in Borough



Topographical Steepness (Slope) in Borough

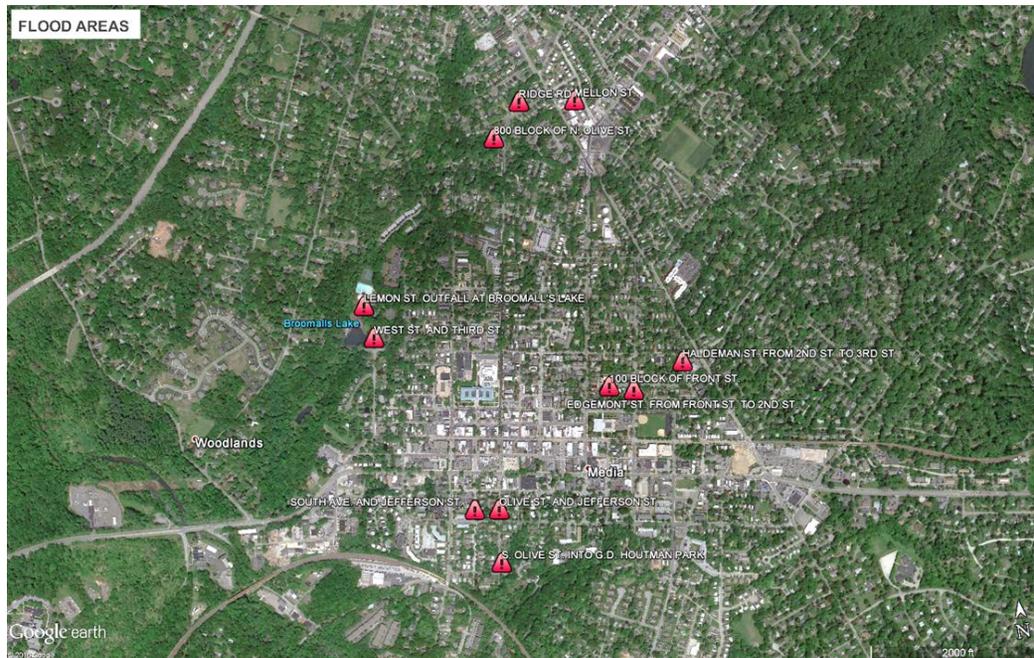
Media Borough is a densely populated urban municipality dating back to the mid-1800s with three preconditions for significant stormwater problems: an antiquated and inadequate storm sewer system, a majority of older structures built before stormwater mitigation requirements and little remaining green space for water infiltration. Stormwater that does not infiltrate into the ground becomes surface runoff, which flows directly into Broomall Run and Gayley Run and eventually into Ridley Creek.

The overall effect of urbanization coupled with inadequate stormwater infrastructure can be clearly observed throughout the Borough even with common storm events. In some parts of the Borough, the storm sewer systems are isolated and not connected to the Borough’s main storm sewer trunk-lines – resulting in surcharging from the system and thus adding to surface flow volume. Unchecked volume of rainfall runoff has increased resulting in frequent flooding throughout the Borough, as well as, erosion and sedimentation within the Borough’s creeks. The Borough is listed as an upstream community to streams listed as impaired by the Pennsylvania Department of Environmental Protection. Media Borough, as part of its MS4 Pollutant Discharge Elimination System (NPDES II) stormwater permit requirements, will be required to reduce its runoff and streambank erosion contributions to pollutant wasteloads in those waters. For the next MS4 permit cycle expected to promulgate in 2018, the Borough will require the development of a separate plan for identifying watershed restoration projects that will reduce pollution to impaired waters. Construction of the BMP/green infrastructure projects identified in this planning document will provide wasteload pollutant reductions that would help the Borough achieve its water quality goals.

Media Borough, Delaware County (NPDES ID: PAG130115)	
IMPAIRED DOWNSTREAM WATERS	PRP REQUIREMENTS
Vernon Run	Appendix E-Siltation
Ridley Creek	Appendix E-Siltation
Crum Creek	Appendix E-Siltation; Appendix C-PCB
Unnamed Tributaries to Darby Creek	Appendix C-PCB
Dicks Run	Appendix E-Siltation



AREAS OF CONCERN



Flood Incident Report Mapping



Flood Incident Example

Eleven (11) areas of acute and persistent flooding were identified for study under this effort.

Flood causes are attributed to a number of reasons including, but not limited to:

- Orphaned drainage sub-networks (disconnected);
- Pipe capacity issues;
- Buried Streams;
- Lack of Stormwater Management Controls;
- Lack of an inlet collection systems; and;
- General increases in runoff associated with dense urbanization.

PRIORITY ASSETS FOR FLOOD PROTECTION

Sanitary Sewer Infrastructure

- Lincoln Street pumping Station of LWWW

Transit Infrastructure

- SEPTA Suburban Trolley Line: Route 101 Media
- Media Train Station



GREEN INFRASTRUCTURE AND BEST MANAGEMENT PRACTICES



- 1 Washington Street Streetscape
Hoboken, NJ
Rain Gardens
- 2 West End Theatre District
Allentown, PA
Bio Retention Planters
- 3 Traders Cove Marina
Brick, NJ
Porous Pavement
- 4 1st Avenue
Hoboken, NJ
Bioswale
- 5 Canal Crossings Redevelopment
Area Plan
Jersey City, NJ
*Rain Gardens, Bio Retention,
Stormwater Harvesting*
- 6 Carnegie Bldg. 804
West Windsor, NJ
Stormwater Harvesting, Green Roof

POTENTIAL FUTURE GI/BMP CANDIDATE SITES

The use of green infrastructure, also known as, stormwater best management practices (BMPs), is one way to supplement and enhance the existing drainage network to sustainably manage stormwater. Every opportunity should be taken to develop green stormwater infrastructure throughout the Borough to reduce runoff volume and peak flow rates. Enhancing streets, Borough parks or other public spaces with green infrastructure can be accomplished by the Borough on properties they control. Based on the small amount of land available to the Borough, it is suggested the Borough seek assistance of residents, businesses and other governments through public-private partnerships (P3) as well. Within the Borough, there are a number of institutional/non-profit properties and entities having better than average potential for cooperative action for future P3 opportunities, including churches, school, non-profits, county government, and open space. In addition, reviewing land development ordinances can determine where there might be additional opportunities to capture GSI benefits through private improvements.



