

ALLEGHENY COUNTY ACT 167 PHASE 2 COUNTY-WIDE STORMWATER MANAGEMENT PLAN EXECUTIVE SUMMARY

1. Introduction

This Stormwater Management Plan (PLAN) has been developed for Allegheny County, Pennsylvania to comply with the requirements of the 1978 Pennsylvania Stormwater Management Act, Act 167. This PLAN is the initial county-wide Stormwater Management Plan for Allegheny County, and serves as a Plan Update for the Allegheny County portions of eight watershed-based previously-approved Act 167 Plans including: Deer Creek (portion located in Allegheny County), Girty's Run, Little Sewickley Creek, Monongahela River (portion located in Allegheny County), Montour Run, Pine Creek (portion located in Allegheny County), Squaw Run, and Turtle Creek (portion located in Allegheny County), with new hydrologic modeling analyses for the Flougherty Run, Robinson Run, and Thompson Run Watersheds. The PLAN consists of Part 1, which includes a report that documents the reasoning, methodologies, and requirements necessary to implement the PLAN; Maps to illustrate the PLAN and to document the findings; and Appendices for information on which to base future decisions related to the PLAN, which is intended to be a living document as additional watersheds are studied. Part 2 of the PLAN consists of the Model Stormwater Management Ordinance including the watershed-based release rate maps. The PLAN covers legal, engineering, and municipal government topics which, combined, form the basis for implementation of a Stormwater Management Plan. It is the responsibility of the individual municipalities located within the County to adopt or amend an ordinance based on the Model Stormwater Management Ordinance to provide a consistent methodology for the management of stormwater throughout the County.

The PLAN was managed and administered by Allegheny County Economic Development in consultation with Michael Baker International, Inc. in consultation with NTM Engineering, Inc. PLAN development occurred over the course of six years: the Phase I Scope of Study took place in 2012 to 2014, and development of the Phase II Stormwater Management Plan took place in 2015 to 2017. PLAN adoption by Allegheny County Council is envisioned for May 2017. This PLAN is the product of a collaborative effort of the Watershed Plan Advisory Committee (WPAC) and the County. The WPAC members are listed in the Acknowledgements at the beginning of this document and include representatives of each municipality, watershed and environmental associations, governmental councils, County Council and staff, and other regional organizations.

2. Stormwater Management and Act 167

Effective stormwater management controls flooding, prevents soil and streambank erosion and sedimentation, promotes groundwater recharge, and improves the overall quality of the receiving streams. Prior to Act 167, stormwater control was viewed only on a site-specific basis. However, in recent years, understanding of runoff dynamics and spatial relationships across larger areas has indicated that stormwater management is more effective when evaluated on a watershed basis.

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As stated in Act 167, the “policy and purpose of this Act is to:

1. Encourage planning and management of stormwater runoff in each watershed which is consistent with sound water and land use practices;
2. Authorize a comprehensive program of stormwater management designated to preserve and restore the flood carrying capacity of Commonwealth streams; to preserve to the maximum extent practicable natural stormwater runoff regimes and natural course, current and cross-section of water of the Commonwealth; and to protect and conserve groundwaters and groundwater recharge areas; and
3. Encourage local administration and management of stormwater consistent with the Commonwealth’s duty as trustee of natural resources and the people’s constitutional right to the preservation of natural, economic, scenic, aesthetic, recreational, and historic values of the environment.” (Act 167-Section 3)

To fulfill the purpose and policy, stormwater management requires cooperation between state, county, and local officials. It involves sound planning, engineering, permitting, design, construction, operation, and maintenance of stormwater management facilities. This includes informing the public and local officials about effective stormwater management techniques, development of workable design standards and criteria, and the adoption of those standards within municipal ordinances.

This PLAN addresses the requirements of the Pennsylvania Stormwater Management Act, Act 167. The information, criteria, and standards presented in this PLAN will enable future development within Allegheny County to utilize stormwater Best Management Practices (BMPs) to properly manage stormwater runoff in the County.

The Act requires counties to prepare and adopt a stormwater management plan for each of their designated watersheds in consultation with their municipalities. Within six months following adoption of the Act 167 Plan by the Allegheny County Council and approval by the Pennsylvania Department of Environmental Protection (PaDEP), each municipality is required by the Act to adopt or amend their stormwater ordinances to be in conformance with the PLAN and to meet or exceed the requirements of the Model Ordinance. These ordinances will regulate development within the municipality to be consistent with the PLAN and the provisions of the Act. For those municipalities with watersheds included in a previously approved Act 167 Stormwater Management Plan, the Municipality must, for those watersheds, adopt or amend their stormwater management ordinance with provisions that are the stricter of either the PLAN or the previously approved Act 167 Stormwater Management Plan.

