ABINGTON TOWNSHIP COMPREHENSIVE STORMWATER MANAGEMENT PLAN

ABINGTON TOWNSHIP

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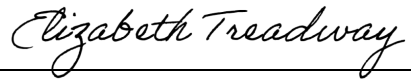

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1 BACKGROUND

Abington Township has a successful track record of addressing its flood-related stormwater issues by making specific investments in floodplain restoration and stormwater control projects. A summary report prepared by the Delaware Valley Regional Planning Commission (DVRPC) states that in the late 1990's, the Township purchased dozens of homes in the floodplain after successfully matching $7M of Federal Emergency Management Agency funds with $1M of Township funds. The Township converted these areas into parkland to be enjoyed by Township residents. In addition, the Township issues bonds for $3M to $4M every few years for stormwater capital improvements to protect property, infrastructure, and the environment from flood waters and threats to water quality. These projects, coupled with the day-to-day stormwater infrastructure operations and maintenance activities performed by Public Works crews, and participation in the Wissahickon Clean Water Partnership, exemplify the Township's commitment to water resource management.

In addition to capital projects to mitigate the impacts of floodwaters in the community, the Township faces another wave of stormwater challenges, this time from the requirements of Pennsylvania water quality regulations. Abington's water quality challenges include compliance with Pennsylvania Department of Environmental Protection's (PADEP) Municipal Separate Storm Sewer System (MS4) Permit and the Wissahickon Creek Total Maximum Daily Load (TMDL). Water quality regulations are driving an expansion of the Township's list of capital stormwater projects while Township staff continues the day-to-day operation and maintenance of existing infrastructure to meet the expectations of residents and business owners.

The Township received a renewed PADEP MS4 permit with the mandate to address specific pollutant reduction goals coupled with capital projects to address the pollutant load reductions for the Wissahickon TMDL. The flood-prone areas of the Huntingdon Valley Shopping Center (HVSC) and the Keswick neighborhood have experienced excessive flooding and these areas were evaluated in 2019 as part of this project, to identify optimal strategies to reduce flooding. The recommended alternatives to mitigate these conditions could exceed $42 million with life cycle costs for operation and maintenance of the infrastructure investments of $2.6 million (over a 20-year period).

The needed investments in infrastructure and water quality protection will contribute to overall sustainability for management of stormwater in the Township. This Stormwater Management Plan is a roadmap to maintain and administer the stormwater infrastructure and is based on a comprehensive approach answering the following questions.

- What is the current stormwater management program?
- Is the current stormwater management program of services adequate to meet operational, regulatory, and environmental challenges?
- Is the scope of operations and maintenance activities sufficient to address an expanding stormwater drainage system complexity focused on flood reduction and water quality regulatory compliance?
- What is the compliance cost for the Municipal Separate Storm Sewer System (MS4) permit, and can regulatory exposure be limited?
- What strategy should the Township's pursue for improvements within in the public right of way?
- What is the role for Green Stormwater Infrastructure (GSI) best practices?

- What level of funding is needed to implement the recommendations in the neighborhood flood reduction studies for HVSC and Keswick as well as the future-oriented Stormwater Management Plan?

This Plan focuses on stormwater operations and infrastructure management and was developed with input from interviews with Township personnel and document research during data collection for the project beginning in 2018. From the current services baseline, a future program that addresses the long-term investment in flood abatement and water quality protection is laid out, a review of the alternatives analyzed for the HVSC and Keswick neighborhoods as well as incorporation of the various best management practices (BMPs) for pollutant load reduction mandated in the MS4 permit. Implementation of the options discussed in the Level of Service (LOS) strategies to mitigate flooding along with compliance requirements for the Township MS4 permit is the foundation for the future stormwater management services over the next decade.

Stormwater services engage multiple organizations within the Township as well as partnership with external agencies along with the Environmental Advisory Council. The Wissahickon Valley Watershed Association along with the Tookany/Tacony-Frankford Watershed Partnership support the goals of the Township stormwater program.

The stormwater services organization is captured in this chart that summarizes the various roles and responsibilities.

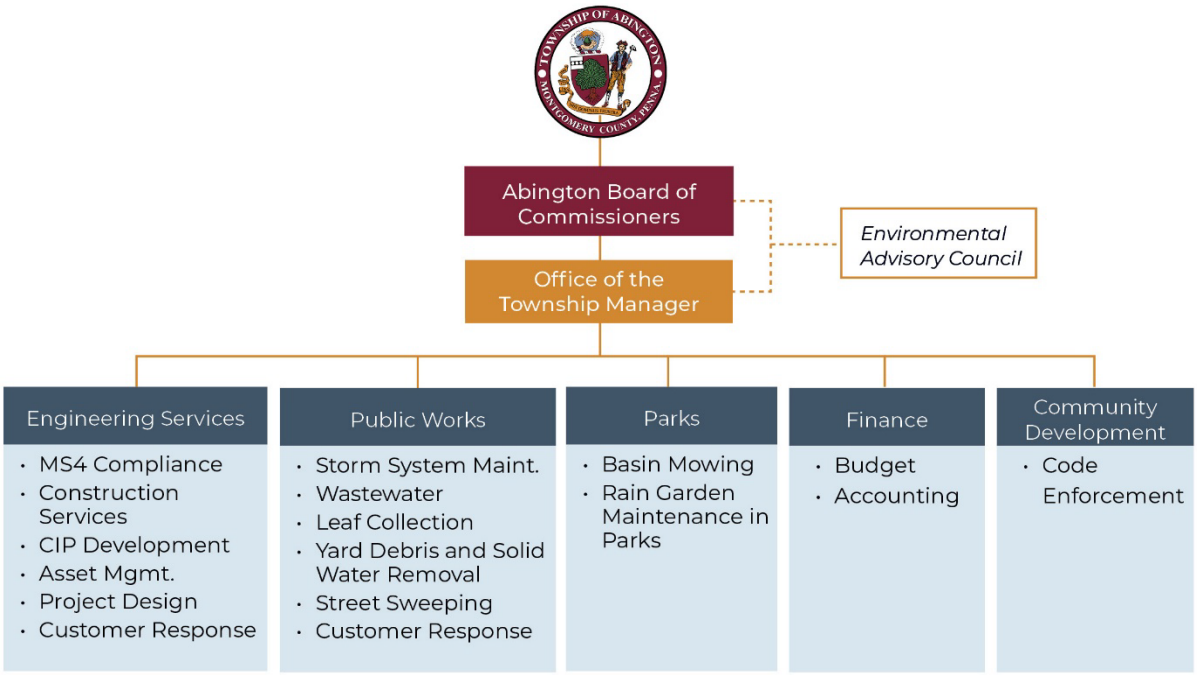


Figure 1-1: Stormwater services organization

2 CURRENT STORMWATER SERVICES PROGRAM

The Current Services Program discussion focuses on operational topics starting with administration and budget development through capital improvement projects. An evaluation of costs to operate the public drainage system is captured as part of the current program.

2.1 ADMINISTRATION AND BUDGET DEVELOPMENT

Overall leadership for stormwater management rests with the Board of Commissioners along with daily operational leadership provided by the Office of the Township Manager. Primary maintenance and operation services are delivered by Engineering Services and Public Works Department, with the Construction Services Team having primary stormwater construction.

Capital Improvement Plan (CIP) is included in the annual budget and identifies stormwater projects as well as other capital project investments of the Township.

There is not a separate budget account for stormwater management operations, however, debris removal, MS4 activity costs, and CIP projects that are specifically stormwater, can be identified in separate line items within the annual budget.

Established in 2018, the Construction Services Team tracks costs for specific stormwater capital projects (e.g., engineering design, construction, construction management).

The Township has actively and successfully pursued grants for specific stormwater projects; however, the backlog of projects likely exceeds the availability of grants for resources that would be required for implementation. Continued use of grants, when available, is important but cannot be relied upon for long-term system repair and rehabilitation. The Office of the Township Manager manages all grants. When grant opportunities are identified, each Department is responsible for reviewing and identifying applicable projects for consideration. If advantageous to the project, Departments may partner with volunteer boards such as the Shade Tree Commission on applications. Most grants do require a local match which can vary based on the source and terms established by the granting agency and may be in-kind services or cash.

2.2 CUSTOMER SERVICE

Calls from citizens and businesses for assistance in addressing a stormwater issue are assessed and resolved appropriately by the relevant Township Department or Division. Calls may be received at various points of contact in the Township and referred to Public Works for follow-up. If a work order is needed, the necessary action will be documented by the responding Department within the Township's work order system. Best practice is to utilize call logs because they provide valuable insight into the location and frequency of various types of issues and provide key information for long-term maintenance providing documentation on repetitive concerns or locations. This best practice has been implemented in the Township.

If the problem identified by a customer is on private property, staff gives advice to the property owner, but direct delivery of services by Public Works is limited to the public right-of-way, which is typical in most communities. If a public infrastructure component is

located on private property and part of the overall storm sewer system, the Township will respond and address the issue based on priority. If a publicly owned component is part of the overall issue responses are based on the priority for resolution.

The use of the public right-of-way is assumed within the hydraulic assessment of mitigation strategies to manage flooding in the Keswick and HVSC areas. Consequently, this may increase call volume due to the disturbance within the street network and park. The overall approach and policy may require further review based on an analysis of the local code governing the use of the street right of way. (Appendix A)

2.3 ENGINEERING SERVICES

Recently, contracting for local engineering support for the Municipal Engineer was initiated. This approach is a best practice by many communities. Local engineering firms often provide a range of services to meet the needs of a community, expanding the overall capacity for engineering services.

Drainage system assets are tracked through historical paper documents with an asset management system under development to convert CADD-based files into Geographical Information System (GIS) layers with related data to track system conditions and attribute features. The IT Department is in the lead for setting up the asset inventory in GIS. The Township is making progress in this effort at approximately 50% completion in the fall of 2021, with anticipated completion by the end of calendar year 2023. The goal is to have a desktop version of GIS providing staff with ready access to key system information.

Design and construction oversight has traditionally been handled in-house. Public Works performs minor system repairs, and major projects are managed by the Construction Services team. Engineering Services take the lead in MS4 permit compliance for coordination of required activities and periodic reporting to the state.

Implementation and compliance with the Township Stormwater Ordinance are the responsibility of Engineering Services operations. The Stormwater Ordinance is a stand-alone local regulatory authority that is applicable to both new and redevelopment activities. Plan review is based on the criteria in the Ordinance and includes different thresholds for different sizes and types of development. Each watershed has a separate Act 167 Plan that may require different stormwater management strategies depending on where the project is located within the Township.

Land development applications are managed by the Office of the Township Manager. Inspections are performed both by Township personnel(Municipal Engineer) or third parties, depending on the type of inspection required. There are procedures for submissions, and there are instructions on the Township website to walk an applicant through the entire subdivision or land development application process. Outside of the land development process, stormwater management related permit applications are received and managed through Engineering Services. Inspections for these permits are routinely performed by Township personnel.

2.4 STORMWATER CONVEYANCE OPERATION AND MAINTENANCE

Figure 2-1: Stormwater inlet/outlet structures.

The Abington stormwater systems are relatively young, less than 30 years old, in many areas. The Township invested in upgrades over the past several decades, with the addition of collection features including additional basins after the flood of 1995. There are over 2000 grated inlets and 1200 open mouth inlets. There is 123.6 miles of pipe system with 43 trash traps which are cleaned after heavy rain events. The Township owns 5 basins with a total of 10 basins located within the corporate limits. There are two (2) underground detention facilities.

When an issue is identified where public land generates flows and multiple properties are involved, the concern is evaluated to determine the nature/cause and action necessary to address it. The Township will take the lead to mitigate the problem location.

Drainage problems can be identified by property owners, residents, field crews, and/or by historical documentation of known problem areas. Maintenance and repairs are reactive, and action is typically triggered by a problem identified within the system or street. Stream blockages and sinkholes are addressed to reduce the potential for flooding.

The Township utilizes scheduled visual inspections as well as inspections in response to complaints to identify drainage-related concerns such as blockages or debris buildup. The Township is familiar with the various “hotspots” that they routinely inspect due to historic flooding or other stormwater related issues. Particular care is taken before a forecasted rain event. Costs of repairs/maintenance are captured in the workorder system, and this data is useful in developing a projection for future needs to move to a more proactive program.

Figure 2-2: Old Huntingdon Pike Stream Bank Stabilization

Streambank erosion is a known problem within the Township. The priority of streambank restoration is increased when a blockage threatens to create a flooding condition. Across the Commonwealth, there is some ambiguity regarding local government responsibility for stream conditions. Stream management is the responsibility of the Pennsylvania Department of Environmental Protection (PADEP). If the Township takes action to maintain open flow, that may create increased risk and liability for the Township. Historically, approximately 10% of streambanks have been maintained by the Township using techniques such as rip-rap placement.

Sinkholes are identified by the Public Works Department street maintenance crews, and repairs are completed when located in or near the

street. If a sinkhole project exceeds the capacity of Public Works, Engineering Services takes responsibility for the design and construction of a permanent solution.

A video inspection of the underground system has not been systematically completed due to the limited staff time available for daily Public Works operations. Currently, it is considered cost-prohibitive to contract for services due to the extensive storm sewer system of the Township, as well as the impact on staff time required to manage a pipe inspection program. Township staff acknowledge that the data gathered through an inspection of the pipe network could serve in documenting the current condition of the pipe, informing a long-range maintenance strategy, and enhancing the asset inventory data.

Recent MS4 permit annual reports document approximately 20 repairs/cleanings completed each month. Cleanings include debris removal from the trash racks, inlets, and outfalls. Township staff must balance workload between stormwater management and other public works operations. Two primary municipal facilities are maintained, and these include stormwater inlets at the trash transfer station equipped with filters to catch debris and oil runoff from trucks. Staff understands that as investments are increased in stormwater management, additional personnel may be needed to ensure the long-term sustainability of the operation and maintenance of the public system.

Wastewater Treatment Department staff spend about 10% of their time on stormwater activities such as providing CCTV inspection of the drainage pipe network when blockages are identified. There is a mutual exchange of staff time between Wastewater and Public Works. The Wastewater Department can provide support using a Vac Truck to remove residual debris from an inlet once a blockage is removed.

Trash traps are located in three basins and at 38 outfalls, all maintained by the Public Works Department. Retention basins are routinely mowed by the Parks Department along with the cemetery retention basin and maintenance on a rain garden within the park system. Street sweeping level of service ensures that all streets in the Township are swept at least once a year. The Township operates two sweepers and one vac truck in Public Works, shared between street maintenance and stormwater services.

Leaf Collection occurs in the fall and removing leaves from the curb is an important water quality protection strategy. Collection service utilizes 10 trucks and 30 FTEs during leaf removal season. The leaf collection program is curbside for loose leaves during the fall. Year round the Township will pick up bagged leaves and yard waste to keep this green waste from the stormwater system.

Green Stormwater Infrastructure and underground detention systems will require maintenance and may increase the resource needs for personnel and materials as the Township implements these best practices.

2.5 FLOOD REDUCTION AND PREPAREDNESS

Fire and Police are called into action when a storm threatens to cause flooding. The typical nuisance flooding is cause by backup in a storm inlet. There are 3000 properties located within mapped floodplains that may be at risk when extreme rainfall events occur.

Figure 2-2: Police and Fire Departments responding to flooding.

Buyouts occurred in the past involving 18 homes at a cost estimate of $4 million. No additional buyouts are scheduled for the near future. Floodplain mapping is up to date, with the most recent FEMA mapping studies in the late 2000s. As stated above, the flood mitigation study for priorities areas of HVSC and Keswick is a component of this Plan (Section C) and alternative analyses identified options to reduce flood potential in these two areas of the Township. The remaining neighborhoods with histories of routine or nuisance flooding should be considered for additional analysis, which provides the Township with complete coverage and the ability to prioritize investments that address flood abatement and mitigation.

2.6 MS4 PERMIT ACTIVITIES

The Township MS4 permit was renewed in March 2018 and is focused on Minimum Control Measures (MCM) implemented by various Departments. New elements were included in the renewal that have significant financial impacts in capital system investments to improve water quality throughout the Township.

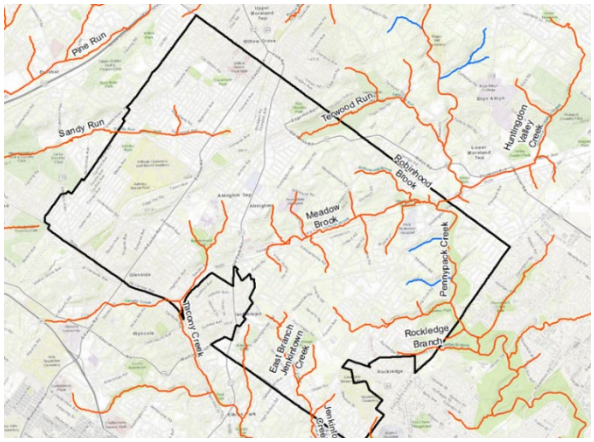


Figure 2-3: Stream Segments in Abington Township.

In addition to the permit activities documented, watershed groups conduct activities that meet MS4 MCM requirements for the Township. They assist with public education and outreach, and occasionally implement projects. However, there are no formal agreements in place between the Township and the volunteer agencies/service organizations, which is a risk for the Township. Partnerships can be effective in delivering compliance activities, but the permit does require a documented agreement between parties that sets forth the responsibilities of each. The Township should execute Memorandums of Understanding to ensure that the compliance mandates imposed on the Township are fully documented, and steps for reporting progress and implementation of measures are in place.

The MS4 Individual Permit for Abington is focused on improvements for streams. Abington has stream segments identified as impaired that are listed below. The Pollutant

Reduction Plan required in the new permit addresses sediment and nitrogen, specifically. The TMDL for the Wissahickon Watershed requires the creation of a stormwater management plan to meet the TMDL discharge limits (reductions in pollutant loads) as well as pollutant control measures (PCM) for impaired streams. A plan was submitted to PADEP with the renewal application for an individual MS4 permit and the plan was approved in June of 2018.

2.6.1 IMPAIRED STREAMS

- Frankford Creek
- Jenkintown Creek
- Meadowbrook Creek
- Pennypack Creek
- Robinhood Brook
- Rockledge Branch
- Sandy Run
- Tacony Creek
- Terwood Run
- Wissahickon Creek

2.6.2 PUBLIC EDUCATION AND OUTREACH

A Public Education and Outreach Plan and a Public Participation and Involvement Plan have been developed and guide the actions for compliance with the MS4 permit. Many outside programs and organizations are used to support the Township and include:

Volunteers on the Environmental Advisory Council

Wissahickon and Tookany/Tacony-Frankford Watershed Partnership (provide outreach across the region)

Shade Tree Commission

Rain barrel program provided by the Environmental Advisory Council (financially self-sufficient)

Briar Bush Nature Center

2.6.3 PERSONNEL TRAINING IN STORMWATER POLLUTANT REDUCTION AND PREVENTION

No formal program is in place to target Township personnel training; however, as reported in the MS4 Annual report, the use of operations and maintenance manuals provides detailed information on the best practices for stormwater. Public Works personnel utilize these manuals to ensure best practices are followed. Training is provided on hazard substance management which includes training on pollution prevention to storm drains. This is provided every two years by the Delaware Valley Trust.

The Fire Department provides annual training that includes spill management, and a spill prevention plan is in place for fleet operations. Fuel pumps are set up with response supplies in case of an emergency (oil dry and absorbent pads).

2.6.4 PRIVATE STORMWATER SYSTEM INSPECTIONS

The permit requires a routine inspection program of private facilities under the Post Construction MCM. The Township requires the posting of a 5-year maintenance/inspection fee. Engineering Services performs an annual inspection of the private facilities. Inspection details are kept in a tracking system. Typically, an inspection occurs at least once during the permit term. Publicly owned facilities are inspected more frequently. The Township tracks private BMPs, and data is collected from permit applications. During construction of a private BMP, there are 2 to 3 inspections by the Township, and the design plan is reviewed by the Township prior to construction.

2.6.5 SEDIMENT AND EROSION CONTROL

Construction sites are inspected by the Engineering Services personnel following Pennsylvania standards. The Building Inspector will provide sediment and erosion inspections for smaller projects such as a single lot home project. For land development projects, inspections are handled by the Township Engineer's office to ensure compliance with the NPDES permit requirements. It is the developer or applicant that is held responsible for ensuring erosion and sediment control measures are compliant with PADEP regulations. If an inspection identifies an issue, the developer or applicant is required to address the problem.

Figure 2-4: Sediment runoff from a nearby construction site to a stormwater inlet structure.