Properties Owned by Media Borough



Properties Owned by Tax Exempt Entities

PART 2 | PROGRAM APPROACH

OBJECTIVES



Existing Drainage System of Media Borough

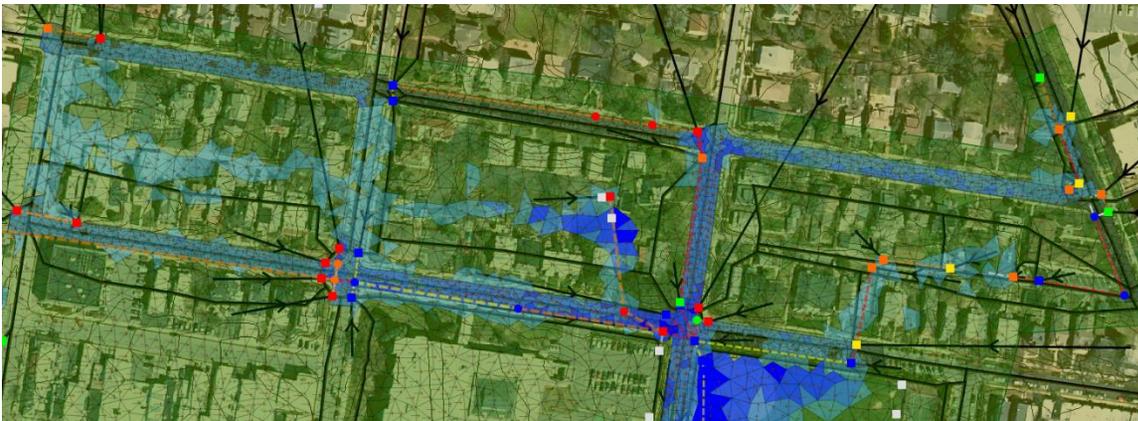
The need to address flooding and non-point source water quality issues would ideally be done by addressing stormwater infrastructure inefficiencies within the Borough while also identifying key opportunities for integrations of green infrastructure BMPs (GSI).

A balanced approach between upgrading stormwater pipe capacity and installation of green infrastructure opportunities is most desired.

In some drainage-sheds, there are clear-cut opportunities to provide GSI and provide a means of runoff volume control - typically with Borough owned land. In other sheds, there are considerably fewer options for GSI.

It's difficult to predict with any certainty what collaborations may develop to provide opportunities for runoff reductions.

The purpose of this plan is to identify stormwater projects that will address urban nuisance flooding while also meeting regulatory requirements to restore the water quality of receiving (impaired) watercourses. Instrumental to this purpose, a community-wide integrated sewer and flood model was developed to mimic existing flooding conditions. Once calibrated, this deterministic tool provides a platform to query the theoretical effects of various stormwater project alternatives – including combinations of volume capture (green infrastructure), detention facilities and conveyance capacity upgrades. A series of analyses were conducted to identify the optimal solutions to community flooding and water quality goals, while also seeking to identify, validate and provide opportunities for savings through cooperative action e.g. public-private partnerships (P3) and coordination with other governmental entities.



InfoWorks ICM

Once data collection and survey was complete T&M began creation of a community-wide, real-time, integrated sewer & flood model using Infoworks ICM by Innovzye, a GIS-integrated state-of-the-art modeling tool which can accurately simulate the interaction of sewer conveyance, stormwater management basins and surface flooding simultaneously. Having an integrated, time-step model was a great asset with differentiating true system concerns verses occurrences that are more symptomatic of the real causes. Regarding the scale of study, a community-wide model was key to ensuring that investment in truly effective improvements are being made. This would facilitate solutions that address the real causes of flooding instead of moving the problems downstream which would have been more likely if a more fragmented approach program approach would have been selected.

After the model study was complete and verified by the Stormwater Committee, the model then served as a valuable deterministic tool for querying the effect of various scenarios and alternatives throughout a range of storm recurrence intervals (storm events).

GREEN INFRASTRUCTURE STRATEGIES

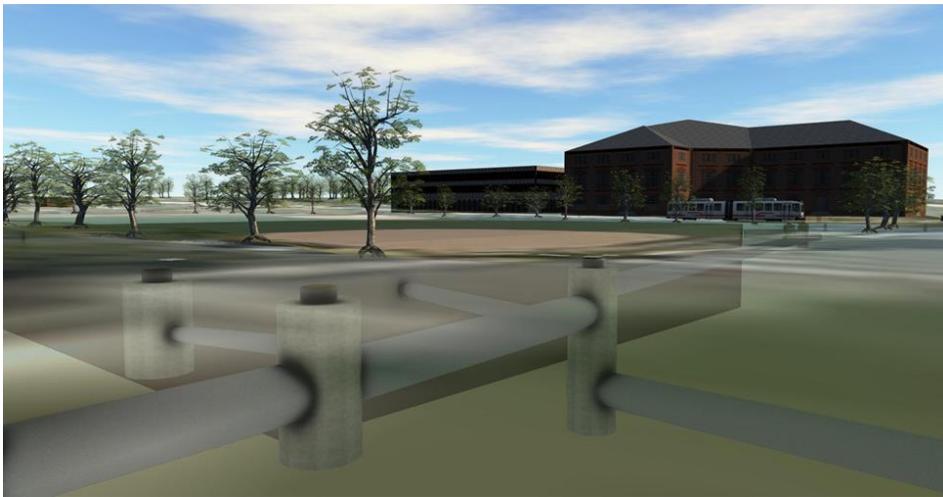
Based on the need to address flooding and non-point source water quality issues a work plan needed to be developed that would provide a substantial improvement to the quality of life of the residents of Media Borough. This would ideally be done by addressing substantial flooding issues within the Borough while identifying key opportunities for integrations of green infrastructure BMPs (GSI).

In addressing flooding an approach was taken that would balance the need for pipe capacity upgrades with green infrastructure opportunities. In some cases there are clear-cut opportunities and provide a means of runoff volume control, typically with Borough owned land. In other regions of the Borough there are considerably less options. In addition to runoff reduction, green infrastructure offers a number of co-benefits such as reduction of heat island effect, opportunities for aesthetic enhancement and even habitat creation. For the purposes of this plan no distinction was made in separating what zones within the Borough would be more suitable versus another as soil classification for all areas are listed as “urban” or made land. Therefore, testing for geological conditions is recommended for governing which GSI methods would be suitable.



COLLECTION SYSTEM IMPROVEMENTS

Much of the Borough's drainage collection system is over one hundred years old and consequently is grossly under service capacity for adequate conveyance of runoff. Consequently, many portions of the Borough exhibit acute flooding. As part of this plan, in conjunction with underground detention and green infrastructure techniques a substantial upgrade the Borough's drainage collection system is proposed. Including greater conveyance capacity of main drainage trunk-lines as well as additional inlets to more efficiently collect runoff.