Maintenance of erosion control practices installed during construction has been identified as a contributor to sediment loading, especially during heavy rain events. The Township inspects known problem sites and follows up when complaints of off-site sediment flows occur. There are generally less than five development projects underway at any time with up to 20 infill projects implemented during the same period. Engineering Services completes reviews for infill projects, and they are not classified as land development under the Township code.

2.6.6 ILLICIT DETECTION AND DISCHARGE ELIMINATION

The Township is not aware of any cross-connections with the sanitary system. A house-by-house inspection was done over ten years ago to eliminate any illegal connections to the

wastewater system. Private property drains were part of the overall inspection program and these may lead to a public storm drain. If a complaint is received, Township personnel will inspect the location and determine if an illicit discharge has occurred. Personnel will investigate the condition to identify the source.

Spill management is a focus of the Illicit Detection and Discharge Elimination Program. For Township operations, spill kits are available for fuel spills and are located at the fuel pumps, in the maintenance facility, and with each foreman. Kits include oil dry, absorbent pads, booms, and pails that can be put under a piece of equipment. The Fire Department is dispatched for significant spills, and they take charge of reporting spill details to the appropriate agencies. On average, three significant spills occur a year. Hazmat team responds to spills where stream impacts may occur, and when a spill reaches a component of the stormwater system, a report is filed, and PADEP is notified. A written Standard Operating Procedure (SOP) was prepared by the Safety Committee and is reviewed as needed.

2.6.7 POLLUTANT REDUCTION PLANS (PRP) AND THE WISSAHICKON TMDL PLAN

These Plans were approved by PADEP on June 19, 2018, and they detail projects to be constructed. The TMDL plan must address a 73% reduction in sedimentation from Sandy Run. Initial target reductions were to remove 355,229.6 pounds of sediment annually (2003 data). In 2017, modeling was completed to evaluate the specific load reduction requirements, and the reduction target was updated to 526,257 pounds of sediment and 882.45 pounds of nitrogen reduction per year. Phosphorus was included in the 2017 modeling, with a target reduction of 137.25 pounds per year. The 2017 modeling included an assessment of various BMPs for implementation to achieve the long-term targets to meet these load reductions.

The PRP evaluation to achieve a 10% sediment load reduction and a 5% nitrogen load reduction throughout the corporate limits included an assessment of various BMPs and their load reduction efficiencies. The potential projects and costs are documented in the CIP summary below.

PRP documents three (3) locations for improvement.

- Roychester Park (grants have been pursued for Roychester and awarded)
- Sandy Run Streambank Stabilization
- Evergreen Manor (completed in 2020 – series of check dams)

2.7 CAPITAL INVESTMENTS

Capital projects have been identified in the flood mitigation study for the HVSC and Keswick neighborhoods and are part of developing a 10-year Future Program for investments. The overall prioritization addresses flood reduction in key priority areas. It is important that the other flood-prone areas be evaluated for a complete Master Plan Townshipwide.

CIP projections are based on an on-going project inventory to be funded as the Township can dedicate resources. Funding for the PRP and TMDL BMPs is important to ensure effective compliance with the MS4 permit.

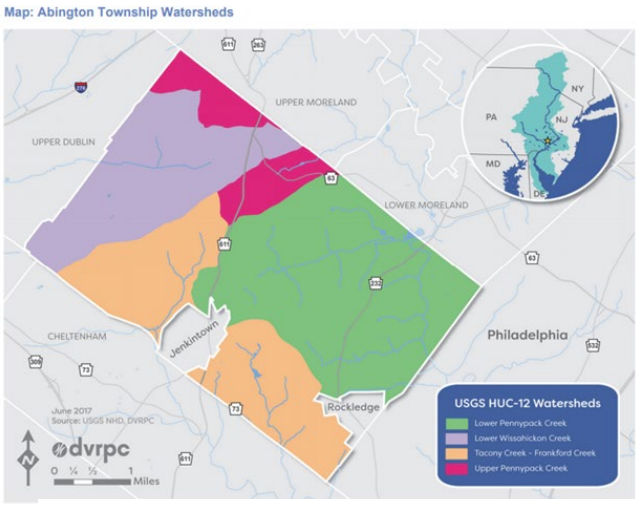


Figure 2-5: Watershed Map of Abington Township.

Watershed modeling informs a long-term strategy for management of water quality. The Wissahickon Valley Watershed Association is completing a model driven by the TMDL. Additional modeling was completed in 2019-2020 and the recommendations are incorporated in the Future Stormwater Program.

2.7.1 BMP PROJECTS FOR TMDL COMPLIANCE:

The following projects were identified in the 2017 model for BMPs to meet the sediment, nitrogen, and phosphorus targets over a 5-to-10-year implementation period. It is estimated that of the total cost shown, $2,332,210 is funded through grants with the Township contribution of $1,297,250. (Average annual Township funding over 10 years is $129,725).

Table 2-1: Total Cost of BMP Projects for TMDL Compliance.

BMP PROJECT	COST	STATUS
Susquehanna Woods Basin #3 Retrofit	$ 86,250	Completed
Sandy Run Streambank Stabilization	$ 69,000	Completed
Madison Avenue Meadow Construction	$ 34,500	Completed
Roychester Park Rain Garden	$ 52,010	Completed
Roychester Riparian Buffer Restoration	$ 40,595	Completed
Roychester Park Bioretention Trench	$ 28,290	Completed
Roychester Park Infiltration Berms	$ 54,280	Completed
Evergreen Park Infiltration Basin	$ 39,535	Completed In-house
Grove Park Streambank Restoration	$2,650,000	Construction planned for Spring 2023
Ardsley Wildlife Sanctuary Basin Renovation	$ 575,000	Completed

2.7.2 PRP BMP PROJECTS

The following BMP projects were evaluated in 2017 for compliance to address sediment and nitrogen reduction goals. These projects are projected for a 5-year implementation period to meet the requirements of the MS4 permit. The total estimated cost of $970,810 is the cost to the Township without grant funds. (Average annual Township funding of $194,162 over 5 years).

Table 2-2: Cost of BMP Projects for PRP Compliance.

BMP PROJECT	COST	STATUS
Pennypack Creed Melmar Rd Basin	$ 86,250	Completed
Pennypack Creek Wyndmoor LA Basin	$ 86,250	Planning Stage
Pennypack Creek Irvin Rd Stream Stabilization	$ 57,500	Completed
Meadowbrook Streambank Stabilization	$ 143,050	Completed
Meadowbrook Streambank Stabilization (Bird Sanctuary)	$ 98,280	Spring 2023
Robinhood Brook Sharpless Rd Filter Box	$ 81,900	Planning Stage
Rockledge Branch Rockledge Ave Filter Box	$ 84,430	Planning Stage
Terwood Run Davidson Rd Filter Box	$ 85,900	Planning Stage
TTF Alverthorpe Park Extended Detention Basin	$ 115,000	Completed
TTF Alverthorpe Park Bioswale	$ 132,250	Completed
TTF Alverthorpe Subsurface Basin	$ 500,000	Construction Planned for Spring/Summer 2022
TTF Hamel Avenue Bioswale	$ 63,000	Completed

2.7.3 PCM BMP MEASURES

Pollutant control measures address reductions of pathogens and organic compounds, and cost estimates presented below address the engineering costs for implementation of these measures. The total cost estimate from the 2017 analysis is $45,000, funded by the Township.

Table 2-3: Cost of pollutant control in impaired streams through Abington Township.

POLLUTANT CONTROL	COST
Pathogens – Wissahickon Creek	$ 5,000
Pathogens – Sandy Run	$ 10,000
Pathogens – Pennypack Creek	$ 10,000
Priority Organic Compounds – Pennypack Creek	$ 10,000
Priority Organic Compounds (PCBs) – Frankford Creek	$ 10,000

2.7.4 CURRENT ADMINISTRATIVE AND MAINTENANCE COSTS

Though the Township does not maintain separate accounting of the budget for stormwater management services, data was collected on the overall operational costs based on input from staff for FY20 budgets. In addition, the summary of the compliance costs for projects that meet the MS4 permit (TMDL, PRP and PCM projects) has been summarized as an annualized cost, assuming an average expenditure over the planning period for each program.

Estimated costs, shown in Table 5, were developed based on discussions with staff to determine an equitable distribution of labor effort in Public Works administration, Public Works operations, and Engineering Services. Each position was reviewed and based on the analysis shown in Table 4, the total fulltime equivalent of 6.05 positions provides stormwater services on an annualized basis.

Table 2-4: Estimated full-time equivalent of labor to provide stormwater services in each department.

ORGANIZATIONAL UNIT	FTE
Public Works - Administration	0.3
Public Works - Operations	4.35
Engineering Services	1.4
Total FTE	6.05

The position distribution was used to allocate direct costs to support the efforts of 6.05FTE, including benefits, supplies, materials, and other direct expenses budgeted within each organizational unit.

Table 2-5: FY20 Estimated Operating Cost of Service.

COST CATEGORY	FY20
Personnel	$ 499,806
Direct Costs	$ 504,624

2.8 CAPITAL PROJECTS

Projects were identified in the FY20 program plan. The status of these projects is verified for the development of the long-range capital investment plan, along with the implementation strategy for flood mitigation and regulatory compliance. The total value of these projects is $482,265.

Table 2-6: Cost Analysis of specific activities in the FY20 Program Plan.

SPECIFIC ACTIVITY	FY20
Grove Park Grant Project (Match for USACE project)	$ 100,500
Ardsley Wildlife Sanctuary Streambank Stabilization (completed grant)	$ 111,765
Meadowbrook Streambank Stabilization (MS4) Bird Sanctuary (on-hold)	$ 30,000
Engineering Study 600 Block Cricket/Central Ave.	$ 25,000
Engineering Study 600 Block Roslyn Ave.	$ 40,000

2020 Bridge Repairs (may go forward)	$ 50,000
MS4 Requirements	$ 75,000
Stream Maintenance	$ 25,000
Sump Pump Connects for Discharge to Township Storm Sewer	$ 25,000

Table 2-7: Total Cost of Service – FY20.

COST CATEGORY	FY20
Personnel	$ 499,806
Direct Costs	$ 504,624
Capital Costs	$ 482,265
Total	$ 1,486,695

Table 2-8: Summary of TMDL and PRP funding needs for the first five years

COST CATEGORY	AVERAGE YEARLY
TMDL	$ 129,725
PRP	$ 194,162
PCM	$ 9,000
Total	$ 332,887

2.9 RECENT PROJECTS - WATER QUALITY AND IMPACTS FROM EXTREME RAIN EVENTS

The Township has invested in a number of projects to address initiatives for improvements in water quality as well as impacts from extreme weather events.

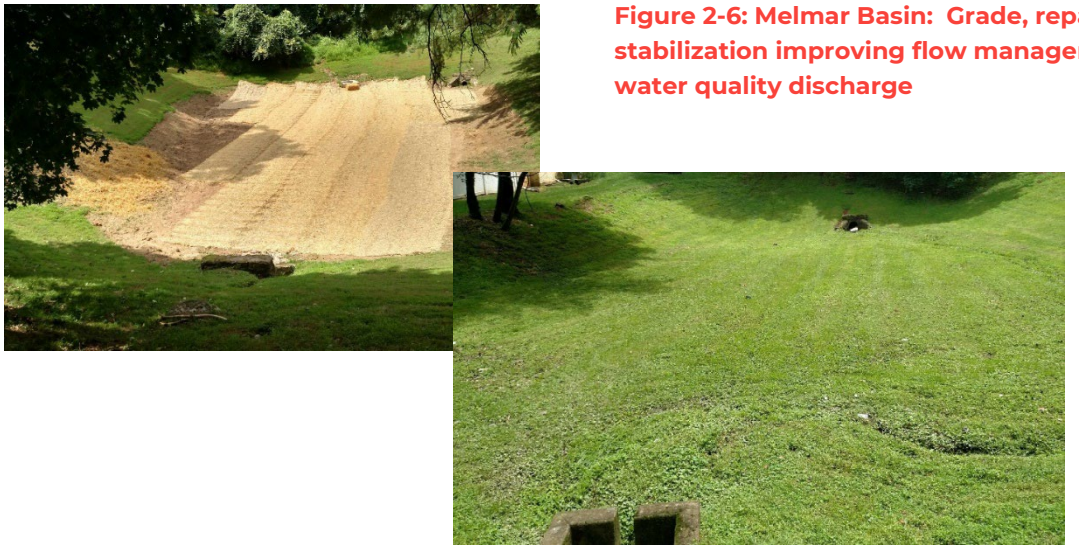


Figure 2-6: Melmar Basin: Grade, repair, and stabilization improving flow management and water quality discharge

Figure 2-7: Hurricane Ida impacts on Autumn and Buckingham Roads completed September 30, 2021.

Figure 2-8: Hamel and Monroe Flood Mitigation Project increasing drainage system capacity and pipe longevity

3 FLOOD MITIGATION ANALYSIS FOR KESWICK AND HUNTINGDON VALLEY SHOPPING CENTER NEIGHBORHOODS

Master Planning analysis for the two priority neighborhoods of Keswick and HVSC identified alternatives for implementing projects to address local flooding. Both neighborhoods were identified by the Township as being prone to excessive flooding. The results of the study identified over $40 million in investment to address stormwater mitigation. The future services analysis focuses on an implementation strategy to design and construct the facilities in these priority areas.

PCSWMM models for the two priority neighborhoods were developed to evaluate existing and proposed stormwater conditions within the study areas for the 10-year, 24-hour storm event (4.9 inches) to identify specific locations for where the most severe flooding occurred and potential solutions. The 10-year, 24-hour storm event was assumed for design purposes based on Philadelphia Water Department's (PWD) standards. Survey data supplemented with as-built data was used to develop the stormsewer network in the PCSWMM models. In the PCSWMM models, subcatchments draining to inlets along the stormsewer network were delineated based on digital elevation model (DEM) and aerial data downloaded from the Pennsylvania Spatial Data Access (PASDA) portal. Within the Keswick and HVSC watersheds. Curve numbers for each subcatchment were calculated in ArcGIS using the 2016 U.S. Geological Survey National Land Cover Database data and hydrologic soil group data downloaded from the National Resources Conservation Service Web Soil Survey platform. Figures displaying the subcatchment locations and input data are included in Appendix B.

The proposed stormwater conditions models were used to analyze three different base alternative solutions to alleviate flooding. The evaluated base alternatives included the following three options for improving conditions; increasing pipe sizes and capacity to move flow through the system to the downstream location, large detention features based on a review of available locations for surface or subsurface practices for storage, and green stormwater infrastructure solutions throughout the stormsewer network for each area. In the Keswick area, it was apparent that there are some areas for detention, but the sizing seemed infeasible to implement at a scale sufficient to alleviate the flooding; therefore, the Township requested a combined additional alternative that included both green stormwater infrastructure and local detention options, Alternative 4.

Detention features were input into the model based on volume and outlet elevation to maximize capacity and reduce overland surcharge and flooding. Green stormwater infrastructure was assumed to be a Tree Pit standard feature that was repeated around the system based on locations requiring stormwater management, to assume the installation of a green stormwater feature. As noted below during costing, this feature was assumed to be most efficient at providing storage, with the smallest footprint possible. This assumption allowed for the incorporation of the timing impact of green

stormwater infrastructure to reduce the volume loading the stormsewer in these areas, to show the benefit in overland flooding.

Discussions about the feasibility of the considered alternatives determined that capacity cannot be increased to carry additional flow downstream as the downstream community already has concerns about flow volumes flowing into their system and increasing flows downstream would only move the problem. Large detention basins were more feasible in the Keswick area, with available open spaces that could be utilized for subsurface detention; however, upon sizing the necessary basins the implementation of these features seemed prohibitive by depth of construction, groundwater, and available space. The Green stormwater infrastructure solution provides management of rainfall near the source of the runoff. This approach allows for distributed management of stormwater through these stormsewer-sheds, reducing the load on single management features, while allowing for greening and other community incentives that can be incorporated into the function of these features.

Discussions with the Township that evaluated feasibility of the proposed alternatives, identified a preferred alternative method to alleviate flooding for each priority area. Costing for the preferred alternative was provided, utilizing an average PWD cost basis previous projects completed by WSP. Green stormwater infrastructure was assumed to be able to capture the first 1" of runoff. Costing from local projects with use of proprietary storage devices was provided to maximize storage and minimize footprint. These values can be optimized for cost and footprint in the planning and design process. Fact sheets were produced for both neighborhoods, presenting the results, pros and cons of the different alternative solutions, and costs.

Abington Township

Priority Flood-Prone Area #1 – HVSC

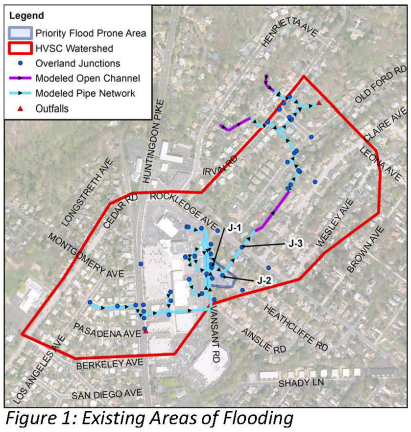


Figure 1: Existing Areas of Flooding

Goal

The neighborhood surrounding the HVSC (Huntington Valley Shopping Center) has been identified as an area prone to excessive flooding. The most severe flooding occurs at the intersection of Vansant Rd and Heathcliffe Rd, between Rockledge Ave and Ainslie Rd, downstream of the HVSC. The goal is to alleviate flooding via implementation of stormwater management practices.

Analysis

The hydraulic modeling software, PCSWMM, was used to evaluate existing and proposed stormwater conditions within the study area for the 10-year, 24-hour storm event (4.9 inches). It was found that the existing storm sewer system downstream of the HVSC parking lot is undersized and unable to manage the full runoff volume from this event, subsequently resulting in overland flooding within roadways and adjacent properties.

Alternatives

The following alternatives were evaluated for their effectiveness in alleviating flooding within the most severe areas of HVSC:

1. **Upgrade Storm Sewer System -** Increase existing storm sewer pipe size
   - Too much land disturbance, including private properties.
   - Reduces flooding locally, but transfers the issue further downstream.
2. **Regional Stormwater Management -** Large Area Disconnection
   - Manages larger drainage areas than traditional GSI.
   - May be placed in the west side of the HVSC parking lot away from Streets and Residential property.
3. **Green Stormwater Infrastructure (GSI) -** Along streets, within Right-of-Way (ROW)
   - Provides social, economic, and environmental benefits to residents.

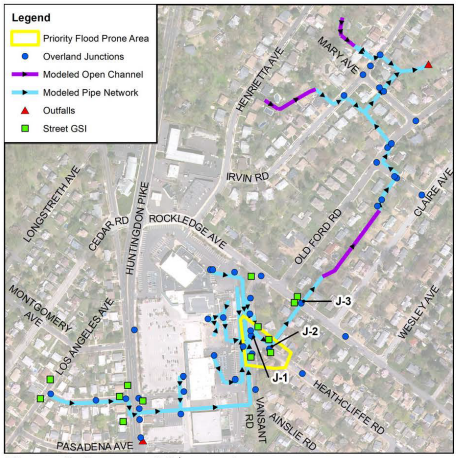


Figure 2: Proposed Alternatives

Results

Stormwater runoff volumes, maximum flooding depths, and flow rates associated with each of the alternatives at critical overland flow study points are presented below:

ID	Total Volume (MG)				Max Flooding Depth (ft)				Max Flow Rate (cfs)			
	Exist Cond.	Alt. 1	Alt. 2	*Alt. 3*	Exist Cond.	Alt. 1	Alt. 2	*Alt. 3*	Exist Cond.	Alt. 1	Alt. 2	*Alt. 3*
J-1	0.14	0.06	0.06	*0.00*	1.1	0.2	0.2	*0.0*	16	3	3	*0*
J-2	0.18	0.11	0.11	*0.00*	0.4	0.1	0.1	*0.0*	18	5	5	*0*
J-3	0.27	0.27	0.27	*0.00*	0.3	0.3	0.3	*0.0*	11	11	11	*0*

Preferred Alternative

Based on results, Alternative 3, installation of street GSI (approximately 13 locations) throughout the upstream portion of the watershed, is preferred. A rough order of magnitude cost for Alternative 3 could be as much as $7,150,000[1,2] with a potential 20-year lifecycle cost of $500,000[2].

[1] Costing from local projects with use of proprietary storage devices in order to maximize storage and minimize footprint. These values can be optimized for cost and footprint in the planning and design process.

[2] All costing is present day value of money.

Figure 3-1: Abington Township- Priority Flood-Prone Area #1 _HVSC

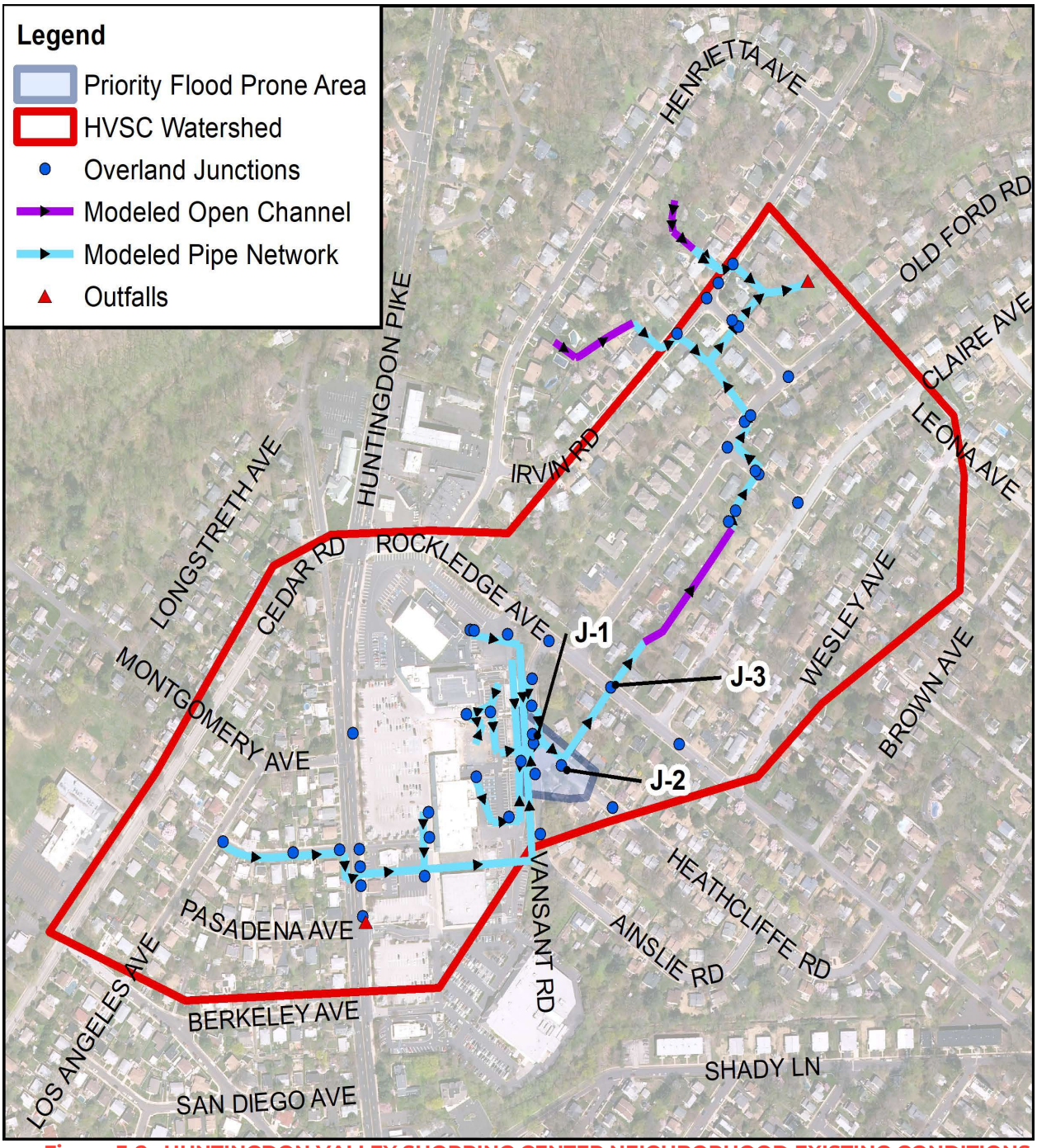


Figure 3-2 : HUNTINGDON VALLEY SHOPPING CENTER NEIGHBORHOOD EXISTING CONDITIONS

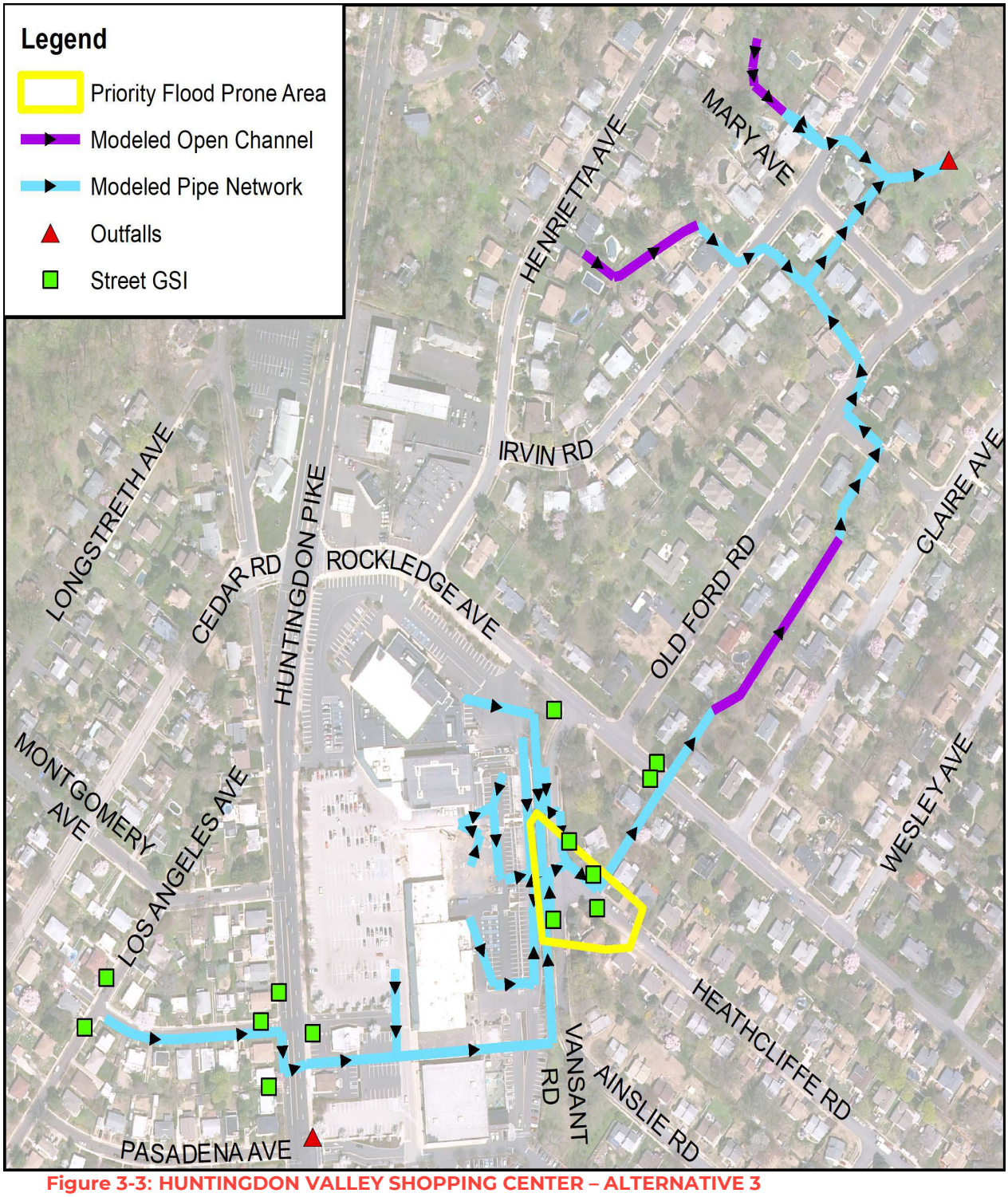


Figure 3-3: HUNTINGDON VALLEY SHOPPING CENTER – ALTERNATIVE 3

Abington Township

Priority Flood-Prone Area #2 – Keswick

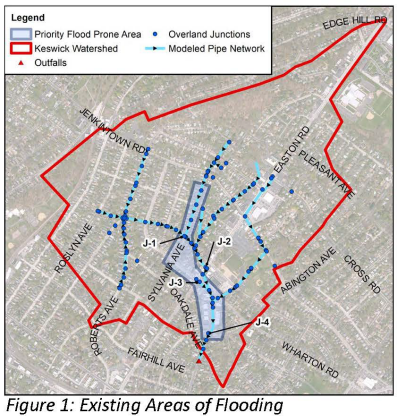


Figure 1: Existing Areas of Flooding

Goal

Keswick has been identified as a neighborhood prone to excessive flooding. The most severe flooding occurs along Sylvania Ave, between Jenkintown Rd and Keswick Ave, and along Keswick Ave, between Sylvania Ave and Abington Ave. The goal is to alleviate flooding via implementation of stormwater management practices.

Analysis

The hydraulic modeling software, PCSWMM, was used to evaluate existing and proposed stormwater conditions within the study area for the 10-year, 24-hour storm event (4.9 inches). It was found that the existing storm sewer system is undersized and unable to manage the full runoff volume from this event, subsequently resulting in overland flooding within roadways and adjacent properties.

Alternatives

The following alternatives were evaluated for their effectiveness in alleviating flooding within the most severe areas of Keswick:

1. **Upgrade Storm Sewer System -** Increase existing storm sewer pipe size
   - Too much land disturbance, including private properties
   - Reduces flooding locally, but transfers the issue further downstream
2. **Regional Stormwater Management -** Large Area Disconnection
   - Manages larger drainage areas than traditional GSI.
   - May be placed within large parcels away from Streets and Residential property.
3. **Green Stormwater Infrastructure (GSI) -** Along streets, within Right-of-Way (ROW)
   - Provides social, economic, and environmental benefits to residents.
4. **Combined Street GSI and Regional Stormwater Management**
   - Balance costs and benefits of Alternatives 2 and 3

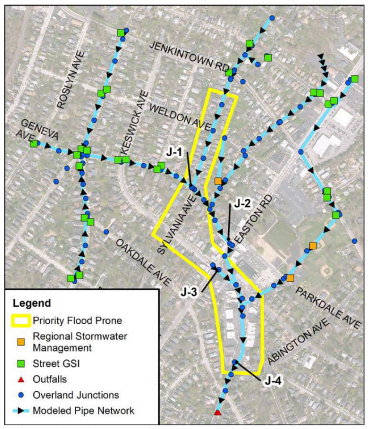


Figure 2: Proposed Alternatives

Results

Stormwater runoff volumes, maximum flooding depths, and flow rates associated with each of the alternatives at critical overland flow study points are presented below:

ID	Total Volume (MG)					Max Flooding Depth (ft)					Max Flow Rate (cfs)				
	Exist Cond.	Alt. 1	Alt. 2	Alt. 3	*Alt. 4*	Exist Cond.	Alt. 1	Alt. 2	Alt. 3	*Alt. 4*	Exist Cond.	Alt. 1	Alt. 2	Alt. 3	*Alt. 4*
J-1	2.21	0.36	2.11	0.76	*0.96*	1.0	0.3	1.0	0.7	*0.7*	124	9	123	37	*37*
J-2	5.51	0.77	3.24	2.58	*1.80*	1.8	0.5	1.8	1.4	*1.3*	235	24	212	104	*99*
J-3	3.28	0.96	2.04	0.90	*1.04*	1.0	0.3	1.0	0.4	*0.3*	207	25	177	33	*24*
J-4	4.39	0.86	1.77	1.09	*0.70*	1.1	0.6	0.9	0.7	*0.5*	231	28	145	45	*24*

Preferred Alternative

Based on results, Alternative 4, a combined installation of street GSI and regional stormwater management throughout the watershed, is preferred. Combining street GSI (approximately 30 locations) with three regional stormwater management reduces placing GSI in flooded prone areas while maximizing flood mitigation. A rough order of magnitude cost for Alternative 4 could be as much as $35,725,000[1,2] with a potential 20-year lifecycle cost of $2,100,000[2].

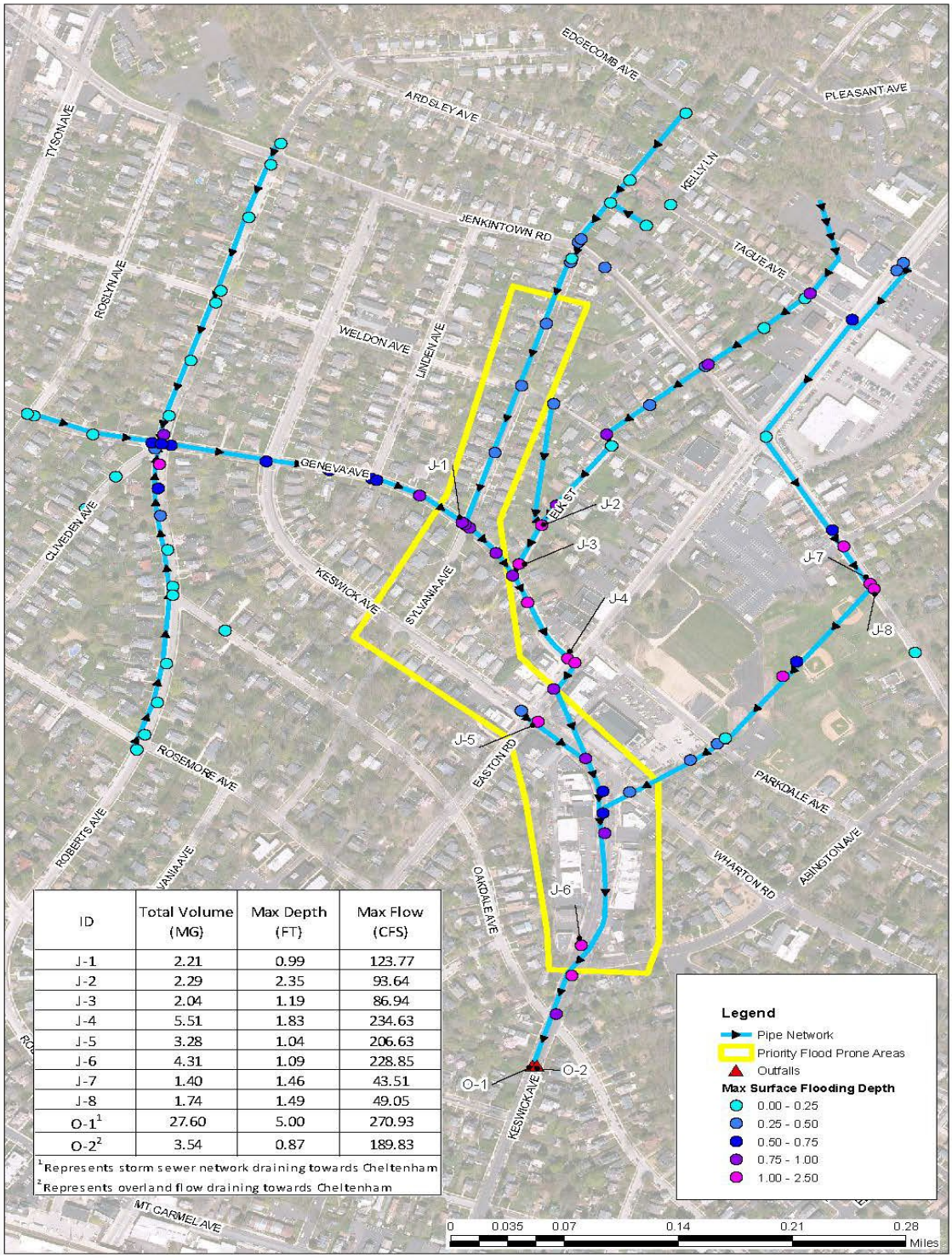
[1] Costing from local projects with use of proprietary storage devices in order to maximize storage and minimize footprint. These values can be optimized for cost and footprint in the planning and design process.

[2] All costing is present day value of money.

Flood-Prone Area Preferred Alternatives **January 2020**

Figure 3-4: Abington Township- Priority Flood-Prone Area #2 _Keswick

Existing Conditions



ID	Total Volume (MG)	Max Depth (FT)	Max Flow (CFS)
J-1	2.21	0.99	123.77
J-2	2.29	2.35	93.64
J-3	2.04	1.19	86.94
J-4	5.51	1.83	234.63
J-5	3.28	1.04	206.63
J-6	4.31	1.09	228.85
J-7	1.40	1.46	43.51
J-8	1.74	1.49	49.05
O-1[1]	27.60	5.00	270.93
O-2[2]	3.54	0.87	189.83

[1] Represents storm sewer network draining towards Cheltenham
[2] Represents overland flow draining towards Cheltenham

Figure 3-5: Abington Township- Priority Flood-Prone Area #2 _Keswick

Figure 3-6: ALTERNATIVE 4 – REGIONAL STORMWATER BASIN WITH GSI

4 PROGRAM CHALLENGES AND LEVEL OF SERVICE OPTIONS

4.1 REGULATORY REQUIREMENTS CHALLENGES INTO THE FUTURE

The mandates described herein are not the sole drivers for the increased focus on stormwater management but are the most impactful and relevant drivers. Although the mandates may appear to be burdensome, the Township has developed a plan to minimize the administrative costs by using existing financial resources, grants, and technical staff.

The mandates contributing to increased focus on stormwater management are listed below and summarized in Table 1. Some of the regulations are currently in place and others will affect the Township with the update of the Municipal Separate Storm Sewer System (MS4) Permit and Total Maximum Daily Load (TMDL) requirements.

1. TMDLs
2. National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System Individual (MS4) Permit
3. Pollution Reduction Plan (PRP)
4. Act 167: Stormwater Management Plan
5. Pollutant Control Measures (PCM)

Table 4-1: Summary of Stormwater Related Regulatory Mandates.

REGULATION	DESCRIPTION	LOCAL EFFECT
Total Maximum Daily Loads (TMDLs)	The Clean Water Act (CWA) requires that impaired waterways be regulated with pollution diets of the substance responsible for impairing the body of water. For stormwater management, the typical nitrogen, phosphorus, and sediment have been deemed as the primary culprits to declining water quality. Sources of pollution include run-off from urbanization, wastewater facilities, septic systems, and stormwater. The Township Wissahickon TMDL plan must address a 73% reduction in sedimentation from Sandy Run. In the initial plan this equates to removing 355,229.6 pounds of sediment annually (2003 data). In 2017, modeling was completed to evaluate the specific load reduction requirements and the reduction target was updated to 526,257 pounds per year of sediment and 882.45 pounds of nitrogen reduction per year. Phosphorus was included in the 2017 modeling, with a target reduction of 137.25 pounds per year. The 2017 modeling included an assessment of various BMPs for implementation to achieve the long-term targets to meet these load reductions.	Ensure compliance with TMDLs to meet sediment, nitrogen, and phosphorus targets for a 5-to-10-year period. Total estimated cost for compliance is $2,332,210 through grants and $1,297,250 through local match. The annual Township funding over 10 years is $129,725.
Municipal Separate Storm Sewer System (MS4) Permit	As precipitation runoff flows over impervious surfaces, it picks up chemicals, debris, sediment, and other pollutants that, left untreated, could harm local waterways. Municipalities are permitted when they convey their stormwater through separate storm sewer systems, which discharge runoff into local waterways. As part of the CWA, the NPDES Stormwater Program regulates stormwater discharge from municipal sources. Municipalities must obtain MS4 permits from the state regulatory agency to discharge stormwater and are required to reduce impacts through the prevention of potentially harmful pollutants from entering a MS4. MS4 permits are further divided by the size of community, identified as Phase I or Phase II. Phase I communities are medium and large cities or counties with a population of 100,000 or more (based on the 1990 census) that must obtain individual permits. Phase II communities are smaller communities in census delineated urbanized areas, based on the 2000 data, regulated by Phase II general permits when appropriate or by individual permits issued when specific water quality control measures are mandated, such as approved TMDLs. Abington holds an Individual MS4 Permit.	The Township will submit an MS4 Notice of Intent (NOI) for renewal of the individual permit which expires July 1, 2023**. The application for renewal is due January 1, 2023.** Permittees operating under the General MS4 Permit PAG-13 had their effective date extended by 24 months to 2025.