**Underground Detention at Barrall Park
(Conceptual Rendering)**



Existing Drainage System of Media Borough

MEDIA BOROUGH
STORMWATER MODEL
DRAFT 6-2016

FULL PLAN IMPLEMENTATION

Based on the need to address flooding and non-point source water quality issues a work plan needed to be developed that would provide a substantial improvement to the quality of life of the residents of Media Borough. This would ideally be done by addressing substantial flooding issues within the Borough while identifying key opportunities for integrations of green infrastructure BMPs (GSI).

In addressing flooding an approach was taken that would balance the need for pipe capacity upgrades with green infrastructure opportunities. In some cases there are clear-cut opportunities and provide a means of runoff volume control, typically with Borough owned land. In other regions of the Borough there are considerably less options. It cannot be predicted with any certainty what collaborations will develop to provide opportunities for runoff reductions, in the case where there is currently no feasible options to integrate green infrastructure facilities, those regions are identified and prioritized for future green infrastructure development. In these regions an evaluation of what overall volume reduction would need to be achieved to begin to provide a substantial benefit towards the water quality of Ridley Creek.



RAINWATER HARVESTING



UNDERGROUND DETENTION



COLLECTION SYSTEM / STORM SEWER UPGRADES



BIORETENTION



NATURALIZED DETENTION BASINS



GREEN ALLEY



GREEN ROOF/BLUE ROOF



GREEN INFRASTRUCTURE RETROFITS



CONTINUOUS TREE TRENCHES



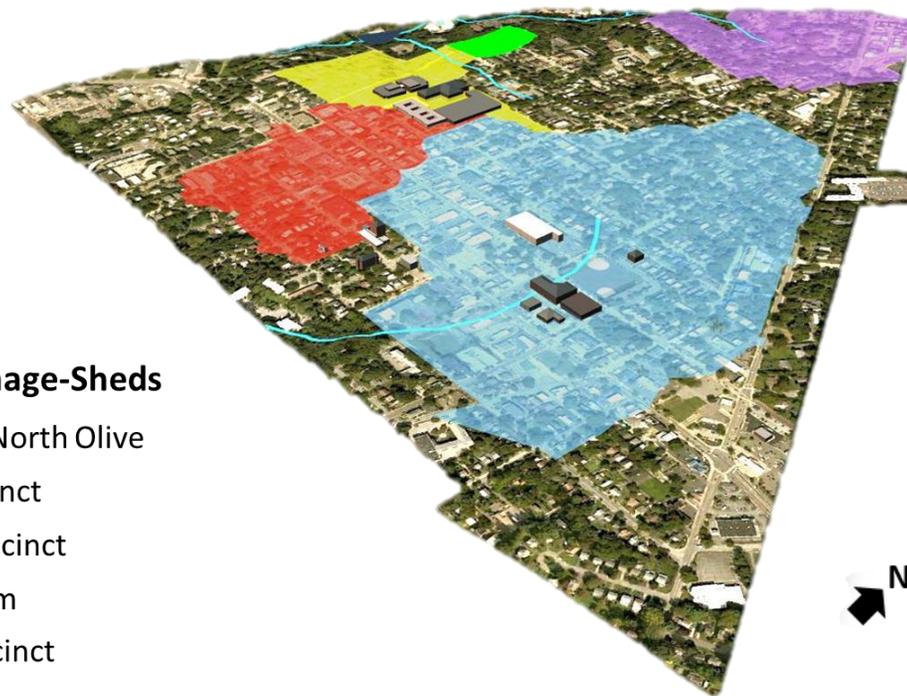
PART 3 | DESIGN STRATEGIES BY SEWERSHED

Overview

Based on the severity of the runoff and flooding issues within the Borough it was decided that an integrated flood and storm sewer model would be developed to evaluate the effectiveness of a number of potential infrastructure interventions. In order to look at drainage and flooding issues more holistically, a focus was put on evaluation of established problem areas on a drainage-shed basis. Consequently, it was found that all eleven (11) problem areas discussed in the previous section were contained within five (5) distinct drainage-sheds listed below.

Media Borough Drainage-Sheds

-  DS1 | Ridge Road/North Olive
-  DS2 | Eastern Precinct
-  DS3 | Southern Precinct
-  DS4 | 3rd Street Dam
-  DS5 | Western Precinct



Drainage-Sheds

DS1: RIDGE ROAD/NORTH OLIVE DRAINAGE-SHED

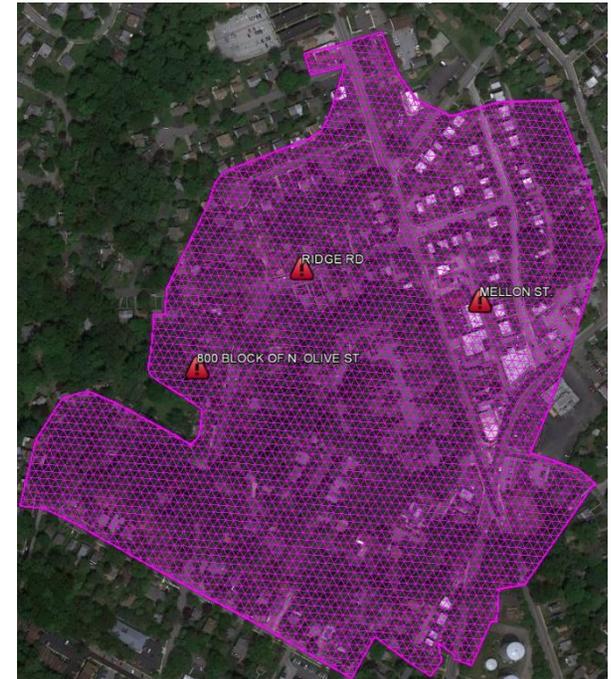
Drainage-Shed 1 is located in the north-most extent of the Borough.

Causes of flooding are attributed to a number of reasons including, but not limited to:

- Orphaned drainage sub-networks (disconnected);
- Pipe capacity issues;
- Lack of stormwater Management features (Controls);
- Steep Topography;
- Lack of an adequate inlet collection systems; and;
- General increases in runoff associated with dense urbanization.



DS1 | Ridge Road/North Olive Drainage-Shed



Flood Incident Areas

- Ridge Road
- 800 Block of N. Olive Street
- Mellon Street

DS1 | Ridge Road/North Olive Drainage-Shed

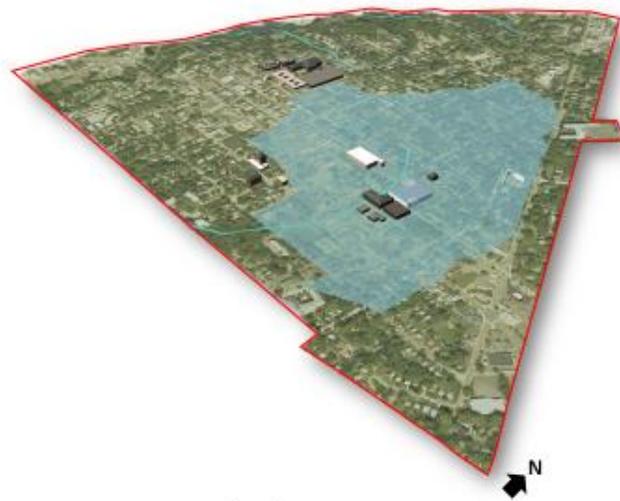


DS2: EASTERN PRECINCT DRAINAGE-SHED

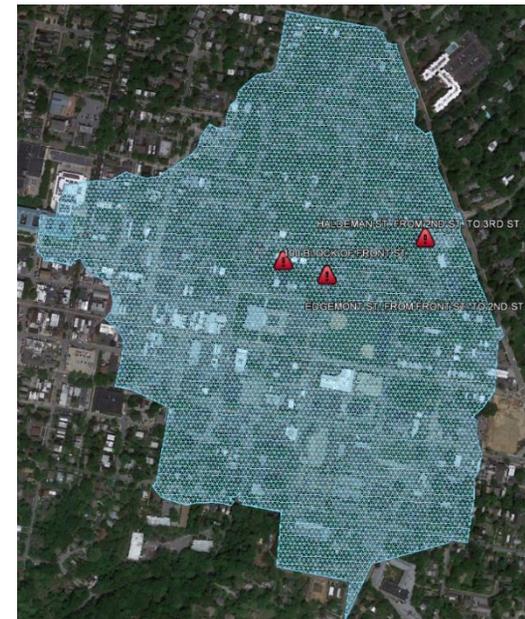
Drainage-Shed 2 is located in the south-east portion of the Borough.

Causes of flooding are attributed to a number of reasons including, but not limited to:

- Orphaned drainage sub-networks (disconnected);
- Pipe capacity issues;
- Lack of Stormwater Management Features (Controls);
- Buried Stream;
- Lack of an adequate inlet collection systems; and;
- General increases in runoff associated with dense urbanization.



DS2 | Eastern Precinct Drainage-Shed



Flood Incident Areas

- Haldeman Street from 2nd Street to 3rd Street
- 100 Block of Front Street
- Edgemont from Front Street to 2nd Street

DS2 | Eastern Precinct Drainage-Shed



GREEN INFRASTRUCTURE RETROFITS



COLLECTION SYSTEM / STORM SEWER UPGRADES



BIORETENTION



UNDERGROUND DETENTION

DS3: SOUTHERN PRECINCT DRAINAGE-SHED

Drainage-Shed 3 is located in the south-western portion of the Borough.

Causes of flooding are attributed to a number of reasons including, but not limited to:

- Orphaned drainage sub-networks (disconnected);
- Pipe capacity issues;
- Lack of Stormwater Management Features (Controls);
- Steep Topography;
- Lack of an adequate inlet collection systems; and;
- General increases in runoff associated with dense urbanization.
-



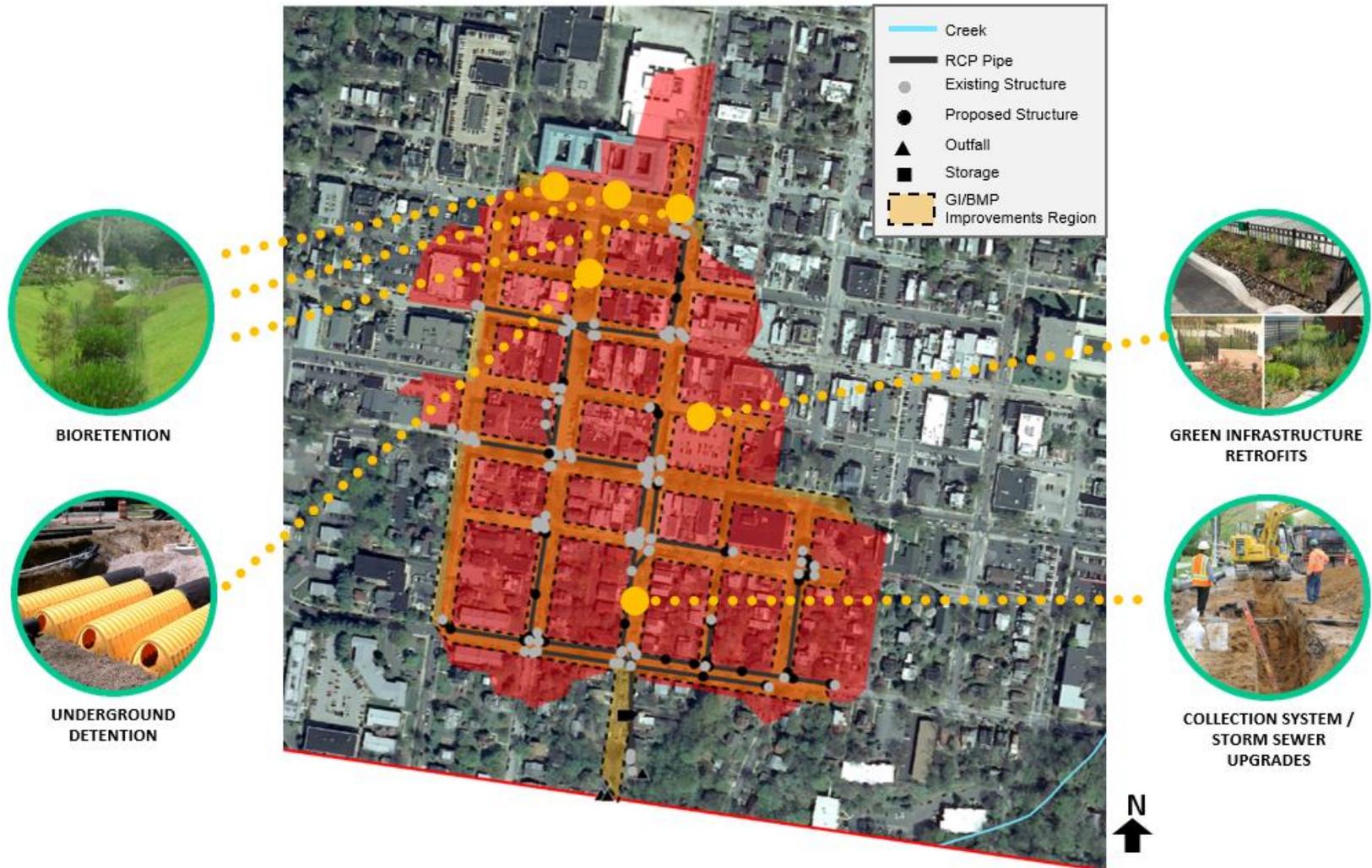
DS3 | Southern Precinct Drainage-Shed



Flood Incident Areas

- South Avenue & Jefferson Street
- Olive & Jefferson Street
- S. Olive Street (Houtman Park)