REGULATION	DESCRIPTION	LOCAL EFFECT
Pollution Reduction Plan (PRP)	The Pennsylvania MS4 Permit program requires a small MS4 that discharges into impaired waterways have a PRP. To meet the load allocations required by the TMDLs and locally impaired waters, the submitted PRP must include the implementation of BMPs to reduce nitrogen, phosphorous, and sediment (depending on the regulatory driver). The PRP connects the MS4 permit to the TMDL regulation, ensuring nutrient and sediment reduction from the urban sector.	The PRP sets the baseline of current contributions and establishes necessary reductions by way of various practices, BMP's, behavior changes, etc. The Township responsibility is to implement the PRP during the 5-year permit term.
Act 167: Stormwater Management Plan	Pennsylvania Act 167, known as the stormwater management plan, provides regulation for land and water for flood control and stormwater management purposes. The plan requires counties to prepare, update, and adopt plans for stormwater management. It also requires municipalities to amend or adopt stormwater management ordinances consistent with the plan. Implementation of a stormwater management plan under Act 167 helps municipalities meet their MS4 permit regulations, namely their Minimum Control Measures. Having a written plan is integral to a successful stormwater management program to fully comprehend the requirements of the MS4 permit and the steps necessary to achieve compliance.	The Township has in place an Ordinance which addresses the necessary controls and authorities to meet the requirements of the MS4 permit from new and redeveloped projects.
MS4 Pollutant Control Measures	Pollutant control measures (PCM) address reductions of pathogens and organic compounds identified in receiving streams within the Township.	In 2017 estimates were prepared to address the engineering costs for implementation of these measures. The Township plan set annual goals for PCM development for the period 2019-2022.

4.2 FLOOD EVENTS AND MITIGATION

Buyouts occurred in the early 2000s (initiated in 2003) involving 18 homes and at a cost estimate of $4 million to remove the properties from impacts of flooding conditions. Buyouts were funded by the Federal Emergency Management Agency (approved at $3 million) and the Township. Homes were located along a flood-prone area near Baeder Creek (approximately 70 feet from the creek along Wanamaker and Baeder Roads). No additional buyouts are programmed. Floodplain mapping is up to date, with the most recent FEMA mapping studies in the late 2000s. The flood mitigation study for priorities areas of Huntington Valley Shopping Center (HVSC) and Keswick neighborhood were completed in 2019 with alternative analyses identify options to reduce flood potential in these two areas of the Township. The remaining neighborhoods with routine or nuisance flooding histories are targets for future analysis and modeling. Completing such studies provides the Township with complete coverage and ability to prioritize investments that address flood abatement and mitigation. The HVSC and Keswick studies project over $40M to implement the Township preferred options. Each study included multiple options, varying by the degree of mitigation provided. In the Level of Service alternatives captured in Table D2 below, HVSC and Keswick mitigation investment alternatives are addressed in Section B.1 and D.1 within the Table.

4.3 PROGRAM LEVEL OF SERVICE (LOS) OPTIONS AND PRIORITIES

LOS Options: The following matrix provided in Table D2, provides a method for evaluation and prioritization of programs/services. Data includes current conditions, potential gaps, alternative strategies for different LOS for each program component, and notes potential cost factors to consider. LOS option categories are Basic, Medium, and High, with incremental changes in resources differentiating each level.

The Township operates at the Basic LOS and will continue for the immediate future. Conditions may prevail over the next decade that will require a change in the LOS for a specific target. The LOS matrix and this report is a starting point, and the Township should review periodically to determine if a specific focus area needs an adjustment in resources and identify the effort to meet community needs and expectations. Table D-5 documents the projected 10-year cost of operation based on the Basic LOS strategies along with the implementation of the neighborhood studies for flood mitigation in Keswick and Huntington Valley Shopping Center areas.

Green Stormwater Infrastructure: The analysis of neighborhood flood mitigation strategies focuses on the use of Green Stormwater Infrastructure (GSI) with specific benefits recognized within engineering practices. These benefits are defined by environmental, economic, and social terms.

Figure 4-1: GIS Benefits

It is important to note that the history of GSI engineered solutions is limited. Through early experience of implementation, a few key principles have been established for their use. These focus on long-term GSI functionality.

1. Experience in design, tailored to the climate and operational location is critical to ensure achievement of desired outcomes.
2. Maintenance of GSI systems may be more intense than the traditional “gray” infrastructure practices.
3. Expected life of GSI is less than traditional “gray” infrastructure; however, an effective, implemented maintenance program complements extending the performance of GSI.
4. Installation of GSI systems requires experienced construction teams as well as frequent inspection during construction, often best performed by the design engineer of record to ensure materials, vegetation, and sequencing of installation is performed as planned.
5. On-going inspection during the first year of operation may be determine if the GSI is meeting performance expectations, with targeted inspection after major weather events.

The USEPA website provides an excellent summary of best practices for the design and implementation of GSI. https://www.epa.gov/green-infrastructure/green-infrastructure-design-and-implementation Their website on Build Green Infrastructure also provides guidance on topics of operation and maintenance as well as opportunities for funding GSI. https://www.epa.gov/green-infrastructure/green-infrastructure-operations-and-maintenance.

The LOS Matrix provides an opportunity to review options to develop a long-range forecast and program plan for a 10-year period. The key areas of service are those that typically comprise a comprehensive management strategy for a stormwater system. The three LOS identify building blocks for a future program but are not tied to a specific timeframe. A future program for one service can remain at a Basic level while others reach a Medium or High LOS for the 10-year goal. If the operating at a Basic LOS today but there is a recognized need in the future to achieve a Medium or High LOS over the next ten years, the Future Program provides a LOS and investment and methods to achieve it. **The Basic LOS is highlighted in "yellow" to indicate that the Township targets the Basic LOS for the immediate future.**

Table 4-2: Level of Service Matrix – Basic LOS with Options for Change

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
A. ASSET MANAGEMENT - System Inspections and Investment Strategies					
System assets are tracked through historical paper documents with an asset management system under development to convert CADD-based files into GIS layers with related data to track system conditions and features. The IT Department is in the lead for setting up the asset inventory in GIS. The Township is making progress in this effort at approx. 50% completion to date, with anticipated completion by the end of year 2022. The goal is to have a desktop version providing staff with ready access to key system data. It has been a challenge to dedicate sufficient staff time to completion of the inventory.	Services provided by the Township should be based on an assessment of actual need and be provided as efficiently as possible.	Age of system does not warrant investment in equipment or staff additions to maintain an in-house inspection program. Assumes in the Medium LOS the Township will complete a one-time underground system assessment to capture pipe network conditions and classify to determine priority replacement/repairs. Assumes in the High LOS the Township will maintain a contract for continued system inspection to assess condition of the underground network.	Continue to build the GIS database for documentation of the system components, capturing where available data on age, design, type of pipe, repairs, etc. Update database with inspection information when completed. Use GIS-based data to prioritize maintenance.	Complete a one-time assessment, by contract, for the underground pipe and inlet components. Capture updates or additional attributes of system components. Assign condition using rating scale for underground pipe network.	(1) Maintain plan for annual updates to the pipe network. Contract underground inspection by CCTV with the target of 1/3 of the system completed each year. (2) Prioritize repeat inspections based on rating scale in initial completion of the system, returning to locations where the components are rated fair or poor.

Table 4-2: Level of Service Matrix – Basic LOS with Options for Change

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
System assets are tracked through historical paper documents with an asset management system under development to convert CADD-based files into GIS layers with related data to track system conditions and features. The IT Department is in the lead for setting up the asset inventory in GIS. The Township is making progress in this effort at approx. 50% completion to date, with anticipated completion by the end of year 2022. The goal is to have a desktop version providing staff with ready access to key system data. It has been a challenge to dedicate sufficient staff time to completion of the inventory.	Services provided by the Township should be based on an assessment of actual need and be provided as efficiently as possible. Services provided by the Township should be based on an assessment of actual need and be provided as efficiently as possible.	Assumes that 1-2% of the pipe will be found to require repair (sediment removal, lining, etc.) and other sections will require more costly actual replacement. Pipe replacement would be part of the capital improvement priority list and repairs/rehabilitation would be managed using on-call contracted services when Township staff cannot address the issue identified.	Assume two to five blockages a year for the repair program.	Increase annual funding to achieve the goal of underground system inspection and condition assessment by contract, during the period November through March. Assume two to five blockages a year for the repair program.	Evaluate the option to transfer equipment from Wastewater operations for in-house inspection of the pipe network when programming replacement of CCTV equipment in wastewater. If in-house underground system inspection (CCTV) is not an option, increase budget for Public Works to maintain contract for ongoing system inspection program. Assume two to five blockages a year for the repair program.
		It is estimated that the average cost of in-place repair would be $400,000 per mile (includes pipe lining option) and actual replacement would average closer to $1M per mile. Project management and field inspection time will also need to be budgeted to oversee these services if contracted.	Using the inspection data, establish a dedicated maintenance budget for the inspection program and increase resources for maintenance and operation based on the data capture for the overall drainage network.	The expected outcome is that the 100% inspection goal will be achieved within five years and the majority of identified repairs will be dealt with annually, minimizing delays and performing work more efficiently. See recommendation in System Maintenance to achieve repair/rehab workload.	The expected outcome is that the 100% inspection goal will be achieved in three years and the majority of identified repairs will be dealt with annually and priority replacements will be funded by dedicated revenue. Inspections will continue to address 1/3 of the system target, adjusted based on initial implementation.

Table 4-2: Level of Service Matrix – Basic LOS with Options for Change

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
System assets are tracked through historical paper documents with an asset management system under development to convert CADD-based files into GIS layers with related data to track system conditions and features. The IT Department is in the lead for setting up the asset inventory in GIS. The Township is making progress in this effort at approx. 50% completion to date, with anticipated completion by the end of year 2022. The goal is to have a desktop version providing staff with ready access to key system data. It has been a challenge to dedicate sufficient staff time to completion of the inventory.	Services provided by the Township should be based on an assessment of actual need and be provided as efficiently as possible. Services provided by the Township should be based on an assessment of actual need and be provided as efficiently as possible.	The Township will need to determine whether the assumption of % to be repaired is valid after the first few years and whether additional resources may be necessary.			Based on annual inspection findings, identify and fund one major replacement project per year (up to $1,000,000 for total pipe replacement).

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
B. STORMWATER PLANNING AND ENGINEERING					
B.1. Implement Master Plan for HVSC and Keswick Neighborhoods: There is no budget to specifically fund the projects. Capital projects have been identified in the flood mitigation study for the HVSC and Keswick neighborhoods and are part of the development of a 10-year Future Program for investments. The overall prioritization will address flood reduction in key priority areas. It is important that the other flood-prone areas be evaluated for a complete Master Plan Township-wide. Funding for the PRP and TMDL BMPs is important to ensure effective compliance with the MS4 permit.	The stormwater program plan should be coordinated with on-going planning and growth initiatives and should include public participation as a fundamental component.	Assumes existing staff will manage and address stormwater infrastructure needs including public outreach and partnerships. Funding will be accounted for in the Township's Operating and Capital budgets once a project has been identified. Partnerships and grant applications will be sought to minimize impact of project cost to Township. Total estimated project value for these two areas: $43M, with $2.6M 20-year lifecycle maintenance cost.	Priority flooding areas continues to be addressed by existing staff, with emphasis on land developments or redevelopments to include stormwater management and mitigation. A $1.72M in new projects annually will be required based on a dedicated revenue for stormwater study implementation, with the HVSCS and Keswick projects completed over a 25-year period.	A $2.9M in new projects annually will be required based on a dedicated revenue to design and contract construction of priority projects with the HVSC and Keswick projects completed over 15-year period.	A $4.3M in new projects annually will be required based on a dedicated revenue to design and contract construction of priority projects with the HVSC and Keswick projects completed over 10-year period.

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
B. STORMWATER PLANNING AND ENGINEERING					
B.2. Increase resources for engineering analysis for additional watershed modeling. To develop a Master Plan for stormwater system improvements, modeling should be completed for all watersheds within the Township. This will provide an overall strategy for long-term improvements to sustain the stormwater system and minimize flooding while improving overall water quality.	The Township is actively seeking to move from reactive management of stormwater system components to a proactive approach.	Assumes existing staff will manage and address stormwater modeling efforts. Funding will be accounted for in the Township's Operating and Capital budgets as needed.	Prioritize watershed for analysis and sequence for additional study. Existing staff time will be allocated to perform this task.	Evaluate the impact of implementation of an asset management program for stormwater and determine if additional staff support is needed for engineering as well as public works maintenance services. As additional neighborhood/regional subbasin watershed studies are completed, increase prioritization plan funding for capital projects. Amend long-range plan for system improvements to address new information obtained through additional studies.	Hire full-time stormwater engineer to review, compile, prioritize, and plan project implementation in coordination with other Township capital projects. Additional staff to oversee outsourced design, project review, and construction inspection. Add a full-time stormwater inspector to review and approve properly installed and maintained stormwater infrastructure. Estimated cost $80,000 per year.

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
B. STORMWATER PLANNING AND ENGINEERING					
B.3 Ensure compliance with TMDLs to meet sediment, nitrogen, and phosphorus targets for a 5-to-10-year period. Total estimated cost for compliance is $2,332,210 through grants and $1,297,250 through local match. The annual Township funding over 10 years is $129,725.	Update of development requirements that allow for and encourage low impact development (LID) and green stormwater infrastructure (GSI) BMPs, as key component to reducing long-term financial and operational burden for public drainage system.	Assumes the goal will be to integrate recommendations and findings on LID and GI strategies from various Township studies into a set of policies or standards that provide specific directives on the selection, installation, and maintenance approaches for new and re-development projects. Assumes incentives and other methods of promotion will be considered.	Using existing staff time, develop and implement GI policies that support using GI as a preferred method of stormwater management. Adopt these policies as part of the required stormwater/drainage design standards. Initiate amendments to the development code to encourage and promote LID and GI.	Using existing staff time, develop and implement policies that support using GSI as a preferred method of stormwater management and engage an advisory committee of interested engineers, developers, and residents to provide input on the plan. Cost for advisory committee: $10,000 Review development code as well, to establish appropriate incentives for use of LID and GI.	Hire a consultant to develop, obtain public feedback, and make recommendations on development code and standards for green infrastructure use. Estimated cost: $75,000.

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
B. STORMWATER PLANNING AND ENGINEERING					
B.4 *Compliance Strategies for Pollutant Control Measures:* Pollutant control measures (PCM) address reductions of pathogens and organic compounds identified in receiving streams within the Township. In 2017 cost estimates were prepared to address the engineering costs for implementation of these measures. The total cost estimate from the 2017 analysis is $45,000, to be funded by the Township. These include Pathogens and Priority Organic Compounds. The Township plan set annual goals for PCM development for the period 2019-2022.	Permit compliance is a key goal for the stormwater program and integrated into the overall Township strategy for stormwater management.	Assumes financial projection from 2017 is valid and budgeted (annual total of $65,000). Assumes the strategy actions identified in the permit compliance plan submitted by the Township are adequate and achieved. Plan approved by the State through the issuance of a renewed permit in 2018.	Implement the Plan to address PCM measures meeting the following deadlines: Mapping - Sept 2019 Inventory - Sept 2020 Investigation - Sept 2022 Enforcement - Sept 2022	Same as Basic LOS	Same as Basic LOS

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
C. STORMWATER OPERATION AND MAINTENANCE					
C.1. *Increase resources to allow more proactive stormwater system maintenance*: Stormwater maintenance activities are performed by existing staff. As noted, maintenance repair activities tend to be performed reactively depending on the availability of resources. This is often due to the need to respond to resident complaints, pre-storm preventative maintenance, or clean up from neighborhood flood events. Drainage problems can be identified by customers, field crews, and/or through historical documentation of known problem areas. Action is typically triggered by a problem identified within the system or street. Stream blockages and sinkholes are addressed to reduce potential for flooding. Based on recent MS4 permit annual reports, approximately 20 repairs/cleanings are completed each month including debris removal from trash racks, inlets, and outfalls. Staff must balance workload between stormwater management and other public works operations. Two primary municipal facilities are maintained, and these include stormwater inlets at the trash transfer station which are equipped with filters to catch debris and oil runoff from trucks.	The Township is actively seeking to move from reactive management of stormwater system components to a proactive, priority-based asset management program, using Asset Management data collected and maintained on system components.	Delayed maintenance tends to result in more emergency response and increased costs. Proactive maintenance can add longevity to existing resources and maximize the useful life of assets. It is assumed that a full maintenance crew would include a supervisor and two laborers. Based on completion of the asset management data on stormwater, evaluate the need for additional resources to address ongoing system maintenance needs. As capital programs are adopted and implemented, evaluate the staffing/resource impacts for expanded public system components. Sinkholes are identified by the Streets crews and repairs are completed when located in or near the street. If a project exceeds the capacity of the Streets operation, Engineering takes responsibility for design and construction of a permanent solution.	Maintain current resources for public works for current LOS on pipe cleaning, inspection and inlet grate cleaning and repairs. Program resources for equipment replacement on basis of Township policy. Document through work orders the cost of operation and evaluate potential impact of demand for service as watershed plans are implement, expanding the public drainage network and facilities.	Add one field crew in Public Works to address in-house culvert, pond, GSI, and waterway maintenance. The new crew would be utilized by Public Works for all services but with a priority on stormwater management, depending on funding source.	Based on inspection and condition assessment, add additional crew for Public Works, dedicated to stormwater maintenance operations to address priority repair and maintain current system proactively. ($120,000 crew; backhoe, dump truck, gradeall as needed).

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
C. STORMWATER OPERATION AND MAINTENANCE					
C.2. *Increase annual system maintenance investment:* The current replacement value of the Township's stormwater infrastructure is in the range of $80M and $120M. Having made this significant investment, the Township needs to support a program that will extend the life and effectively manage the operation of these assets. Depending on the utilized guideline, the Township should consider investing $2 M to $6M per year in system O&M and capital improvements. Additional resources should be carefully considered to address a change in level of service for GI facilities constructed to address flood mitigation. It is understood that green stormwater solutions require more frequent inspection and specific maintenance practices to ensure efficiencies are gained to mitigate flooding and improve water quality.	Program funding should be tied to level of service and sustainable financial program goals.	Assumes currently expended resources for stormwater O&M does not provide a level of service (LOS) to sustain the investment in GI facilities and will require additional effort. The goal would be to increase the LOS over the next several years, focusing on the highest priority needs, to be proactive in systemwide maintenance and rehabilitation as number of public facilities increase. This item would be in addition to the investment in system repairs being done as a follow on to the system condition inspection (Asset Management above) and assumes a combination of contracted and in-house services. Implementation of pipe lining to extend operational life is one tool to consider, as the condition assessment is complete. Usable life of the underground and above ground drainage system components is extended by lining and rehabilitation investments.	Increase the annual budget, over time, for system replacements, upgrades, cleaning, etc. and to maintain improvements based on watershed studies that identify solutions to mitigate local flood conditions.	Ensure maintenance needs are met by an increase budget 10% each year for the next 10 years and then review updated maintenance program and adjust accordingly. This is in concert with other LOS under Asset Management, Engineering, and Capital Improvements.	To address ongoing maintenance needs and address increase demand based on additions to the public system inventory and feedback from the ongoing inspection program, increase budget 10% for one year and then add additional $100,000 each year for the next 10 years dedicated to maintenance.

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
C. STORMWATER OPERATION AND MAINTENANCE					
C.3 *Pond/Basin Maintenance*: Stormwater management ponds require regular monitoring and cleaning to insure they are functioning properly. Currently the maintenance program for stormwater management facilities (ponds) can be described as routine. Dedicating additional resources to-increase inspections and maintenance may assist in mitigation of localized flooding. Retention basins are routinely mowed by the Parks Department along with the cemetery retention basin and maintenance of a rain garden within the park system.	The Township should establish a goal to move from routine management of stormwater system components to an increased, priority-based asset management program.	Trash traps are in three basins and at 38 outfalls, all maintained by the Public Works Department. Assumes pond upgrades/retrofits are part of the flood mitigation toolbox and included in long-range mitigation planning.	Continue inspection at current level of service with the goal of evaluating each pond/basin as part of the asset inspection program. Assign a priority based on monitoring and inspection and maintain (including dredging to remove sediment buildup). Inspection program can inform sediment buildup projections as well as assist in targeting material buildup in the receiving pipe or stream network.	Formalize pond/basin monitoring and inspection program with the goal of evaluating each pond as part of the asset inspection program and identify priority issues. Maintain pond/basin to design standard. Establish routine cleaning/maintenance of basin assets (risers, dams, outlets, inlets).	Establish a pond monitoring and inspection program with the goal of evaluating each pond on a three-year cycle. Assign a priority based on monitoring and inspection and maintain (including dredging). Monitoring program can inform sediment buildup projections as well as assist in targeting buildup in the receiving pipe or stream network.

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
C. STORMWATER OPERATION AND MAINTENANCE					
C.4 *Street Sweeping:* Street sweeping is provided with a level of service to ensure that all streets in the Township are swept at least once a year. The Township operates 2 sweepers and 1 vac truck in Public Works which is shared between street maintenance and stormwater services. Removing leaves from the curb is an important water quality protection strategy and the Township utilizes 10 trucks and 30 FTEs during leaf removal season. The leaf collection program is curbside for loose leaves during the fall. Year round the Township will pick up bagged leaves and yard waste to keep this green waste from the stormwater system.	Sustaining the environmental condition of the natural systems is a key benefit of the sweeping program. In addition, the leaf removal and sweeping programs contribute to reduction of blockages in the pipe network as well as sediment deposition in receiving bodies of water.	It is assumed that a backup unit will be established when one of the two existing sweepers is replaced. Optimal operation is a dedicated sweeping program crew in Public Works. During non-sweeping period of the year, a dedicated crew supports other Public Works operations including the drainage system inspection program.	Continue current level of service with the addition of a backup unit when current sweeper is replaced.	Same level of service as Basic unless sediment buildup is identified as a priority for stream and underground system maintenance. If a change in level of service is identified and warranted, dedicate a team to raise the level of service to twice a year street sweeping with priority areas targeted for more frequent coverage.	Same as Medium.

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
C. STORMWATER OPERATION AND MAINTENANCE					
C.5 *Sediment and Erosion Control:* Construction sites are inspected by the Engineering staff, following Pennsylvania standards. The Building Inspector will provide sediment and erosion inspections for smaller projects such as a single lot home project. For land development projects, inspections are handled by the Township Engineer's office to ensure compliance with the NPDES permit requirements. It is the developer or applicant that is held responsible for ensuring erosion and sediment control measures comply with DEP regulations. If an inspection identifies an issue, the developer or applicant is required to address the problem. Maintenance of erosion control practices installed during construction has been identified as a problem especially during heavy rain events. The Township inspects known problem sites and follows up when complaints of off-site sediment flows occur. There are less than five development projects underway at any time with up to 20 infill projects implemented during the same period. Engineering completes reviews for infill projects, and they are not classified as land development.	Township inspections continue to include the control of sediment/erosion management for systems installed during construction, with ultimate responsibility by the developer/permittee.	Review of the erosion control plans for construction projects involves a site walk with the installation company to ensure that the plan is fully implemented. The inspection process should be communicated to the site superintendent for construction. A copy of the E&S Plan approved for the site must be on site at all times. Township staff should be trained in E&S standards and techniques. All site inspections should be documented and signed off by the inspector and site superintendent. Documentation should be entered into the GIS database for continued tracking during construction. Sites with violations should be reinspected within two working days of citation to ensure that corrective actions have been taken.	Maintain current resources for Engineering oversight of the E&S Inspections. Use digital tools to provide onsite information for the E&S Plan, form for inspection, downloading to workorder system and GIS database upon return to the office to efficiently conduct inspection.	Maintain Basic level of service with use of digital tools to provide onsite information for the E&S Plan, form for inspection, downloading to workorder system and GIS database upon return to the office to efficiently conduct inspection. If number of sites active at one time exceeds effective inspection and oversight, have a backup contract in place for third party inspections. Enforcement is maintained by the Township. Third-party contractor will complete inspection, E&S Plan review with site superintendent and submit digital report to the Township.	Same as Medium.

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
D. CAPITAL IMPROVEMENTS					
D.1. *Annual Stormwater Capital Investment:* As existing infrastructure assets age, the need for additional investment in capital improvements increases. The findings from the modeling analysis of the HVSC and Keswick neighborhoods demonstrates the need for significant investment in flood mitigation. The identified cost to implement these two recommended strategies exceeds $40 M. Analysis to mitigate flooding in other priority areas is likely to grow the investment needs. In addition to proactive targeting for mitigation of excessive quantity, additional investments are needed to address regulatory mandates for water quality. Various BMPs are in the planning stage and will require adequate funding.	Program funding should be tied to level of service and sustainable financial program goals.	Assumes that as part of the existing annual budget process, the highest priority projects will be scheduled first and funding strategy will include grant funding for project such as those identified in the Asset Management setting an annual level of investment target, the Township has the flexibility to adjust the priority list annually to ensure the most efficient and effective spending of funds.	Continue to dedicate about 50% to 55% of the total Engineering budget to address stormwater issues.	Dedicate $4M annually to address watershed analysis plans for mitigation of flood conditions, address water quality mandates, addressing all areas over a 25-year period. ($2.4 M addresses Keswick and HVSC implementation. An additional $1.1M targets new flood mitigation projects identified in other area/neighborhood studies).	Dedicate $7M annually to address watershed analysis plans for mitigation of flood conditions, address water quality mandates, addressing all areas over a 10-year period. ($4.3 M addresses Keswick and HVSC implementation. An additional $2.7M targets new flood mitigation projects identified in other area/neighborhood studies).

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
D. CAPITAL IMPROVEMENTS					
D.2. Stormwater capital program coordinator: To address capital improvements at an increased pace, the Township will need a balance of dedicated staff, supportive stakeholders, and available capital funding. The stormwater program plan will need to be integrated with other infrastructure projects to ensure efficiency and to maximize sharing of resources with other projects whether that be new development, transportation improvements, or regional cooperative efforts. To lead this integrated effort, a stormwater coordinator needs to be identified and given the responsibility to recommend the best approach to address the capital backlog in a fiscally responsible manner.	The stormwater program plan should be coordinated with on-going planning and growth initiatives to identify efficiencies and should include public participation as a fundamental component.	Assumes that existing staff will continue to provide current services and that a new or revised position will be needed to serve as a full-time coordinator as this program grows. Estimated cost for a program manager position, including all benefits, is $90,000 per year. This position would be directly accountable to the PW Director or Engineering Director.	Continue to use an internal group of existing staff to coordinate and manage the growth and integration of the stormwater program based on an adopted implementation plan for projects and maintenance.	Assign a full-time stormwater coordinator to manage an integrated stormwater capital program. The coordinator will also be responsible for ensuring there are meaningful public participation opportunities. Estimated cost $90,000	Same as Medium LOS.
D.3. *Regulatory BMP Planning and Implementation:* BMP projects approved by the PADEP for MS4 permit compliance documented in the Township Pollution Reduction Plan (PRP) are to be constructed during the five-year permit period (May 2018-May 2023). Currently filter boxes for Robinhood Brook at Sharpless Road, Rockledge Branch Ave, and Terwood Run at Davidson Road are planned but not yet funded. Once final designs are completed the projects will be added to the Capital Program and handled in-house.	Permit compliance is a key goal for the stormwater program and integrated into the overall Township strategy for stormwater management.	Funding will be identified and PRP projects will be handled in-house for construction. Projects will be completed to meet permit mandates.	Complete design and implementation of the mandated PRP projects, estimated costs of $252,230. Projects will be incorporated into the Township CIP to schedule and adopt within the budget.	Same as Basic LOS	Same as Basic LOS

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
E. STORMWATER PROGRAM ADMINISTRATION					
E.1. Stormwater Financial Administration: There is no dedicated administrative and budget tracking structure across departments for the Township's stormwater management program. The need for increased financial coordination will become more acute as stormwater issues become increasingly complex and are assigned a higher budgetary priority. This will be especially true if the Township moves to a dedicated stormwater user fee. A fee will also require management of a billing database and tracking of fee expenditures if a stormwater fee is adopted.	The program should be realistic and achievable and establish clear lines of accountability and decision making.	Assumes that the funding methodology for stormwater services will change and the need to track specific stormwater expenditures and activities will be required.	Use existing staff from operating and financial departments to track and report on revenue needs and expenditures. This may require a change of reporting and training on consistent reporting procedures depending on the capital and operations programs adopted over the next decade. If additional software or programming is necessary to track stormwater management costs, an estimated annual cost for software and training is $25,000.	Assign a part-time (24 hours/week) stormwater management program and financial administrator to track, manage, and report on all stormwater financial issues. Estimated cost $45,000 per year.	Assign a full-time stormwater financial administrator to track, manage, and report on all stormwater program and financial issues. Estimated cost $75,000 per year.

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
E. STORMWATER PROGRAM ADMINISTRATION					
E.2. *Customer Contacts and Requests for Assistance:* Tracking problem notifications and requests for service in a deliberate manner, documenting the location, details of the issue, and disposition provides an historical perspective on stormwater concerns across Abington. Incorporating contacts into all areas of service, across all operations, can provide a broad understanding of the needs and concerns individuals and businesses may have and expect their local agency to address. Responsibility may not rest with the Township to resolve all items noted but understanding the needs and actions that can be taken, serves to make operations more efficient as well as provide insight into communication strategies with the public served.	The stormwater program outreach and customer contacts with requests for assistance can be documented as part of the asset management approach, providing valuable insight to issues and problem areas throughout the Township.	Assumes establishing a Townshipwide strategy for documentation of customer calls and contacts. Most effective methodology is to use a computer-based system to identify contact, point of contact, summary of issue, referral process, and follow-up actions.	Evaluate options for coordinated customer contact documentation. Integrate into GIS asset database for easy geo-reference. Document routing, follow-up actions along with a summary of the issue, contact information, and date received/closed. Develop cost estimate to implement, schedule and funding source. Implement over next fiscal year.	Same as Basic with annual reporting for Administration.	Same as Basic with annual reporting for Administration.

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
E. STORMWATER PROGRAM ADMINISTRATION					
E.3. *Partnership Documentation for MS4 Permit Compliance:* The NPDES MS4 permit structure allows permittees to partner with other agencies, community groups, and other MS4 permittees to carry out the MCMs required. To minimize risk to the Township, development of partnership agreements with those organizations who support and carry out compliance activities is important. Executed agreements set forth the terms of the programmatic activities that support permit compliance and define the responsibilities of each agency/organization. Should a third-party choose to end their role, the Township must pick up the activity to ensure continued compliance.	Ensure Township compliance with all permit mandates for the NPDES Small MS4 individual permit, terms, and conditions.	Assumes the Township will continue with the partnership agencies (or additional partners) to complete compliance best practices under the MS4 NPDES permit terms. Partnership agreements set forth the terms and conditions along with roles and responsibilities for each partner in providing best practices that meet permit terms and conditions.	Identify all partnerships that are reported to PADEP for compliance with the permit. Prepare and execute interlocal or partnership agreements that set forth the commitment of each party to provide services that meet the best practices identified in the individual NPDES MS4 permit issued to the Township.	Same as Basic with annual reporting for Administration.	Same as Basic with annual reporting for Administration.

PROGRAM GAP OR NEED	ASSOCIATED OBJECTIVE	ASSUMPTIONS AND NOTES	LEVEL OF SERVICE OPTIONS		
			BASIC	MEDIUM	HIGH
E. STORMWATER PROGRAM ADMINISTRATION					
E.4 Funding Strategy for Operations and Capital Program: The Township has a history of success in obtaining grants as well as approving use of debt to address major improvements in stormwater system components. Periodic issuance of debt has provided the Township with critical resources when major infrastructure investment is warranted. The Township has been successful in partnering with FEMA and the USACE when qualified projects are needed. Continued effort to receive such financial support is an important tool. As Asset Management data is gathered over time, need for increasing investments in stormwater infrastructure should be expected. A stable funding source such as a dedicated property tax or a user fee to fund on-going services should be considered.	Program funding should be tied to level of service and sustainable financial program goals.	Assumes resource demand to sustain ongoing services will exceed forecast capacity of the General Fund. Short-term needs for stormwater system operation and capital investment does not warrant an immediate change in the funding methodology. Assumes, based on capital project implementation, within three to five years, the Township need for dedicated funding will be recognized and actions taken to identify the appropriate means.	Within 5 years, a dedicated funding source will be evaluated and adopted to support all areas of stormwater management.	Within three years, a dedicated funding source will be evaluated and adopted to support all areas of stormwater management.	Same as Medium LOS

4.4 FUTURE PROGRAM – FORECAST FOR 10-YEAR PROGRAM PERIOD

A cost analysis was completed for the Basic LOS described in Table D2. The cost model uses the following financial factors for projection of personnel and general operating costs (direct consumable expenses, non-capital).

1. Personnel costs for the 10-year forecast are based on the current cost of service documented above, with engineering staff focused 50% of the year on stormwater services and field operations personnel focused 18% of the year on stormwater system maintenance.
2. Personnel salary and wages are adjusted annually by 3%.
3. Direct expenses are based on the FY22 annual budget for Engineering and Public Works, with an annual adjustment of 3% over the 10-year analysis period. Fifty percent (50%) of the Engineering direct expenses are dedicated to stormwater while 18% of Public Works direct expenses are dedicated to stormwater operations.
4. FY22 Capital projects for compliance with the Township MS4 permit PRP implementation are assumed to be constructed and completed in calendar year 2022. The Grove Park US Army Corps of Engineers project, with a local match of $1,212,500 is assumed to be completed in 2022 with no additional capital costs for the Township.
5. MS4 permit compliance is a capital project line item and the Township will budget from year to year, with a baseline cost of $65,000 (FY22) escalated by five percent (5%) annually in anticipation of increased requirements of a renewed Individual MS4 permit.
6. Compliance with the PCP requirements for pathogens and priority organic compounds will continue through the 10-year analysis period to address the TMDL mandates to reduce or eliminate such contamination. The cost annually is set on a year-to-year basis.
7. Mitigation of flooding in the Keswick and Huntington Valley neighborhoods will be initiated as funding is identified, with initial detailed analysis and preliminary design for projects identified in the two study areas (see Appendix A for the summary plans) as the first priority. Implementation includes cost for planning, design and permitting along with construction costs for each area. Full implementation of the preferred solutions for each area may be completed over a 15-year period, based on final funding and scheduling process.
8. Tables D5 through D8 provide details for each of the cost centers in the 10-year forecast.

Keswick: Total Project Estimated Cost for planning/design/permitting for the preferred option is $3,969,000. Annualized costs over a 15-year implementation period for planning/design/permitting is $264,600 in current year dollars. Total Estimated Project Cost for Construction for the preferred option is $31,749,000. Annualized cost for construction over the 15-year implementation period is $3,969,000 in current year dollars.

Huntingdon Valley: Total Project Estimated Cost for planning/design/permitting for the preferred option is $721,695. Annualized costs over a 15-year implementation period for planning/design/permitting is estimated at $48,113 in current year dollars. Total Estimated Project Cost for Construction for the preferred option is $5,760,000. Annualized costs for construction over the 15-year implementation period is $384,670 in current year dollars.

TABLE 4-3: ABINGTON 10-YEAR COST OF SERVICE SUMMARY TABLE

Cost Center	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
Personnel Costs	$ 566,954	$ 583,963	$ 601,482	$ 619,526	$ 638,112	$ 657,255	$ 676,973	$ 697,282	$ 718,200	$ 739,747
Direct Costs	$ 663,780	$ 683,291	$ 703,388	$ 724,087	$ 745,407	$ 767,367	$ 789,985	$ 813,282	$ 837,278	$ 861,994
Capital Costs	$ 1,211,919	$ 430,738	$ 2,969,153	$ 2,972,736	$ 2,976,498	$ 2,980,448	$ 2,984,596	$ 2,988,952	$ 2,993,525	$ 2,998,326
Total Costs	$ 2,442,653	$ 1,697,992	$ 4,274,022	$ 4,316,348	$ 4,360,017	$ 4,405,070	$ 4,451,554	$ 4,499,516	$ 4,549,003	$ 4,600,067

Table 4-4: 10-Year Forecast of Personnel Costs

STAFF POSITIONS	PERCENT OF TIME DEDICATED TO STORMWATER	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
Part Time Employees (no benefits)	50%	$ 5,300	$ 5,459	$ 5,623	$ 5,791	$ 5,965	$ 6,144	$ 6,328	$ 6,518	$ 6,714	$ 6,915
Salaries	50%	$ 161,511	$ 166,356	$ 171,346	$ 176,487	$ 181,781	$ 187,235	$ 192,852	$ 198,638	$ 204,597	$ 210,735
Wages Hourly	18%	$ 266,957	$ 274,966	$ 283,215	$ 291,712	$ 300,463	$ 309,477	$ 318,761	$ 328,324	$ 338,174	$ 348,319
Salaries	18%	$ 98,902	$ 101,869	$ 104,925	$ 108,072	$ 111,315	$ 114,654	$ 118,094	$ 121,636	$ 125,286	$ 129,044
Part Time Employees (no benefits)	18%	$ 25,465	$ 26,229	$ 27,015	$ 27,826	$ 28,661	$ 29,520	$ 30,406	$ 31,318	$ 32,258	$ 33,226
Overtime	18%	$8,820	$ 9,085	$ 9,357	$ 9,638	$ 9,927	$ 10,225	$ 10,532	$ 10,847	$ 11,173	$ 11,508
	Totals	$ 566,954	$ 583,963	$ 601,482	$ 619,526	$ 638,112	$ 657,255	$ 676,973	$ 697,282	$ 718,200	$ 739,747

NOTE: Personnel salaries are escalated at 3% annually. Benefits are captured under Direct Costs.

Table 4-5: 10-Year Forecast of Capital Costs

Program Areas	Specific Activity	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
Infrastructure Operations and Maintenance	Grove Park Grant Project (Match for USACE project) (PRP/TMDL Project)	$637,500									
Infrastructure Operations and Maintenance	Grant Matching Funds (8 projects)	$464,419									
Infrastructure Operations and Maintenance	Meadowbrook Streambank Stabilization (MS4) Bird Sanctuary										
Infrastructure Operations and Maintenance	Meadowbrook Streambank Stabilization										
Compliance and Enforcement	Pennypack Creek Wyndmoor LA Basin										
Compliance and Enforcement	Robinhood Brook Sharpless Rd Filter Box										
Compliance and Enforcement	Rockledge Branch Rockledge Ave Filter Box										
Compliance and Enforcement	Terwood Run Davidson Rd Filter Box										
Compliance and Enforcement	TTF Alverthorpe Subsurface Basin										

Program Areas	Specific Activity	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
Infrastructure Operations and Maintenance	Meadowbrook Streambank Stabilization										
Compliance and Enforcement	MS4 Requirements	$65,000	$68,250	$71,663	$75,246	$79,008	$82,958	$87,106	$91,462	$96,035	$100,836
Infrastructure Operations and Maintenance	Flood Mitigation - Keswick Neighborhood - Design/Construction (15yr)		$264,600	$2,381,270	$2,381,270	$2,381,270	$2,381,270	$2,381,270	$2,381,270	$2,381,270	$2,381,270
Infrastructure Operations and Maintenance	Flood Mitigation - Huntington Valley Shopping Center Neighborhood - Design/Construction		$52,888	$471,220	$471,220	$471,220	$471,220	$471,220	$471,220	$471,220	$471,220
Compliance and Enforcement	Pathogens – Wissahickon Creek	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
Compliance and Enforcement	Pathogens – Sandy Run	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Compliance and Enforcement	Pathogens – Pennypack Creek	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Compliance and Enforcement	Priority Organic Compounds – Pennypack Creek	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Compliance and Enforcement	Priority Organic Compounds (PCBs) – Frankford Creek	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000

NOTE: Assumes PRP Mandated projects under current MS4 permit will be completed by FY23.

NOTE: Keswick project cost is $264,600/yr in planning, design, and permitting with $2,116,670/yr in construction over 15 years. Include 10% contingency.

NOTE: HVSC : projected cost is $48,113/yr in planning, design and permitting with $384,670/yr for construction over 15 year period. Includes 10% contingency.

NOTE: TMDL mandate to address pathogens and priority organic compounds results in a sustained cost over the 10 year period.