DS3 | Southern Precinct Drainage-Shed



DS4: 3RD STREET DAM DRAINAGE-SHED

Drainage-Shed 4 is located on the west-side of the Borough.

Causes of flooding are attributed to a number of reasons including, but not limited to:

- Orphaned drainage sub-networks (disconnected);
- Pipe capacity issues;
- Lack of Stormwater Management Features (Controls);
- Steep Topography;
- Lack of an adequate inlet collection systems; and;
- General increases in runoff associated with dense urbanization.



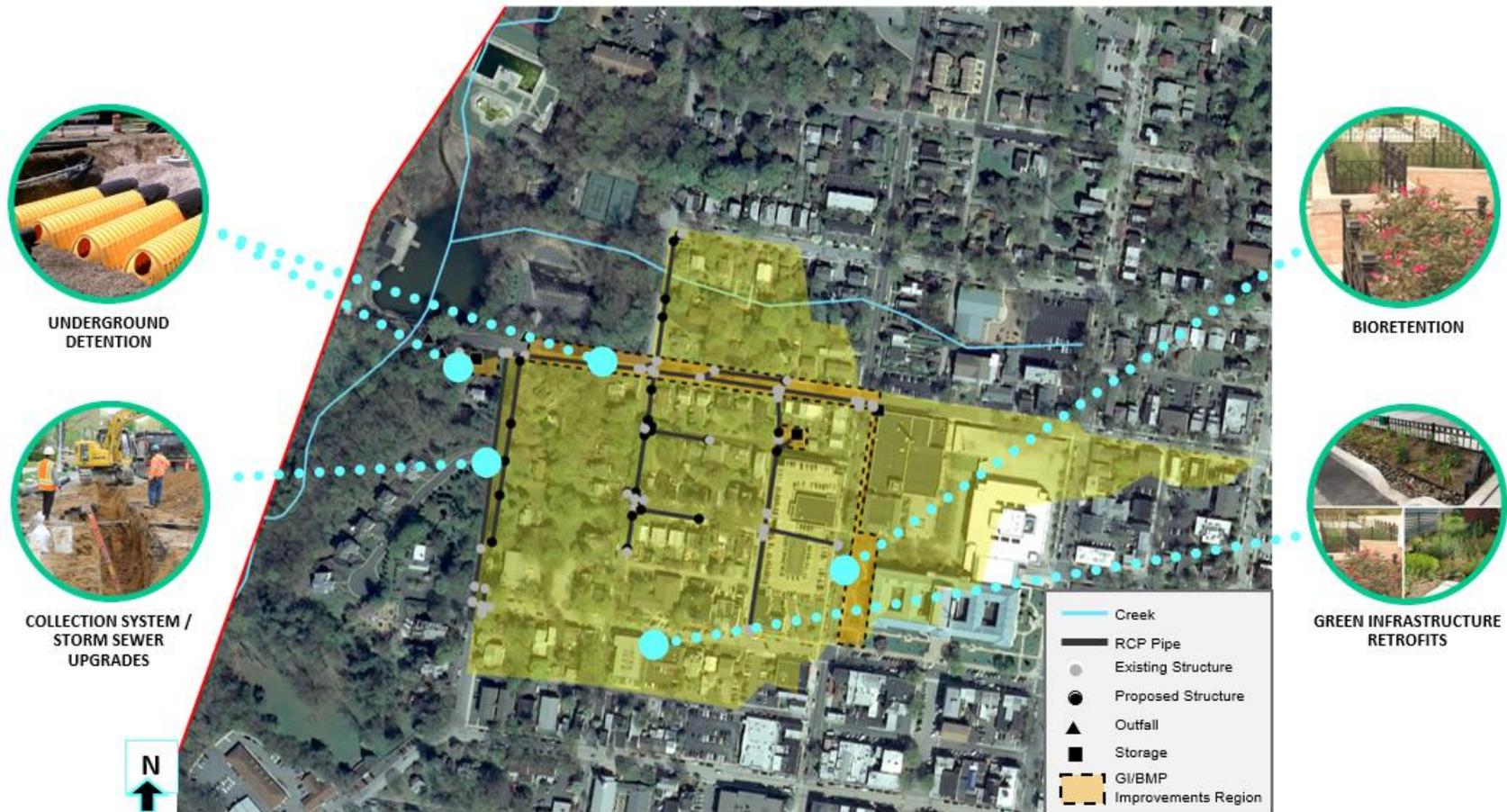
Flood Incident Area

- West & 3rd Streets



DS4 | 3rd Street Dam Drainage-Shed

DS4 | 3rd Street Dam Drainage-Shed



DS5: WEST PRECINCT DRAINAGE-SHED

Drainage-Shed 5 is located on the west-side of the Borough.

Causes of flooding are attributed to a number of reasons including, but not limited to:

- Pipe capacity issues;
- Lack of Stormwater Management Features (Controls);
- Steep Topography;
- Blockage due to Debris Generated from Erosive Flow;
- Lack of an adequate inlet collection systems; and;
- General increases in runoff associated with dense urbanization.