Table 4-6: 10-Year Forecast of Stormwater Direct Operating Costs

TOWNSHIP ORG	SUPPORT COSTS	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
Public Works	Longevity	$7,839	$8,074	$8,316	$8,566	$8,823	$9,088	$9,360	$9,641	$9,930	$10,228
Public Works	Social Security	$31,211	$32,147	$33,111	$34,105	$35,128	$36,182	$37,267	$38,385	$39,537	$40,723
Public Works	Medical Benefits	$103,999	$107,119	$110,332	$113,642	$117,051	$120,563	$124,180	$127,905	$131,742	$135,695
Public Works	Life and Disability Insurance	$2,765	$2,848	$2,933	$3,021	$3,112	$3,205	$3,302	$3,401	$3,503	$3,608
Public Works	Office Supplies	$540	$540	$540	$540	$540	$540	$540	$540	$540	$540
Public Works	Association Dues and Meetings	$1,080	$1,112	$1,146	$1,180	$1,216	$1,252	$1,290	$1,328	$1,368	$1,409
Public Works	Contracted Services	$19,530	$20,116	$20,719	$21,341	$21,981	$22,641	$23,320	$24,019	$24,740	$25,482
Public Works	Electric and Gas	$5,400	$5,400	$5,400	$5,400	$5,400	$5,400	$5,400	$5,400	$5,400	$5,400
Public Works	Water	$576	$576	$576	$576	$576	$576	$576	$576	$576	$576
Public Works	Uniforms	$3,528	$3,634	$3,743	$3,855	$3,971	$4,090	$4,213	$4,339	$4,469	$4,603

Township Org	Support Costs	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
Public Works	Building Maintenance	$900	$900	$900	$900	$900	$900	$900	$900	$900	$900
Public Works	Pension - Defined Benefit	$27,626	$28,455	$29,309	$30,188	$31,094	$32,027	$32,987	$33,977	$34,996	$36,046
Public Works	Pension - Defined Contribution	$4,275	$4,403	$4,535	$4,671	$4,812	$4,956	$5,105	$5,258	$5,415	$5,578
Public Works	Info Tech Chargeback	$5,507	$5,672	$5,842	$6,017	$6,198	$6,384	$6,575	$6,773	$6,976	$7,185
Public Works	Vehicle Maintenance	$106,929	$110,137	$113,441	$116,844	$120,349	$123,960	$127,679	$131,509	$135,454	$139,518
Public Works	Workers' Comp	$28,302	$29,151	$30,025	$30,926	$31,854	$32,809	$33,794	$34,807	$35,852	$36,927
Public Works	Prop and Liability Insurance	$22,181	$22,846	$23,531	$24,237	$24,964	$25,713	$26,485	$27,279	$28,098	$28,941
Public Works	Small Tools - Minor Equip	$24,300	$25,029	$25,780	$26,553	$27,350	$28,170	$29,015	$29,886	$30,783	$31,706
Engineering	Longevity	$2,675	$2,755	$2,838	$2,923	$3,011	$3,101	$3,194	$3,290	$3,389	$3,490
Engineering	Social Security	$12,966	$13,354	$13,755	$14,168	$14,593	$15,031	$15,481	$15,946	$16,424	$16,917
Engineering	Medical Benefits	$61,775	$63,628	$65,537	$67,503	$69,528	$71,614	$73,762	$75,975	$78,254	$80,602

Township Org	Support Costs	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
Engineering	Life and Disability Insurance	$1,082	$1,114	$1,148	$1,182	$1,218	$1,254	$1,292	$1,331	$1,371	$1,412
Engineering	Materials and Supplies	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500
Engineering	Equipment and Supplies	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
Engineering	Contracted Services	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000
Engineering	General Expense	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500
Engineering	Defined Pension Benefit	$17,441	$17,964	$18,503	$19,058	$19,630	$20,219	$20,825	$21,450	$22,094	$22,757
Engineering	Defined Pension Contribution	$2,969	$3,058	$3,150	$3,244	$3,342	$3,442	$3,545	$3,651	$3,761	$3,874
Engineering	Info Tech Chargeback	$10,926	$11,254	$11,591	$11,939	$12,297	$12,666	$13,046	$13,438	$13,841	$14,256
Engineering	Vehicle Maintenance	$12,661	$13,040	$13,432	$13,834	$14,250	$14,677	$15,117	$15,571	$16,038	$16,519
Engineering	Worders Comp	$3,768	$3,881	$3,997	$4,117	$4,241	$4,368	$4,499	$4,634	$4,773	$4,916

Township Org	Support Costs	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31
Engineering	Property and Liability Insurance	$5,033	$5,183	$5,339	$5,499	$5,664	$5,834	$6,009	$6,189	$6,375	$6,566
Public Works	Life-cycle cost - Keswick Projects	$105,000	$108,150	$111,395	$114,736	$118,178	$121,724	$125,375	$129,137	$133,011	$137,001
Public Works	Life-cycle cost - HVSC Projects	$25,000	$25,750	$26,523	$27,318	$28,138	$28,982	$29,851	$30,747	$31,669	$32,619
	Totals	$663,780	$683,291	$703,388	$724,087	$745,407	$767,367	$789,985	$813,282	$837,278	$861,994

NOTE: Direct costs are calculated as a function of the percent of personnel effort dedicated to stormwater. This is set at 50% effort for Engineering services and 18% effort of the Public Works services.

NOTE: Direct costs for most expenditures are escalated at 3% a year. Where historical information indicated no growth projection, the costs were fixed over the analysis period (General Expense, Materials and Supplies, for example).

5 STORMWATER PROGRAM FUNDING OPTIONS REVIEW

This summary examines the funding mechanisms available to the Township to support a stormwater management program. The background information assists the Township in making policy decisions regarding the right mix of funding methods to achieve the Township's target level (and extent) of service for their stormwater program. Issues highlight funding equity (linking revenue sources with revenue purpose) and funding adequacy (the ability of a potential source to produce a sufficient and stable revenue stream). Revenue generation methodologies are defined by the capacity to fund an entire program (primary sources), and those with the capacity to fund specific program elements (secondary sources).

While there are several potential secondary sources of revenue, there are only two commonly recognized primary sources of revenue for stormwater management that are available to the Township. These are the General Fund, supported primarily through the earned income tax, real estate transfer taxes, and real property tax, and a user fee for service. As a result, after considering how secondary sources can fund specific program elements, the Township's major options for primary stormwater funding include the following:

- Maintain the status quo (same level of service and funding sources)
- Redistribute General Funds from other programs to fund stormwater management services at a level to meet current and future resource needs.
- Raise additional General Funds through earned income tax and/or real property taxes and dedicate to stormwater management services to meet current and future resource needs.
- Implement a dedicated fee for service (similar to drinking water and wastewater charges) as the primary source of revenue to support current and future resource needs.

5.1 OVERVIEW OF STORMWATER FUNDING MECHANISMS

Stormwater funding mechanisms for primary cost coverage, commonly used by local governments in the Pennsylvania, include taxes (e.g., on property, retail sales, real property sales, income, and business gross or net profits taxes), exactions, special assessments, and service fees (sometimes also termed user fees or service charges). Each has a different underlying philosophy that guides the structure of the funding mechanism and the use of the revenues.

Funding mechanisms can also be distinguished as ad valorem or non-ad valorem. Ad valorem simply indicates that the revenue basis is a function of value. By contrast, non-ad valorem is associated with or conditioned upon the performance of an act, the engaging in an occupation, or the enjoyment of a privilege. The following is a brief overview of the funding mechanisms.

Table 5-1: Summary of Common Township Funding Methods

Taxes	Most general purpose local governmental functions are primarily funded through taxes that generate general revenues. For example, an ad-valorem property tax is often imposed upon real (and sometimes personal) property based on its value. The purpose is to provide revenue to defray the expenses of general government, as distinguished from the expense of a specific function or service. It is not necessary for a tax to have a demonstrable association with any particular purpose or function. Dedicated tax policies play a key role in many municipalities. Communities levy earned income tax on all income earned as salary and wages. Passive income such as interest, dividends, capital gains, and pensions are exempt from this tax. Tax Increment Financing is a specific type of tax that can be used by a municipal agency in PA to support public works activities.
Exaction	An exaction, or excise tax, is associated with franchise rights and development-related activities or impacts. Over many years the term has come to mean and include any tax that is not an ad-valorem tax. An example is a franchise fee on a cable utility. The franchise tax/fee is based on the privilege of running wires along public rights-of-way, rather than any assessment of the value of the information transmitted. However, like other taxes, the ultimate use of the revenue does not need to be associated with its source.
Special Assessment	The essential characteristic of a special assessment is that it must confer some direct and special benefit to the property being assessed. A special assessment is based on the premise that the property assessed is enhanced in value at least to the amount of the assessment. Like service fees, special assessments are intended for a specific purpose rather than simply as a revenue generating mechanism. Assessments may be based on property value (ad valorem) or other factors (non-ad valorem) such as frontage along a street or sidewalk improvement.
Service Fee/ Stormwater Utility	A stormwater service fee, often referred to as a stormwater utility fee, is for charges that are related to the cost of providing the services and facilities. User fee funding establishes dedicated resources not authorized for other government purposes. Dedicated enterprise accounting provides a mechanism for receipt and allocation of multiple revenue sources allocated to stormwater management only. A service fee is for the purpose of recovering the cost of providing service. A stormwater service charge rate methodology sets the appropriate fees and charges.

As mentioned earlier, the stormwater funding options available are “primary” and “secondary.” Primary methods are those that have the capacity to support the entire program, while secondary methods are applicable to special needs or situations but are not capable of funding a full program.

Table 5-2: Primary and Secondary Stormwater Funding Mechanisms

Primary Funding Methods	Secondary Funding Methods
General Fund Appropriations Tax Increment Financing Stormwater Service Fees (Stormwater Utility Fees)	Other Service Fees Special Assessments Pro Rata Shares Watershed Improvement Districts Federal and State Funding/Grants/Loans In-Lieu-Of-Construction Fees General Obligation and Revenue Bonding

Local governments across the United States have used all the funding mechanisms to some degree. Legislative and/or charter authority and the mission and priorities in each community have guided the selection of a preferred approach. There is no single funding mechanism that is best for every setting. Some funding sources are better suited to operations and maintenance, while others are used strictly for capital improvements. Adequate, consistent funding of a stormwater program is the most important factor for long-term success for the delivery of services to the community.

5.2 OPPORTUNITIES FOR INFRASTRUCTURE PROJECT FUNDING

Grant funding for capital projects is a key component for many communities, including Abington. Historically the Township has had success in receipt of grant funding for flood-prone property buyouts to protect and restore the floodplain as well as infrastructure restoration such as the Grove Park US Army Corps of Engineers (USACE) project. Abington's experience reflects the multiple grant sources available to address both stormwater quality (permit and TMDL mandates) and quantity (flood abatement) projects. Local funding investments for the required match may be as much as 50% of project costs depending on the granting agency terms and conditions. There are financing sources that provide no-interest loans or provide for loan forgiveness methods that functionally changes a loan to grant.

Abington has received grants in the past to support implementation of the MS4 Pollutant Reduction Plan in addition to the current Grant Park Project funded by the USACE.

5.2.1 FEDERAL GRANTS AND LOANS

- **PL 117-58:** The Infrastructure Investment and Job Act (IIJA), Public Law 117-58, passed in 2021, focuses attention on stormwater through several existing and new programs, targeting local investment in infrastructure. It is important to track each grant/loan program as rules and regulations are issued and filing dates occur. Many opportunities are managed by the Environmental Protection Agency (EPA) for stormwater and through FEMA, USACE and NOAA for hazard mitigation and management.
- **PL 117-58**: State Revolving Fund: The Act increased the available funding for water/wastewater/stormwater project funding for the traditional State Revolving Fund programs. These are low-cost loans, with some grants. Stormwater projects are eligible for these funds; however, competition is a challenge. Pennsylvania

Infrastructure Investment Authority (PENNVEST) serves the communities and citizens of Pennsylvania by funding sewer, storm water and drinking water projects. The Growing Greener initiative has created an opportunity for PENNVEST to participate in innovative ways to promote sound land use, while simultaneously improving the Commonwealth's water resources. Under this initiative, PENNVEST has grant funds available for drinking water, wastewater, and storm water infrastructure projects. These are the same types of projects that PENNVEST has always funded. PENNVEST uses these grant funds in its normal funding process, making these infrastructure projects more affordable for the users who pay for them. The process for application is online, streamlining the effort to submit eligible projects.

- **PL 117-58**: Clean Water Infrastructure Resiliency and Sustainability Grants established in the IIJR is a targeted program, with a funding of $25 million a year. Stormwater projects are often focused on establishing or maintaining community resiliency, with particular benefit for those projects that address mitigation of flood waters.
- **PL 117-58**: EPA will oversee the Stormwater Reuse Municipal Grants funded at $280million a year with a mandate to support green infrastructure projects.

- **PL 117-58**: Disaster Relief Fund (DRF) for pre-disaster hazard mitigation assistance under FEMA's Building Resilient Infrastructure and Communities grant program is part of the $6.7 billion for flood mitigation assistance. $1billion is targeted specifically for pre-disaster hazard mitigation. This funding does include a cost-benefit study when applying and information can be found at:

  www.fema.gov/grants/guidance-tools/benefit-cost-analysis
- **PL 117-58**: Increased NOAA funding supports inland mapping and flood mitigation grants as well.
- **PL 117-58: STORM Act** – Safeguarding Tomorrow Through Ongoing Risk Mitigation is fully funded at $500million over 5 years. The focus is climate-impact mitigation which address flood mitigation and building/creating resilient infrastructure.

5.2.2 FEDERAL EMERGENCY MANAGEMENT AGENCY GRANTS

- **Flood Mitigation Assistance (FMA) Program** – This FEMA program provides funds for planning and projects to reduce or eliminate risk of flood damage to buildings that are insured annually under the National Flood Insurance Program.
- **Hazard Mitigation Grant Program (HMGP)** – This FEMA program provides funds annually for hazard mitigation planning and projects. Hazard Mitigation Assistance grants are provided to states, local, tribal and territorial governments. This funding is authorized with a Presidential Major Disaster Declaration as requested by the Governor and the funding made available to the applicant is generally 15% of the total federal assistance amount provided for recovery and is determined by an approved FEMA Hazard Mitigation Plan.
- **BRIC – Building Resilient Infrastructure and Communities** – This is a competitive grant program, initiated in FY20 and managed by FEMA. BRIC replaces the Pre-Disaster Mitigation Program and is authorized by Section 203 of the Stafford Act as amended. The purpose of the grant program is to shift away from recovery to a proactive investment in community resilience. Applicants must apply on a yearly basis. The program encourages public infrastructure projects, especially projects

incorporating nature-based solutions along with the adoption of building codes designed to protect structures.

5.2.3 PENNSYLVANIA EMERGENCY MANAGEMENT AGENCY (PEMA)

Flood mitigation assistance in the Commonwealth is managed by PEMA who promotes use of FMA and BRIC grants. The PEMA website provides current data on applications with links to the FEMA grant website. General questions about the federal grants should be directed to the Commonwealth Hazard Mitigation Officer.

The PENNVEST program provides construction and related funding of BMPs, and the funding terms depend on the affordability of the project to an applicant. The PENNVEST website provides the important information and details. The "Growing Greener Grant" program has served many communities throughout PA and funding availability varies from year to year. Tracking funding and grant cycles is critical to ensure identification of opportunities is early in the process, and competitive grant requests can be prepared in time to meet deadlines and grant criteria.

5.2.4 STORMWATER SERVICE FEES (STORMWATER UTILITY)

Service fees are becoming an increasingly popular source of dedicated stormwater funding throughout the United States and Canada. Over the past decade, as legislation provided authority and guidance, Pennsylvania communities are turning to user fees to fund stormwater services. Data from the Western Kentucky University Stormwater Utility Study indicates that at least fifty-nine stormwater utilities have been adopted in Pennsylvania since 2012. The City of Philadelphia has utilized user fees since the 1990s and is the oldest operating utility in the Commonwealth.

The general principle applied to utility fees is that the rate methodology must be fair and reasonable with resultant charges that bear a substantial relationship to the cost of providing services. However, the local government has a great deal of flexibility in attaining such objectives in the context of local circumstances. When stormwater user fee rates have been legally challenged, the courts have tended to apply "judicial deference" to the decisions of locally elected officials. Under judicial deference, the courts will not intervene unless a plaintiff can demonstrate that the decision was arrived at arbitrarily and capriciously or that the result of the decision discriminates illegally.

Stormwater service fees provide a stable revenue because it is dedicated to stormwater services only. Service fee rate methodologies result in a balanced allocation of the cost of services and can provide an opportunity to shift a portion of the community's current stormwater management program costs from the General Fund. Service fee rate structures are designed to distribute program costs based on a correlation between the need for a public drainage system based on the presence of impervious area features. Without development, urbanization where population concentrates into a community, stormwater runoff is managed by absorption and evaporation along with sustainable concentrated flows into streams and rivers. It is the concentration of population that generates a need for a publicly managed program and infrastructure to protect property, public health, and safety of movement. Intensity of land use activities that interrupts the ability of the land to handle the runoff links the need for stormwater management to land development. Over the past 50 years of stormwater utility implementation, the rationale

for user fees is solidly based on impervious area as the standard of practice for distribution of cost.

The revenue generation from a stormwater utility is managed within the financial structure and policies of the Township and is dedicated to stormwater services only. The utility fee billing unit is a measure of impervious area present on the property, serving as the "meter" for allocating costs (rather than income or assessed property values). A stormwater utility user fee rate study is the foundation for policy development and is part of an implementation strategy. Important policy decisions are made that can have significant implications for the selected measure of the billing unit and the calculated rate. Table E3 includes a range of policy questions that ultimately impact the structure of the program and user fee, as well as the stormwater fee rate. All these policy decisions are considered as part of a rate study.

Stormwater Utility development begins with a feasibility study that evaluates the methods, policies, and costs for utility operation. A feasibility study focuses on the overall objectives and goals of the program, refining outcomes, and evaluating internal procedures for utility oversight. It includes the analysis of data that is used to allocate costs to property owners and determines the rate structure. The basic areas of study address public involvement, governance, program of services, financial policies, and cost projections, as well as a review of data used to develop the master account file as shown in Figure E-1. Upon completion of a feasibility analysis, the Township provides to the Board of Commissioners the findings and recommendations at which time the Board may proceed with implementation or end the process.

Figure 5-1: Five Focus Area of a Stormwater Utility Feasibility Study

Stormwater Utilities in PA and throughout the US issue charges and collect revenues through existing tools available to the agency. Communities bill on a property tax bill (e.g., Ferguson Township, Radnor Township, City of Allentown) or on an existing utility bill (e.g., Bethlehem and Easton PA). Efficiency of the process to manage utility administration is the key driver in determining which method works most effectively.

As the Township address its long-term operational goals, the evaluation of the stormwater utility may be appropriate to raise sufficient revenues for local grant match, additions of personnel to manage increased capital project implementation, and increased burden of drainage system operations and maintenance. Completing a feasibility study does not commit the Township to implement but offers answers to key policy questions and can provide a detailed understanding of the future cost burden for overall stormwater management operations.

Table 5-3: Policy Issues Impacting Stormwater Utilities

Policy Decisions Affecting Utility Rate and Structure

1. **Program:** Will all, or only part of the current program/service elements identified in the program evaluation be shifted to the Enterprise Fund?
2. **General Fund:** Will the enterprise fund be used to pay for services received from the GF such as general overhead? (Indirect Cost Allocation)
3. **Special Fees and Other Revenues:** What additional revenue sources will be used, or created, to support stormwater program functions (existing or future increases in fees for erosion and sediment control; fees for inspection of private BMPs; grants, etc.)?
4. **Financial Factors:** What is the fund balance test that must be maintained by the Enterprise Fund? Is interest earned by the cash generated from the utility credited to the Enterprise Fund? What is the "bad debt" factor (based on history of collecting fees)? Are fund balances appropriated in the following year?
5. **Reserves:** Will an emergency reserve be established to address catastrophic system failures? What level of operating reserve will be maintained?
6. **Bonds:** Will bonded debt or short-term bank financing be used to pay for the capital improvements program?
7. **Rate Allocation:** What is the basis for the rate? Impervious area? Other factors? Are their unique circumstances that must be accounted for in allocating the fee (e.g., diversity in housing types and impervious coverage ratios)?
8. **Exemptions:** Will exemptions be established other than those legally mandated?
9. **Credit Policy:** Will credits be adopted for those private properties that provide a public service (i.e., privately owned stormwater management facilities that treat and/or detain stormwater from a specific site or sites) under the program? Will the program only recognize credits related to real world benefits, or are soft benefits (such as public education) grounds for credits?
10. **Billing:** What portion of the billing administrative costs will be funded by the stormwater Enterprise Fund? What portion of customer service costs are funded?
11. **Rate Policy:** Is there a goal that the rate be held constant for 3 years? Or 5 years? Or will the rate be adjusted annually based on fiscal analysis of revenue vs. expenditures?
12. **Bill Receipt:** Who will receive the bill, owners, or current utility customers (such as renters and leasers)?

6 PUBLIC EDUCATION AND OUTREACH PLAN

Education is a key factor in addressing the challenges and overall management strategies for government programs. Engagement of the public in both solving local operational issues as well as contributing the resources necessary for government to effectively deliver in its role is a key factor in building support for change. Storm sewers and their role in protecting life and property, sustaining natural systems, and contributing to the overall quality of life in a community has not been well understood. The stormwater infrastructure is in place each day. Whether or not it is called upon to transport rainfall or snow melt, it is at work. Attention to its ability to perform is often dependent on the demand a rainfall event places on the system components.

Why is public engagement so important in stormwater management? Historically, over the decades, and sometimes centuries since construction, stormwater infrastructure has been under-funded for maintenance and repair, nationwide. The latest report card by the American Society of Civil Engineers (ASCE) notes that multiple billions of dollars is needed just to comply with regulatory mandates and billions more to repair and replace drainage systems throughout the US. Their report states that the annual funding gap for regulatory compliance is $8 billion. (2021 ASCE Report Card for American's Infrastructure).

Repair and replacement funds for stormwater must compete with the needs of other water infrastructure such as potable or wastewater treatment. As noted in Plan Section E, many communities have taken charge of generating revenues to address their infrastructure needs through implementation of a stormwater utility. Regardless of funding source, it is critical that the public understand what the challenges and needs are to operate and maintain the infrastructure so that priorities can be balanced against other local programs and funding set with knowledge of how to value the role of stormwater management when resources are discussed.

In the summer of 2022, the Township implemented a targeted outreach to the public through activities and potential options identified as best practices, for dissemination of key information. Sections 6.1 through 6.5 provide background, options, and content on public outreach and education with examples and actual content that was drafted for use in promoting the development of the Stormwater Management Plan and to communicate with the public at a forum held in August 2022.

Content provided by WSP for the Township website is highlighted in 6.1-6.4. In Section 6.4, the material prepared for Township use provides a summary of the overall Stormwater Management Plan development process, It was published on the Township website. WSP provided material for a Newsletter article for Township publication is in and it is found in Section 6.5.

On August 1, 2022, a public forum was held, with a presentation that covered an overview of the study process along with specific details on the flood mitigation analysis for Keswick and Huntingdon Valley Shopping Center neighborhoods. The presentation was video taped for future use by the Township. Section 6.2 documents the agenda for the Forum.

6.1 STORMWATER MITIGATION PLANNING AND REGULATORY COMPLIANCE EDUCATION STRATEGIES

1. Public Meetings – Forum
    a) Educational outreach about stormwater and water quality permit status
    b) Discussion of future program
    c) Report on studies for flood mitigation
    d) Event structure – live, face-to-face, and virtual based on need
2. Public Outreach
    a) Development of stormwater education articles to include information about concept of flood mitigation and water quality strategies
    b) Social media, print, and television coverage – targeted media campaigns
3. Material Distribution
    a) Dissemination of information regarding targeted schedule of public meetings as well as available educational resources via email blast and Township newsletter(s)
    b) Expanded and/or recycled materials that were developed for the MS4 program
    c) Outreach to community Partnerships providing information for distribution
4. Online Resources/Methods/Tools
    a) Social Media education outreach, utilizing tools that have been successful for Abington in the past
    b) Update webpages to focus on current services leveraging easy, accessible location for residents to self-educate
    c) Enhancement of written materials with photos (pre and post photos of stormwater projects with a message that more can be accomplished
5. Stormwater Quiz/Survey

    After a few initial stormwater outreach activities, distribute a digital survey that will lead users through stormwater information as well as a place to voice questions or concerns.

6.2 PUBLIC FORUMS – STRUCTURE AND KEY TOPICS FOR FORUM

- Introduction
    - Township personnel (Ashley McIlvaine and Tim Clark) and consultant team
    - Commissioner Rothman provided comments at the Public Forum
    - Purpose and agenda review
    - Feedback opportunity

    - Announcement of feedback survey and comments
- Stormwater Management Current Conditions and MS4 mandates (federal requirements flow-down through the PADEP)
    - Neighborhood flooding (mitigation plans, strategies available)
    - Aging infrastructure (facts, methods to address, investment needs)
- Stormwater Strategies for the Future
    - Green Stormwater Infrastructure – mimicking natural processes
    - Regulatory mandated initiatives – pollutant targets and reduction goals
        - Projects implemented
        - Projects to be implemented
- Neighborhood Flooding – Analysis of Options
    - Overview of the two study areas – attributes and goals of studies
    - Focus on Keswick Neighborhood
        - Options evaluated
        - Best Management Practices evaluated
        - Preferred option details
            - Details on project locations
            - Cost Impact and funding options
    - Focus on HVSC Neighborhood
        - Options evaluated
        - Best Management Practices evaluated
        - Preferred option details
            - Details on project locations
            - Cost Impact and funding options
- Additional Areas identified by Abington Township for further evaluation
- Wrap Up and Open Discussion
    - Q&A
    - Feedback methods
    - Next Steps

6.3 ABINGTON SOCIAL MEDIA AND OTHER DIRECT OUTLETS FOR PUBLIC EDUCATION

Social Media Accounts:

- Facebook: www.facebook.com/AbingtonTownship
- Instagram: www.instagram.com/abingtontownship
- Twitter: www.twitter.com/AbingtonPA

TV Channel

- General information slides and videos are generally displayed

E-Newsletter:

- E-Newsletter information (example of newsletter content is provided on page 64.
- Length of content – between 200- 400 words

Example webpages with relevant information:

- Local Climate Action Plan Webpage: Abington Climate Action Plan (arcgis.com)
- Comprehensive Plan Update Webpage:

6.4 STORMWATER MANAGEMENT PLAN WEBSITE CONTENT: STORMWATER MANAGEMENT STUDY | ABINGTON TOWNSHIP, PA (ABINGTONPA.GOV)

Utilizing the Township website provides the public with current information on stormwater programs and activities as well as a means of comment and feedback. The Stormwater Management Plan is housed on this site with specific focus on the Study and the analysis of the neighborhood flood mitigation analysis for Keswick and Huntingdon Valley. Interim reports developed as part of the Plan are available on the website. The following material, in *italics in Section 6.4,* was created for the website and summarizes key highlights of the Plan.

6.4.1 ABOUT THE PLAN

In Abington Township, we have a successful track record of addressing our flood-related stormwater issues by making investments in floodplain restoration and stormwater control projects. In 2003, the Township purchased dozens of homes in the floodplain through successfully matching $7M of Federal Emergency Management Agency (FEMA) funds using $1M of Township funds initiated. The Township converted these areas into parkland to be enjoyed by residents and has issued bonds for $3M to $4M every few years to protect property, infrastructure, and the environment from flood waters and threats to water quality. These projects, coupled with the day-to-day stormwater infrastructure operations and maintenance activities performed by Public Works crews, and participation in the Wissahickon Clean Water Partnership, exemplify the Township's continuing commitment to water resource management.

In 2019, leadership identified a need to review current stormwater system management practices, challenges, regulatory pressures, drainage system performance, and flood impacts from hurricanes as well as more routine storm events. The study outcome is a comprehensive look at the current and future stormwater management operations and challenges. A request for proposals was issued and Wood Environment and Infrastructure, Inc was selected to undertake the studies set forth in the defined scope of services.

For those seeking additional information on Township programs to address runoff, this summer we will provide an opportunity to learn more about the ongoing initiative to address neighborhood flooding and improvements to water quality. Two public forums will be held to share information on current programs and future investments. Your comments and feedback are important in finalizing the overall comprehensive 10-year plan. **See below for details on the date, time, and locations of the two forums.**

6.4.2 PROJECT OVERVIEW

Over the past three years, the Stormwater Management Plan evolved, addressing not only the stormwater management program components but included two neighborhood flood mitigation studies for Keswick and Huntington Valley Shopping Center drainage areas. The study evaluated the current operational processes such as administration, customer service, engineering, conveyance operation and maintenance, flood reduction and preparedness, municipal separate storm sewer system (MS4) discharge permit activities, capital investments and cost of operations.

The Stormwater Management Plan is presented in two parts: (1) the two drainage area studies, providing information on details of the hydraulic and hydrologic modeling, alternatives evaluated, and the preferred alternative identifies by staff; and (2) the current and future operational evaluations including a 10-year cost assessment along with funding options. A link to the Stormwater Management Plan will be provided upon completion in late summer 2022, after public review and opportunity for comment. [insert hot link to the document once published]

In addition to capital projects to mitigate the impacts of floodwaters in the community, the Township is addressing another wave of stormwater challenges from the requirements of Pennsylvania water quality regulations. Abington's water quality challenges include compliance with the Pennsylvania Department of Environmental Protection's (PADEP) Municipal Separate Storm Sewer System (MS4) Permit (renewed in March 2018) and the Wissahickon Creek Total Maximum Daily Load (TMDL). To reduce the cost burden locally, the Township has been successful in obtaining grant funds important to support construction of Best Management Practices (BMPs) that target pollutant reduction in stormwater flows. However, the water quality regulations drive an expansion of the Township's list of capital stormwater projects. Meanwhile, staff continues the day-to-day operation and maintenance of existing infrastructure to meet expectations of residents and business owners. Our strategy is to maximize funding opportunities through grants with local matching funds but the availability and competitiveness for those grants may require a change in strategy over time.

Figure 6-1: Sandy Run, an impaired stream of Abington Township.

Keswick and Huntington Valley Shopping Center (HVSC) Area Studies: The flood-prone areas of HVSC and the Keswick neighborhoods have experienced excessive flooding, and the recommended alternatives to mitigate these conditions could exceed $42 million with life cycle costs for operation and maintenance of the infrastructure investments of $2.6 million (over a 20-year period). These necessary investments in infrastructure and water quality protection will contribute to overall sustainability for the management of stormwater in the Township.

Figure 6-2: Hamel and Monroe Avenue Flood Control Project

Stormwater Management Operations: This section of the Plan focuses on stormwater operations and infrastructure management based on a series of interviews with staff and documents research on current conditions. It provides a summary of activities aligned to service areas and permit components as a snapshot in time. From this

Figure 6-3: Old Huntingdon Pike Stream Bank Stabilization

baseline, a future program that addresses the long-term investment in flood abatement and water quality protection is defined, starting with implementation of the alternatives analyzed for the HVSC and Keswick neighborhoods as well as incorporation of the various best management practices (BMPs) for pollutant load reduction mandated in the MS4 permit. Implementation of the strategies to mitigate flooding along with compliance requirements for the Township MS4 permit is the foundation for the future stormwater management services of Abington over the next decade.

6.4.3 COST OF SERVICES AND FUNDING OPTIONS

Cost Projections: One key element of any study is the financial analysis of costs, for current operations and for capital needs, with a look to the future over the next 10 years. Water quality compliance capital projects for regulatory mandates were identified in the 2017 model for BMPs to meet the sediment, nitrogen, and phosphorus targets over a 5-to-10-year implementation period. It is estimated that the total cost of $3,629,460 will be cost-shared between grants ($2,332,210) and the Township funding the residual ($1,297,250). (Average annual Township funding over 10 years is $129,725).

In addition, other identified CIP needs for water quality permit compliance were estimated at $970,810 or an average annual cost during the compliance period of five (5) years at $194,162 annually.

Township operational cost were reviewed and determined to be an estimate of $1,486,695 annually for personnel, direct expenses, and maintenance capital investments. With the addition of the Township annual capital investments needed for water quality compliance, the total annual operational cost is estimated at $1,819,582 for the next five years.

Funding Options: We make efforts to keep our service cost in control and address our priorities but solutions to flood impacts and meeting water quality permit demands is placing increased pressure on funding needs. Grants are very competitive with many communities having worthy project needs. Our funding options evaluation provides an overview of the various methods available to ensure that we have a sustainable stormwater management program. The options reviewed in the Stormwater Management Plan include funding methods used by other communities to fund their programs. Many Pennsylvania communities have turned to stormwater utility implementation to provide a dedicated source of funds for on-going and future operating costs, capital investments, and local grant match.

Many grant programs are documented in the Stormwater Management Plan such as:

Table 6-1: Grant Programs in Stormwater Management Plan

Primary Funding Methods	Secondary Funding Methods
General Fund Appropriations Tax Increment Financing Stormwater Service Fees (Stormwater Utility Fees)	Other Service Fees Special Assessments Pro Rata Shares Watershed Improvement Districts Federal and State Funding/Grants/Loans In-Lieu-Of-Construction Fees General Obligation and Revenue Bonding

- PL117-58 has many components for grants and loans from grants for infrastructure resiliency to disaster relief funds
- National Oceanic and Atmospheric Administration PL 117-58 grants for inland mapping and flood mitigation
- STORM Act PL117-58 Safeguarding Tomorrow Through Ongoing Risk Mitigation grants
- FEMA Programs:
    - Flood Mitigation Assistance Program
    - Hazard Mitigation Grant Program (HMGP)
    - Building Resilient Infrastructure and Communities (BRIC)
- PENNVEST for funding BMPs

6.4.4 PUBLIC PARTICIPATION – SAVE THE DATES (MATERIAL PROVIDED TO THE TOWNSHIP FOR PROMOTION OF THE FORUM – ACTUAL DATE WAS 8-1-2022)

Public forums are scheduled in July to provide summary information and more detailed analysis of the two neighborhoods studied for flood mitigation options. Township staff along with representatives of the consulting team will be present to provide information and respond to questions. These are opportunities for you to provide important feedback to leadership on the overall stormwater management program, needs, and reactions to the long-range strategies considered in each study section.

July 18, 2022, at 6:30 pm to 8:00 pm at the Town Hall will cover the overall study regarding past, current and future stormwater management strategies, water quality mandates, drainage system challenges, and costs of operation. In addition, funding options evaluated will be covered. The two neighborhood studies will be introduced with information provided on the study areas.

July 25, 2022, at 6:30 pm to 8:00 pm at the Town Hall will cover in detail the two area studies, providing information on the alternatives considered as well as the preferred options. Information on potential capital project options for mitigation will be available with more specific details on various green infrastructure best practices considered. A general brief overview will be covered from the July 18, 2022, forum.

These SAVE THE DATE Reminders will be posted on various media (Facebook and Twitter) platforms, and we look forward to hearing from you about this most important Stormwater Management Plan.

6.4.5 PROJECT DOCUMENTS:

1. Current Services Report
2. Future Services Report
3. Funding Options Report
4. Flood Mitigation Fact Sheets (HVSC and Keswick)
5. Stormwater Ordinance Review

6.5 EXAMPLE ARTICLE (PREPARED FOR PUBLICATION ON WEBSITE AND/OR ELECTRONIC NEWSLETTER)

6.5.1 ADVANCING STORMWATER MANAGEMENT, BUILDING ON A STRONG FOUNDATION

In Abington Township, we have a successful track record of addressing our flood-related stormwater issues by making investments in floodplain restoration and stormwater control projects. Options are often limited such as the purchase of dozens of homes in the floodplain by the Township, after successfully matching $7M of Federal Emergency Management Agency funds with $1M of Township funds. The Township converted these areas into parkland to be enjoyed by residents and has issued bonds for $3M to $4M every few years to protect property, infrastructure, and the environment from flood waters and threats to water quality. These projects, coupled with the day-to-day stormwater infrastructure operations and maintenance activities performed by Public Works crews, and participation in the Wissahickon Clean Water Partnership, exemplify the Township's continuing commitment to water resource management.

In addition to capital projects to mitigate the impacts of floodwaters in the community, the Township is addressing another wave of stormwater challenges from the requirements of Pennsylvania water quality regulations. Abington's water quality challenges include compliance with the Pennsylvania Department of Environmental Protection's (PADEP) Municipal Separate Storm Sewer System (MS4) Permit (renewed in March 2018) and the Wissahickon Creek Total Maximum Daily Load (TMDL). To reduce the cost burden locally, we've been successful in obtaining grant funds important to support construction of Best Management Practices (BMPs) that target pollutant reduction in stormwater flows. However, the water quality regulations drive an expansion of the Township's list of capital stormwater projects. Meanwhile, staff continue the day-to-day operation and maintenance of existing infrastructure to meet the expectations of residents and business owners. Our strategy is to maximize funding opportunities through grants with local matching funds but the availability and competitiveness for those grants may require a change in strategy.

For those seeking additional information on Township programs to address runoff, this summer we will provide an opportunity to learn more about the ongoing initiative to address neighborhood flooding and improvements to water quality. Two public forums will be held to share information on current programs and future investments and look

for announcements with details as we get closer to the date of events. Your comments and feedback are welcome as we move forward.

7 RECOMMENDATIONS AND CONCLUSIONS

7.1 CURRENT SERVICE EVALUATION - CONCLUSIONS

During the review of current services delivered by various organizational units within the Township, several best practices were identified that may serve to improve overall operations, both effective and efficient actions. These were taken into consideration in the development of the future program for stormwater management in Abington.

7.1.1 CUSTOMER CONTACTS

The tracking of calls/emails/in-person visits and online submissions began fall 2022. The system tracks requests and ultimate resolutions. However, its purpose is not to be a directory of contacts, but rather a ticketing and management system. Incorporating the contacts into all areas of service, across all operations, can provide the Township with a broad understanding of the needs and concerns of individuals and businesses. It is understood that the responsibility may not completely rest with the Township to resolve all items. Understanding the needs and actions that can be taken serves to make operations more efficient and can provide insight into communication strategies with the public served.

7.1.2 GIS INVENTORY AND SYSTEM INSPECTION

Maintaining a GIS-based inventory of the infrastructure is foundational to building a strong, resilient stormwater system that can address flood mitigation and protect water quality. The GIS database should integrate the inspection results of the underground and above ground system components as part of an overall asset management plan. This integrated system can set the baseline for linking maintenance workorders and calls for service and form the foundation for long-range management of the drainage system.

7.1.3 CAPITAL INVESTMENT – INTEGRATION OF FLOOD MITIGATION WITH TMDL, PRP, AND PCM STRATEGIES

There are important drivers for addressing water quantity and water quality protection for stormwater management. A long-term Capital Investment Plan is needed to link multi-purpose solutions so that the limited funds are utilized in a way that maximizes their return. Phase I flood mitigation strategies for the HVSC and Keswick neighborhoods is a start for building an effective plan. Evaluating the water quality mandated projects to identify opportunities to include additional treatment for quantity control, and the same for the flood mitigation projects to address pollutant reductions may offer optimization of the available funds.

7.1.4 PARTNERSHIP DOCUMENTATION FOR MS4 PERMIT COMPLIANCE

The NPDES MS4 permit structure allows permittees to partner with other agencies, community groups, and other MS4 permittees to carry out the MCMs required. To

minimize risk to the Township, the development of partnership agreements with those organizations who support and carry out compliance activities is important. Executed agreements set forth the terms of the programmatic activities that support permit compliance and define the responsibilities of each agency/organization. Should a third-party choose to end its role, the Township must pick up the activity to ensure continued compliance.

7.1.5 ROLE OF RIGHT-OF-WAY AND PRIVATE PROPERTIES IN STORMWATER MANAGEMENT

The use of the public right-of-way and public property is assumed within the hydraulic assessment of mitigation strategies to manage flooding in the Keswick and HVSC areas. Other communities have also utilized this strategy in addition to grant partnerships, and credit opportunities with private properties to assist in reaching MS4 and other stormwater compliance goals. Evaluation of current local ordinances that pertain to stormwater indicate that a conflict exists between a best practice of using ROW along street corridors for implementation of GSI to address both flood and pollutant reduction. See Appendix A for the report findings of the comprehensive review of local ordinances.

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A EVALUATION OF EXISTING STORMWATER MANAGEMENT ORDINANCES

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The Township of Abington is experiencing a trend of significant redevelopment. This provides an opportunity to improve stormwater management by better controlling the volume and velocity of runoff that can cause flooding and degrade local streams. This can be done by adding stormwater controls where they do not currently exist and replacing/retrofitting older controls with more effective ones. Redevelopment presents an opportunity to improve the quality of stormwater runoff by integrating green stormwater infrastructure (GSI) and low impact development (LID) during the site planning process.

Stormwater regulations in the Township are included in multiple chapters of the Code of Ordinances, including Stormwater Management Ordinance (Chapter 142), Subdivision and Land Development Ordinance (Chapter 146), and Zoning Ordinance (Chapter 162). The Stormwater Management Ordinance (SMO) is generally consistent with PADEP's model stormwater ordinance, as required for compliance with the MS4 Permit. The Zoning Ordinance provides standards for land use and impervious cover caps. The Subdivision and Land Development Ordinance (SALDO) provides for implementation of standards for flow rate and water quality control, as well as other standards for stormwater conveyance design.

The purpose of this evaluation is to identify opportunities to amend the Township's codes to improve stormwater management through the development and redevelopment process. The primary tool used is the Center for Watershed Protection (CWP) Code and Ordinance Worksheet (COW).[1] This tool was developed to support the CWP's Better Site Design Handbook and establishes a consistent process for evaluating potential barriers to implementing GSI and LID at the local level. The purpose of the COW exercise is not to imply that changes must be made to current code language. Rather, it is a means of prompting Township officials, engineers, and planners to question existing practices and ask whether changes could improve stormwater management.

The review of the ordinances focused on specific Township obstacles to GSI and LID. It is noted that the specific prohibition in SALDO § 146-24.G on hedges, trees, plants, or shrubbery in the right-of-way will impede the Township's preferred GSI-based alternatives for flood mitigation at Keswick and Huntington Valley Shopping Center. Preliminary amendment language for the Township's consideration that would provide greater flexibility to integrate GSI into the right-of-way was developed.

[1] *Code and Ordinance Worksheet – A Tool for Evaluating the Development Rules in Your Community*, Center for Watershed Protection, 2017.