Flood Incident Area

- West & 3rd Streets



DS5 | Western Precinct Drainage-Shed

DS5 | Western Precinct Drainage-Shed



PART 4 | RECOMMENDED GREEN INFRASTRUCTURE
AND BEST MANAGEMENT PRACTICES

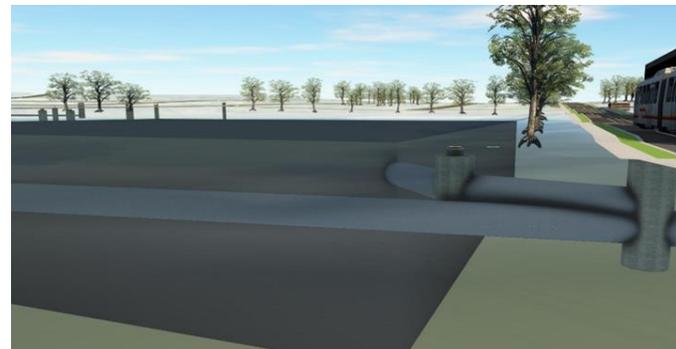
SURFACE AND SUBSURFACE DETENTION / RETENTION



Naturalized Detention Basins
Mount Holly, NJ



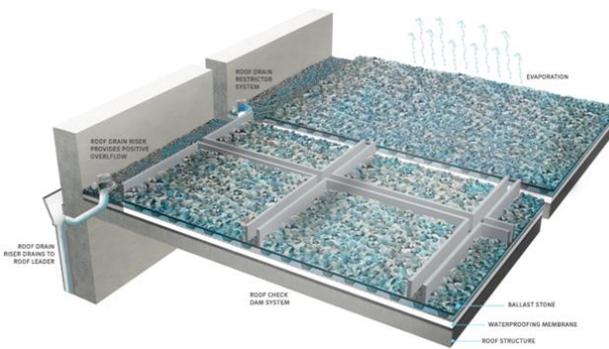
Combined Constructed Wetlands Detention
Storage (Fairmont Park, Philadelphia, PA)



Underground Detention/Infiltration (Conceptual Rendering of Barrall
Park Underground Detention)



Green Roof/Blue Roofs (ASLA/Philadelphia Water Department)



Rain Harvesting (Vine Street, Seattle, WA)

CONTINUOUS TREE TRENCHES

Through the use of Silva Cells or structural soil it is possible to link many points of runoff capture in one continuous storage volume while meeting the conditions of adequate compaction testing requirements for sidewalks and pavers, volume capture, and viability for plant growth.

Estimated Volume Capture Potential = 250 + cubic feet per tree pit

- Moderately low cost for construction, if sidewalks are already being replaced
- Easily perceived as an example of GSI
- Facility will partially exist in the footprint of any area already designated for a tree pit
- Can function with relatively high water tables compared to other GSI practices
- Sidewalk runoff can be captured by using porous pavers or even pavers w/o mortared joints in the sidewalk fringe
- If pipes and arches can be used (low ground water) potential to connect roof leaders may exist



Photo Credit: Philadelphia Green Streets Design Manual

BIORETENTION

One of the most commonly perceived examples of green infrastructure is a bioretention cell or “rain garden”. A rain garden provides a high benefit towards volume capture, water quality and aesthetics. Shown here is an embodiment of the rain garden concept incorporated within a traffic “bump-out”.

Generally can be thought of as a landscape feature which affords the potential for runoff volume capture. This feature though represented in many forms can be described as a shallow impoundment in which surface runoff is directed into. It has plantings specially selected to resist periods of drought and inundation which are typically planted in engineered soil which provides a suitable growth medium while providing ideal porosity characteristics for capture and storage of rainwater. The volume capture and storage of these facilities can be enhanced with an underlayment of stone or a cistern-type structure which can greatly increase the effectiveness of these BMPs in providing effective storm water management.



Photo Credit: Philadelphia Green Streets Design Manual

Other embodiments include:



BIORETENTION PLANTERS



BIO-SWALES



RAIN GARDENS

POROUS SURFACE TREATMENTS

The use of porous pavement either in the form of block units, porous asphalt or porous concrete is recommended throughout the Borough as an effective means to control rainfall closer to where it falls. Specific in parking areas or pedestrian corridor. Generally, appropriate in most situations as long as design guidelines are followed and systems are properly designed to meet the bearing strength of their intended use class.



RETENTIVE GRADING

A shallow depression can be created behind a berm to provide an infiltration area without the need for a more complex stormwater facility. Berms are applicable in many urban settings such as parking, commercial and light industrial facilities, roads and highways, residential developments, and vacant lots. Berms and shallow depressions are well suited for both small and large projects. It can be an inexpensive method of reusing soil on site to manage stormwater. The Borough is made up of many steep open space areas which would provide an ideal alignment with this practice.