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A-1 CODE AND ORDINANCE WORKSHEET

The COW involves a review of relevant codes and ordinances to assess how they support design principles that take stormwater management into consideration. The review process recognizes that the development intensity of the landscape may limit some approaches, while opening up opportunities for other approaches. COW review categories include rural, suburban, urban, and highly urban. The "urban" worksheet was used for Abington Township. Some of the COW questions are not directly related to stormwater management (such as open space and buffer management) and were, therefore, not included in the review.

The completed COW worksheet for Abington Township is included as Appendix A. Generally, the Township did well in the areas of flexible parking ratios, landscaping of parking areas, management of rooftop runoff, stream buffer systems, stormwater outfalls, stormwater standards, and requirements for post-construction maintenance and inspections. Areas highlighted for further consideration by the Township are summarized in Table 1.

Table A-1: Summary of Key COW Worksheet Considerations

Code Area	COW Criteria	Township Standard
Street Width	Minimum street width allowed for low density residential areas of between 18-22 feet.	SALDO § 146-24.D(1) provides for a minimum cartway of 30 feet for all residential streets.
	Right-of-way for low density streets less than 45 feet.	SALDO § 146-24.D(1) provides a minimum width of 50 feet for all residential streets.
Cul-de-Sacs	Minimum radius for cul-de-sacs of 48 feet or less.	SALDO § 146.24.D(4) provides for a minimum outer paving radius of 50 feet.
	Allow use of landscaped islands in cul-de-sacs.	SALDO § 146.24.D(4)(a) provides that no island shall be placed in the paved radius. However, Zoning Ordinance Section 1706 requires a 25-foot planted center island for development in the Land Preservation Overlay District. This appears to be a conflict. Consider amending SALDO to remove the inconsistency and allow planted center islands for additional districts.
	Allow use of alternatives to cul-de-sacs such as hammerheads and loops.	SALDO and Zoning Ordinance are silent on these techniques. For low

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Code Area	COW Criteria	Township Standard
		volume roads, these techniques can significantly reduce impervious area.
Vegetated Open Channels	Allow open sections of vegetated channels where density, slope, etc. allow in lieu of storm drains.	SALDO § 146-33 states that all surface waters shall be enclosed in a storm drain. Consider opportunities for allowing vegetated channels, especially those that can be used to promote infiltration of stormwater runoff.
	Allow runoff reduction practices within curb extensions or median strips.	SALDO and Zoning Ordinance are silent on these techniques.
Parking Ratios	Establish parking ratios based on local demand analysis instead of ITE or ULI values.	Unclear from Zoning Ordinance how specific parking ratios were developed. Consider local demand analysis if possible.
Parking Lots	Minimum stall width for standard space 9 feet or less.	SALDO § 146-28.A provides for a standard width of 10 feet. Consider whether smaller stalls or reserving some stalls for compact cars may be practical.
	Minimum stall length for a standard space 18 feet or less.	SALDO § 146-28.A provides for a standard length of 20 feet.
Structured Parking	Provide incentives for developers to construct garage parking rather than surface lots.	Zoning Ordinance provides reduction to account for nearby public garages only.
Open Space Design	Establish impervious surface reduction as a major stated goal in zoning and subdivision ordinances.	The SMO contains a goal to reduce impervious area, but this is not strongly reflected in SALDO or the Zoning Ordinance.
	Establish density bonuses to encourage open space design.	While flexible design criteria is provided for certain open space, it is not apparent in the Zoning Ordinance that density bonuses are provided.
Driveways	Minimum driveway widths of 9 feet or less.	Zoning Code Section 2601.P.4 provides maximum driveway width of 20 feet.
	Allow for two track design or shared residential driveways to reduce impervious area.	SALDO and the Zoning Ordinance are silent on these concepts.
Stormwater Codes	Define rainwater harvesting and encourage acceptable uses for rainwater (irrigation).	SALDO and the Zoning Ordinance are silent on these concepts. SMO defines cistern but is silent on the practice.

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Code Area	COW Criteria	Township Standard
	Require inspections of BMPs during installation process.	SMO § 142-501 states that the municipality "may" inspect during all phases of installation. It is unclear within ordinance language if the Township has in place a robust inspection process to ensure that BMPs are properly installed during construction.
	Require or provide incentives for consideration of runoff reduction early in the site planning process.	The Land Use and Development Guidance Manual includes provisions for pre-submission meetings; however, the process is generally silent on stormwater. Zoning Ordinance addresses stormwater in landscaping requirements, but it is not an integral part of the site design process.

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A-2 ORDINANCE OBSERVATIONS AND RECOMMENDATIONS

In addition to the Codes and Ordinance Worksheet, the review included the Stormwater Management Ordinance, Subdivision and Land Development Ordinance, and Zoning Ordinance for general consistency and to identify additional areas where stormwater management can be strengthened.

Barriers to Effective GSI and LID Implementation

A major barrier to GSI and LID cited by the U.S. EPA[2] is that codes and ordinances can have the unintended consequence of making them impractical due to overly prescriptive requirements for parking, landscaping, screening, and property setbacks. Another common barrier is language that makes GSI and LID the exception, rather than the expectation. The following are some examples identified during the review of the Township's ordinances.

- *Parking Lot Planting Islands*. Zoning Ordinance Section 2402.A.2.a establishes that planting islands will be protected with curbing, wheel stops, or bollards and mounded to six inches minimum above the paved parking area. Similar language is in place for parking lot buffers. While an exception can be made when the parking island is part of the stormwater management system, effective GSI/LID suggests the preferred approach would be to utilize islands and buffers as bioretention or some other type of infiltration opportunity when at all practical.
- *Impervious Surface Areas*. While Zoning Ordinance Section 2601.M encourages partially pervious macadam materials for residential uses, it is simply permissive for non-residential uses. The Zoning Ordinance could be amended to identify circumstances when pervious alternatives would be encouraged, such as parking areas designed to accommodate periodic large events (such as houses of worship or commercial areas designed to handle weekend or holiday traffic).

[2] *Revising Local Codes to Facilitate Low Impact Development*, U.S. Environmental Protection Agency, EPA 841-F-19-002, June 2021.

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- *Vegetation/Bioretention in Rights-of-Way*. Integration of vegetation and bioretention into the streetscape is a common GSI/LID technique. This can take the form of using the area between the sidewalk and curb for bioretention or the integration of bioretention into curb bump-outs. SALDO § 146-24.G establishes that no hedges, trees, plants, or shrubbery shall be located or permitted within the right-of-way. A similar prohibition exists in SALDO § 146.24.D(4)(a) regarding vegetated cul-de-sac islands (although Zoning Ordinance Section 1706 requires islands with mountable curbing for certain development in the Land Preservation Overlay District). In space-limited municipalities such as Abington, this prohibition may limit the ability for development or redevelopment to effectively integrate GSI/LID into the site design. This approach would need to be considered in conjunction with other requirements, such as responsibility for maintenance.

Figure A-1: Example of curb bump out (USEPA, 2021).

The Township may want to consider amending these and other code sections to better promote GSI/LID and remove perceived or actual barriers to implementation.

The specific prohibition in SALDO on hedges, trees, plants, or shrubbery in the right-of-way will need to be removed or amended to implement the preferred alternatives for flood mitigation for Keswick and Huntington Valley Shopping Center. The following is preliminary draft language that could be added to SALDO § 146-24.G to provide the Township with additional flexibility:

"The Board of Commissioners may grant exceptions to this provision when vegetation is a component of the stormwater management system and supported by appropriate modeling and engineering studies along with maintenance plans for the specific practice proposed."

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Integration of GSI/LID into Zoning Ordinance

A common challenge faced by municipalities is how to ensure that stormwater management concepts are considered early in the layout and design of a proposed development. Otherwise, stormwater management often becomes a secondary consideration that is "shoe-horned" into the site design. As a result, opportunities to integrate GSI/LID may be lost.

The SMO includes multiple sections promoting or requiring the use of GSI and LID.

- Section 142-102 identifies that stormwater runoff can be minimized by using project designs that maintain the natural hydrologic regime and sustain high water quality, groundwater recharge, stream baseflow, and aquatic ecosystems.
- Section 142-103 establishes a goal to minimize stormwater runoff volume and impervious surfaces and requires the promotion of alternative designs and layouts that minimize impacts on surface and groundwater.
- Section 142-401.F requires the incorporation of LID to the maximum extent practicable in accordance with the Pennsylvania Best Management Practices Manual.
- Section 142-404 provides that all regulated activities should minimize stormwater impacts using the Non-structural Project Design Checklist (SMO Appendix B-3).

The question is how these concepts are enforced and carried through to the site design process. In general, stormwater management and the concept of reduced impervious cover (other than zoning district-specific impervious cover maximums) is not a focus of the Zoning Ordinance or SALDO. Because GSI and LID are fundamentally land planning concepts, and are required under Pennsylvania stormwater management requirements, the Town may want to include more explicit requirements and expectations as a new section or chapter in the Zoning Ordinance.

Exemptions to Stormwater Requirements

Another challenge faced by many urban municipalities is that smaller land disturbing activities are exempt from all or certain stormwater management requirements. This is the case for Abington, which is reflected in SMO § 142-106. However, these small increases in impervious surfaces can have a significant impact on water quality and flooding in the aggregate over time. In addition, exemptions may result in lost opportunities to control existing impervious area during smaller redevelopment projects.

The Township may want to consider whether existing exemptions in the SMO are established at the optimal level. There are a wide range of considerations that should go into the decision-making process. A primary concern is that standard practices from the Pennsylvania Stormwater BMP Handbook may be impractical or too expensive for smaller properties. Alternative approaches have been developed for smaller projects that do not require complex engineering, such as requiring rain barrels, pervious pavement, or rain gardens. See https://water.phila.gov/gsi/tools for examples. Other considerations include the administrative burden on Township staff to track maintenance of these practices as well as how such an approach would be received by Township residents and businesses.

Consistency in Definitions

Some stormwater-related terms and definitions in the SMO and SALDO do not align. Most of these discrepancies are minor and would not be expected to cause conflict. However, the Township may want to review and potentially conform definitions during any comprehensive update. Examples include, but are not limited to:

- "Drainage easement" in SMO does not include reference to recordation by the Recorder of Deeds in SALDO.

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- “Floodplain” in the SMO includes areas comprised of Group 13 Soils as identified by PADEP. SALDO has an abbreviated definition of floodplain but also includes a separate definition of floodplain soils based on USDA soil surveys with specific reference to applicable soil types.
- “Floodway” in SMO provides additional detail on determining how the floodway is identified and mapped.
- “Impervious surface” in SMO and SALDO includes different examples and are structured differently, although they cover most of the same items. Note that SMO states that decks, parking areas, and driveways are not counted toward impervious areas if they do not prevent infiltration. It is noted that these areas (especially parking areas and driveways subject to compaction by vehicles) are typically considered impervious unless demonstrated otherwise.
- “Storm drainage facility” is defined in SALDO but not in SMO.
- “Water course” in SALDO is more broadly defined (including channels, ditches, or swales) than in SMO (which is limited to channels with perennial or intermittent flow).

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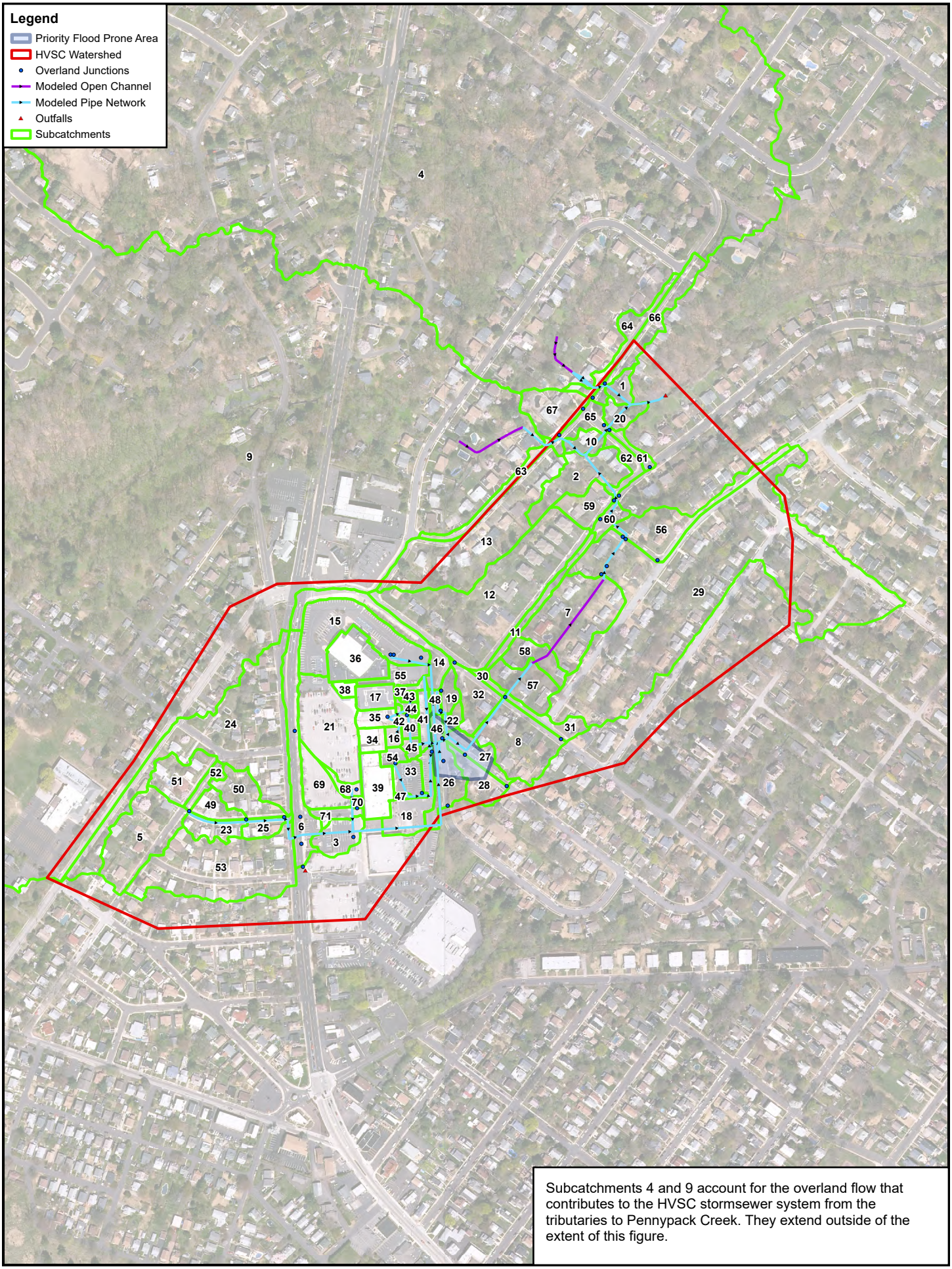
B HYDROLOGIC SUBCATCHMENT DATA

HVSC WATERSHED

NAME	AREA (ACRES)	CURVE NUMBER
1	0.24	86.1
2	1.10	86.0
3	0.51	98.0
4	215.87	85.7
5	1.76	88.0
6	1.28	98.0
7	2.08	86.0
8	1.54	87.4
9	291.90	84.6
10	0.29	86.0
11	0.40	97.1
12	4.67	87.6
13	3.13	87.9
14	0.96	96.2
15	1.80	98.0
16	0.12	98.0
17	0.34	98.0
18	0.74	98.0
19	0.23	91.7
20	0.31	86.2
21	1.79	98.0
22	0.15	88.9
23	0.42	93.4
24	4.55	89.9
25	0.28	93.6
26	0.69	93.3
27	0.45	90.9
28	0.55	89.7
29	12.05	88.3
30	0.11	97.5
31	0.35	91.9
32	0.68	88.5
33	0.36	98.0
34	0.24	98.0
35	0.26	98.0
36	0.88	98.0
37	0.10	98.0
38	0.11	98.0
39	0.67	98.0
40	0.17	98.0
41	0.25	98.0
42	0.02	98.0
43	0.06	98.0
44	0.09	98.0
45	0.12	98.0
46	0.12	93.8
47	0.03	98.0
48	0.10	92.8
49	0.36	93.3
50	0.71	90.6
51	0.78	87.3
52	0.20	93.2
53	3.22	92.2
54	0.15	98.0
55	0.35	98.0
56	1.24	90.8
57	0.79	86.1
58	0.53	86.0
59	0.55	87.6
60	0.24	92.6
61	0.16	96.4
62	0.32	93.3

NAME	AREA (ACRES)	CURVE NUMBER
63	0.39	96.6
64	0.57	92.9
65	0.42	93.3
66	0.83	92.3
67	0.84	87.4
68	0.16	98.0
69	0.64	98.0
70	0.05	98.0
71	0.22	98.0

HVSC WATERSHED



KESWICK WATERSHED

NAME	AREA (ACRES)	CURVE NUMBER
S1	25.40	90.4
S2	0.98	96.4
S3	0.29	95.0
S4	0.41	92.9
S5	4.96	88.7
S6	16.89	84.0
S7	0.41	98.0
S8	0.83	91.7
S9	1.58	90.2
S10	1.17	90.5
S11	22.74	88.2
S12	0.14	97.2
S13	5.25	85.5
S14	0.36	95.5
S15	5.89	89.1
S16	0.93	87.0
S17	4.25	82.7
S18	1.94	98.0
S19	0.12	97.0
S20	0.31	94.2
S21	10.93	89.1
S22	0.44	88.5
S32	0.18	98.0
S33	1.58	85.9
S34	0.21	97.9
S35	1.55	92.1
S36	2.02	89.5
S39	5.01	87.0
S40	12.43	90.1
S42	0.56	88.1
S43	2.17	90.7
S46	2.10	87.2
S48	0.25	98.0
S49	0.78	87.9
S50	0.87	94.7
S51	0.27	93.3
S52	1.27	89.4
S53	6.82	88.5
S57	1.01	94.6
S58	5.98	90.2
S61	1.04	90.4
S62	0.96	88.4
S64	0.29	92.5
S66	0.20	92.7
S67	0.55	97.4
S68	1.68	89.9
S69	0.22	98.0
S71	3.18	86.8
S76	0.57	93.5
S77	2.58	85.4
S78	2.99	86.7
S80	3.51	88.8
S81	0.21	98.0
S82	2.90	90.9
S83	0.70	88.4
S86	5.51	90.6
S87	0.36	96.8
S89	1.22	91.9
S92	0.03	92.3
S93	2.57	88.9
S94	0.41	92.0
S95	0.53	93.6

NAME	AREA (ACRES)	CURVE NUMBER
S96	0.68	90.4
S97	2.17	90.6
S100	2.37	95.2
S101	3.60	87.7
S102	1.59	93.1
S103	0.49	89.5
S104	5.63	88.1
S105	2.45	91.1
S106	5.47	87.6
S107	4.08	94.2
S108	0.26	94.0
S109	4.00	88.4
S110	1.45	89.8
S111	2.74	87.4
S112	2.27	86.0
S113	2.66	88.4
S114	1.38	89.8
S115	5.72	90.7
S116	0.26	98.0
S117	7.10	88.1
S118	3.73	86.7
S119	0.32	93.6
S120	0.43	94.2
S121	0.35	91.5
S122	0.32	92.5
S124	1.26	92.8
S126	3.01	85.5
S127	1.48	93.0
S132	0.94	88.2
S133	2.19	87.3
S135	1.08	88.5
S136	3.03	84.5
S137	0.31	91.7
S138	9.40	88.6
S139	2.25	88.8
S142	1.24	90.9
S144	0.39	91.6
S145	1.14	88.1
S146	2.98	98.0
S149	3.52	87.6
S150	0.42	95.4
S152	5.79	91.6
S153	0.46	91.6
S154	1.55	88.4
S156	3.14	88.5
S157	0.51	98.0
S158	1.80	87.0
S160	3.35	92.4
S161	0.99	92.9
S162	0.65	91.2
S165	1.18	92.1
S168	1.10	87.5
S169	0.58	91.1
S170	0.30	91.6
S171	0.39	93.9
S172	0.41	91.8
S173	0.74	88.7
S174	0.69	89.9
S175	0.85	90.8
S177	0.02	96.8
S178	0.85	91.7
S180	0.91	88.2

KESWICK WATERSHED

NAME	AREA (ACRES)	CURVE NUMBER
S181	1.06	91.1
S182	0.44	90.3
S183	0.41	87.5
S184	0.14	88.5
S185	0.25	93.9
S186	0.24	93.7
S187	0.45	91.7
S188	0.13	96.2
S189	0.68	89.9
S190	1.13	89.4
S192	1.43	88.1
S193	1.34	88.6

KESWICK WATERSHED