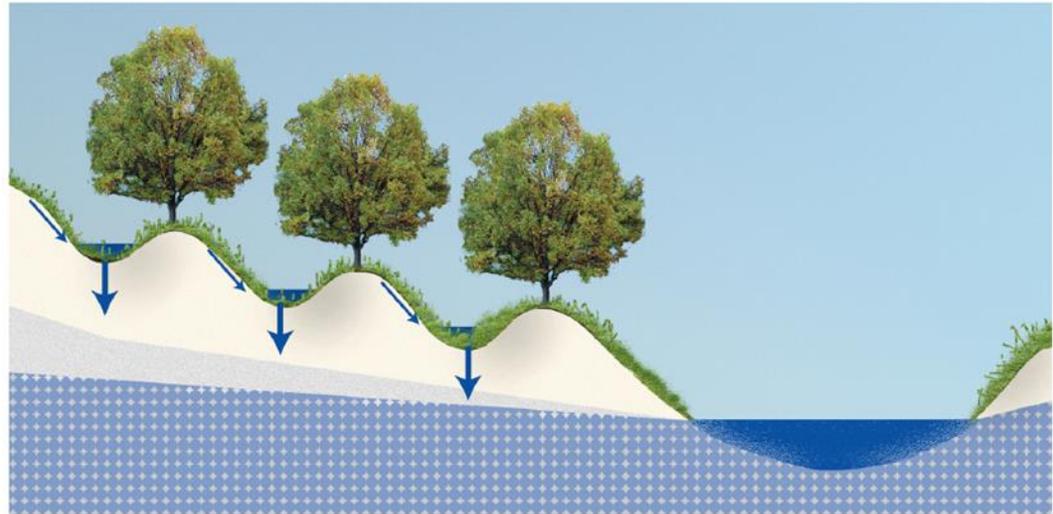


Figure 7.23: Woodland infiltration berms in series

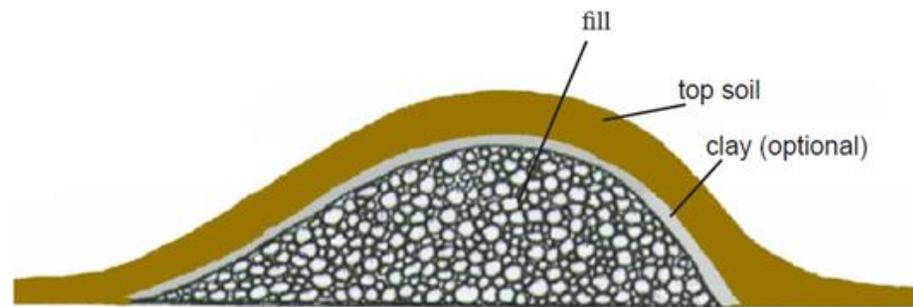


Figure 7.24: Ideal substrate components of a berm

Pennsylvania Stormwater BMP Manual

Photo Credit: Philadelphia Best Management Practice Manual

PART 5 | POLICY RECOMMENDATIONS

STORMWATER TRUST FUND

In conditions where compliance with stormwater ordinances is not possible due to site constraints a program whereby a developer may pay into a program that will fund the development of future stormwater projects to ameliorate conditions of flooding, excessive runoff and degraded water quality. This approach would entail the calculation of stormwater controls that would be incurred in the event that conditions would have presented themselves as being viable for construction. This would function as a fee in lieu of approach, where the developer would still be required to develop stormwater controls to the maximum extent practicable on site. However, accounting for any shortfall in the development of facilities for peak flow rate or volume control would be required as monies that would be paid into the Stormwater Trust Fund.

GRANT FUNDING SOURCES

Potential grant funding sources could include:

- Watershed Restoration & Protection Program — PA Department of Community & Economic Development (PADCED)
- Growing Greener - PA Department of Environmental Protection (PADEP)
- Coastal Zone Grant Program — PA Department of Environmental Protection (PADEP)
- Delaware River Restoration Fund — National Fish and Wildlife Foundation (NFWF)
- Transportation Alternatives Program – PA Department of Transportation (PADOT), Delaware Valley Regional Planning Commission (DVRPC)
- Community Conservation and Protection Program – PA Department of Conservation and Natural Resources (PADCNR)
- Clean Water Revolving Loan Fund – PA Infrastructure Investment Authority (PennVEST)

SERVICE ORGANIZATIONS

Potential teaming partners are identified as follows:

- PennDOT & DVRPC
- Delaware County Planning Department
- Delaware County Conservation District
- Chester Ridley Crum Watershed Association

INCORPORATION OF GREEN INFRASTRUCTURE PROVISIONS: SALDO/ZONING/COMPREHENSIVE MASTER PLAN

In order to optimize planning towards achieving goals for water quality and flood control, it is recommended that the Borough leverage planning for future development to provide a more cost-effective realization of these goals. Consequently, it is recommended that the Borough's Subdivision and Land Development Ordinance, Zoning Ordinance, and Comprehensive Plan be evaluated with the thought of integration of green infrastructure to the maximum extent practicable. Better managing rainfall closer to where it falls will be a key directive in meeting objectives discussed within this plan. EPA has developed a useful tool for the purposes of evaluating these documents called the Water Quality Scorecard. EPA's Water Quality Scorecard is a self-assessment tool that allows the reviewer to rate the relative effectiveness of its own planning documents to meet current clean water standards.



PART 6 | TIMELINES AND PROGRAM IMPLEMENTATION

TIMELINES AND PROGRAM IMPLEMENTATION

1. Drainage Improvements					
Recommendation		Timeframe	Responsible Entity	Potential Funding Sources	Costs:
					Low: <\$100K
					Medium: <\$500K
					High: >\$500K
Execute Capital Improvements to address immediate flood relief efforts					
1.1	Construction of Ridge Rd/N. Olive Drainage Improvements	Within 2-5 Years	Borough	DVRPC-TAP, PADEP-GG, DCED, PADEP-CZG, NFWF, PennVest	High
1.2	Construction of Eastern Precinct Drainage Improvements	Within 2-5 Years	Borough	DVRPC-TAP, PADEP-GG, DCED, PADEP-CZG, NFWF, PennVest	High
1.3	Construction of Southern Precinct Drainage Improvements	Within 2-5 Years	Borough	DVRPC-TAP, PADEP-GG, DCED, PADEP-CZG, NFWF, PennVest	High
1.4	Construction of 3 rd Street Dam Drainage Improvements	Within 2-5 Years	Borough	DVRPC-TAP, PADEP-GG, DCED, PADEP-CZG, NFWF, PennVest	High
1.5	Construction of Western Precinct Drainage Improvements	Within 2-5 Years	Borough	DVRPC-TAP, PADEP-GG, DCED, PADEP-CZG, NFWF, PennVest	High

2. Land Use					
Recommendation	Timeframe	Responsible Entity	Potential Funding Sources	Costs:	
				Low: <\$100K	
				Medium: <\$500K	
				High: >\$500K	
A. Review Land Use compliance documents for potential for incorporation of green infrastructure provisions					
2.1	Establish a stormwater committee to evaluate current Zoning Ordinances to identify opportunity to incentive voluntary implementation of additional stormwater controls through incentive zoning practices	Within 1-3 Years	Borough	Borough	Low
2.2	In conjunction with support services, review current SALDO for incorporation of green infrastructure functionality within current standard details e.g. street trees and sidewalk improvements	Within 1-3 Years	Borough	Borough	Low
2.3	Update current comprehensive plan to include reference to updated SALDO and Zoning Documents, including adoption of a stormwater master plan	Within 1-3 Years	Borough	Borough	Low
2.4	Work with Shade Tree Commission and Planning Commission on development of a continuous tree trench standard	Within 1-3 Years	Borough, Shade Tree Committee, Planning Commission	Borough	Low
B. Review of Current Redevelopment Planning					
2.5	Have Stormwater Committee review areas within the Borough designated for revitalization/ opportunities for potential stormwater infrastructure	Within 1-3 Years	Borough	Borough	Low

3. Energy and Resource Conservation					
Recommendation		Timeframe	Responsible Entity	Potential Funding Sources	Costs:
					Low: <\$100K
					Medium: <\$500K
					High: >\$500K
Support Comprehensive Planning Goals of Energy and Resource Conservation					
3.1	Consider having the Borough adopt LEED or similar building/site scoring metric to promote better stormwater and energy efficiency practices on-site	Within 1-3 Years	Borough	Borough	Low
3.2	Incentivize LEED or similar building/site scoring metric being used for private development	Within 1-3 Years	Borough	Borough	Low
3.3	Collaborate with Philadelphia Water Department and local universities for additional ideas and perspectives on conservation	Within 1-3 Years	Borough	Borough	Low

4. Parks, Open Space, and Natural Areas					
Recommendation		Timeframe	Responsible Entity	Potential Funding Sources	Costs:
					Low: <\$100K
					Medium: <\$500K
					High: >\$500K
A. Park and Recreation Improvements					
4.1	As a corollary to the current Comprehensive Plan initiative to provide parks/civic spaces within ¼ mile of all neighborhoods, it is recommended that these parks also provide runoff capture and educational benefit as “BMP parks”	Within 5-7 Years	Borough	DCNR, NEA, PECO, DCED, PADEP-GG, NFWF, PennVest	Medium
4.2	It is recommended for park improvement areas already identified in the Comprehensive Plan be evaluated for potential GSI implementation (e.g. Water Tower, Houtman Park)	Within 5-7 Years	Borough	PADEP-GG, DCNR, DCED, PADEP-CZG, NFWF, PennVest	Medium
B. Examine upgrades to existing open space areas to meet the needs of local neighborhoods					
4.3	Add bioretention and other BMP types identified in this plan as a “water feature” throughout the Borough within open space land.	Within 1-3 Years	Borough	PADEP-GG, DCNR, DCED, PADEP-CZG, NFWF, PennVest	Medium - High
4.4	Examine open space areas in close proximity to Gayley and Broomall Run for re-establishment of riparian buffer restoration work. In addition, look at retentive grading methods	Within 1-3 Years	Borough	TreeVitalize, PADEP-GG, DCNR, DCED, PADEP-CZG, NFWF, PennVest	Low - Medium

C. Promote increase in the extent of the current shade tree plan					
4.5	After new standard is developed for continuous (stormwater) tree trenches, expand into areas currently outside of existing shade tree plan	Within 1-3 Years	Borough, Shade Tree Committee, Planning Commission	TreeVitalize, DCNR, PADEP-GG, DCED, PADEP-CZG, NFWF, PennVest	Medium
D. Promote at-home stormwater management methods					
4.5	Provide education to the public on methods that can be used at home to help support the communities goals for improved stormwater management (See Appendix)	Within 1-3 Years	Borough	TreeVitalize, DCNR, PADEP-GG, DCED, PADEP-CZG, NFWF, PennVest	Low

5. Building Support for Stormwater Planning					
Recommendation		Timeframe	Responsible Entity	Potential Funding Sources	Costs:
					Low: <\$100K
					Medium: <\$500K
					High: >\$500K
Develop collaborative opportunities through outreach					
5.1	Continue to work with and strengthen relationships with local service organizations (DVRPC, DCPD, DCCD & Chester Ridley Crum Watersheds Association)	Ongoing	Borough	Borough	Low
5.2	Contact Delaware County to discuss teaming on green infrastructure projects within the Borough	Within 1-3 Years	Borough	Borough	Low
5.3	Provide workshops for building at-home BMPs/GIs	Within 1-3 Years	Borough	Borough	Low
5.4	Foster public-private partnerships by involving local business alliances (and residents) in design charrettes involving potential improvements to the frontages of their properties	Within 1-3 Years	Borough	Borough	Low
5.5	Reach out to other Ridley Creek watershed communities to discuss collaboration on MS4 goals as a means of reducing cost and duplicative planning effort	Within 1 Year	Borough	Borough	Low

APPENDIX

Residential Best Management Practices (BMPs)

Residential BMPs aim to achieve many of the same goals as urban BMPs employed throughout the township including rate reduction, volume control, and water quality oftentimes with a side benefit of beautification. Here are a few BMPs that homeowners can take advantage of to reap similar benefits on their property.

Rain Barrels

This simple and easy BMP looks to capture runoff from impervious roof structures of homes, garages, sheds, covered porches, etc. This can be achieved by routing existing downspouts to the rain barrels. Capturing runoff means there is a reduced risk of on property flooding, and water collecting around the foundations of structures. Another benefit is that the captured rain water can be used to water lawns and gardens, reducing billable water use. Rain barrels can be made at home inexpensively, or decorative barrels can be purchased and add a rustic touch to any space.



Rain Gardens

A garden can be more than a way to beautify outdoor spaces, attract butterflies, and grow vegetables. A rain garden can have all of the benefits mentioned above with additional benefits of collecting runoff and allowing it to infiltrate. Rain gardens can be used to collect runoff by directing downspouts to the garden, or by positioning them in natural depressions where water naturally collects. Often times rain gardens allow for quicker infiltration of water which can help reduce property flooding. Many different types of plants can be used in rain gardens and typically require little maintenance after they are established. As with other landscaping projects, adding a beautiful and functional piece to a home's landscape can help increase curb appeal and the property value.



Landscaping

There are many choices with regards to landscaping that can help manage residential runoff. The first way addresses hardscapes

around a home. Hard surfaces such as concrete patios and asphalt driveways do not allow water to infiltrate and can increase problems related to rainfall runoff. An alternative is to use materials that allow water to infiltrate such as permeable pavers. Permeable pavers are not inherently pervious, but allow the runoff to infiltrate between each paver. Other options include pervious asphalt and concrete, which are the same as their imperious counterparts except that there is a very little amount of fine material used in the mixtures. The removal of fine materials in the mixtures allows runoff to



infiltrate through the asphalt and concrete. Of the three options, permeable pavers can be the most aesthetically pleasing. There are many different varieties that come in many shapes sizes and colors. They are very durable and can add a decorative touch that ties together the rest of a home's landscaping.

Plant choice can help with the effects of rain runoff. Plants that have deep root systems help to stabilize and, aerate the soil, as well as encourage infiltration. Plants put around the foundation of homes can help stop erosion around the foundation, and absorb some runoff that may end up near the foundation. Landscaping around the perimeter of the property can serve to reduce runoff entering property and can encourage infiltration of onsite runoff. All landscaping projects aim to beautify the property, and increase curb appeal, which in turn can make neighborhoods more inviting and increase property value.

Dry Wells

A dry well is a small pit usually filled with stone or gravel that stores some storm water runoff and allows it to slowly soak into the surrounding soil. Downspouts



can be direct into the well or the well can be placed at a natural low spot to collect runoff. The function of a dry well is similar to that of a rain garden, but without the planting or maintenance. It can help to reduce the runoff on the property, and help with possible downstream flooding.

Any one, or combination of these projects can help reduce property runoff, enhance drainage, and control flooding. Helping to control runoff on residential properties has a larger impact on the community as it can reduce local flooding, and reduce the stress



on local storm water infrastructure. In addition, there are environmental benefits including improvement to water quality. Whenever water is able to infiltrate, the soil helps to filter the water of contaminants and helps reduce the nutrient loads. Water that infiltrates can recharge groundwater, which eventually makes it to water supplies and waterbodies, so it is important not to deplete or contaminate the groundwater.