An approved Act 167 Plan requires developers to manage the quantity, velocity, and direction of stormwater runoff in a manner that adequately protects the public health and safety. Developers or anyone performing a regulated activity must implement control measures that are consistent with the provisions of the PLAN.

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3. Goals of the Study

There is an increased statewide as well as local recognition that effective stormwater management requires a diversified multi-purpose approach. This PLAN addresses a range of hydrologic consequences resulting from improper stormwater management by considering tributary timing and its effect upon streamflow and runoff volume, base flow augmentation, water quality control and ecological protection rather than simply focusing on controlling site specific peak flow. The goals determined by the County and the Watershed Plan Advisory Committee through the Phase 1 planning process include:

1. Develop a Stormwater Management Plan and Ordinance, to be adopted by all municipalities within the County, thus providing consistent regulations and requirements throughout the County that are in agreement with the NPDES and MS-4.
2. Protect and improve stream water quality and reduce runoff pollutants through encouraging the use of best management practices.
3. Preserve to the maximum extent practicable the natural stormwater runoff regimes and natural course, current, cross-section, and flood carrying capacity of water of the Commonwealth.
4. Protect and conserve groundwater and groundwater recharge through encouraging use of green solutions.
5. Provide guidance for stormwater management through the problem areas identified by the WPAC.

The purpose and goals of this Allegheny County Stormwater Management Plan are to provide reasonable regulation of activities to control runoff from new development, redevelopment projects, and other regulated activities in order to protect the health, safety, and welfare of the public. Once implemented, the PLAN will aid in lessening future flooding by preventing new sources of local uncontrolled runoff, and will improve water quality, groundwater recharge, and streambank erosion.

4. Objectives and Strategies for Stormwater Management

The following Strategies (a., b., c., etc.) are intended to achieve the stated Goals (1, 2, 3, etc.). References are provided to where the Strategies are addressed in the PLAN:

1. Develop a Stormwater Management Plan and Ordinance. The Ordinance is to be adopted by all municipalities within the County, thus providing consistent regulations and requirements throughout the County in agreement with the NPDES and MS-4.
 - a. Provide for consistent regulations and requirements across the County's municipalities (Part 2 - Model Stormwater Management Ordinance).
2. Protect and improve stream water quality and reduce runoff pollutants through encouraging the use of best management practices (BMPs).
 - a. Encourage the use of effective stormwater management BMPs (Section 9).
 - b. Describe the value of buffers and volume controls to improve water quality and pollutant reduction (Section 9).
 - c. Understand the causes of stream pollution (Section 6)
3. Preserve to the maximum extent practicable the natural stormwater runoff regimes and natural course, current, cross-section, and flood carrying capacity of water of the Commonwealth.
 - a. Provide for consistent regulations and requirements across the County's municipalities (Part 2 - Model Stormwater Management Ordinance).

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4. Protect and conserve groundwater and groundwater recharge through encouraging use of green solutions.
 - a. Discuss the relationship between site development stormwater and groundwater recharge (Section 9).
 - b. Describe the value of green solutions in the recharge of the County's groundwater (Section 9).
 - c. Require infiltration for development projects using standardized methodologies (Model Ordinance).
5. Address problem areas identified by the WPAC
 - a. Provide general solutions using BMPs (Section 5).
 - b. Demonstrate the solution process by providing specific solutions to select problem areas (Section 5, Appendix C).

5. Watershed Plan Advisory Committee

Public participation by local stakeholders is an integral part of comprehensive stormwater management planning. Coordination amongst these various groups facilitates a more inclusive PLAN that is able to better address the variety of issues experienced throughout the County. Six WPAC meetings were facilitated throughout the development of this PLAN.

A WPAC was formed at the beginning of the planning process, as required by the Stormwater Management Act. The purpose of the WPAC is to serve as an access for input, assistance, voicing of concerns and questions, and to serve as a mechanism to ensure that inter-municipal coordination and cooperation is secured. The WPAC consists of at least one representative from each of the municipalities within the County, regional planning agencies, the County Conservation District, and other representatives as appropriate. A full list of the WPAC members can be found in the Acknowledgements section at the beginning of this PLAN. For some communities, their Municipal Engineer and Solicitor were also involved.

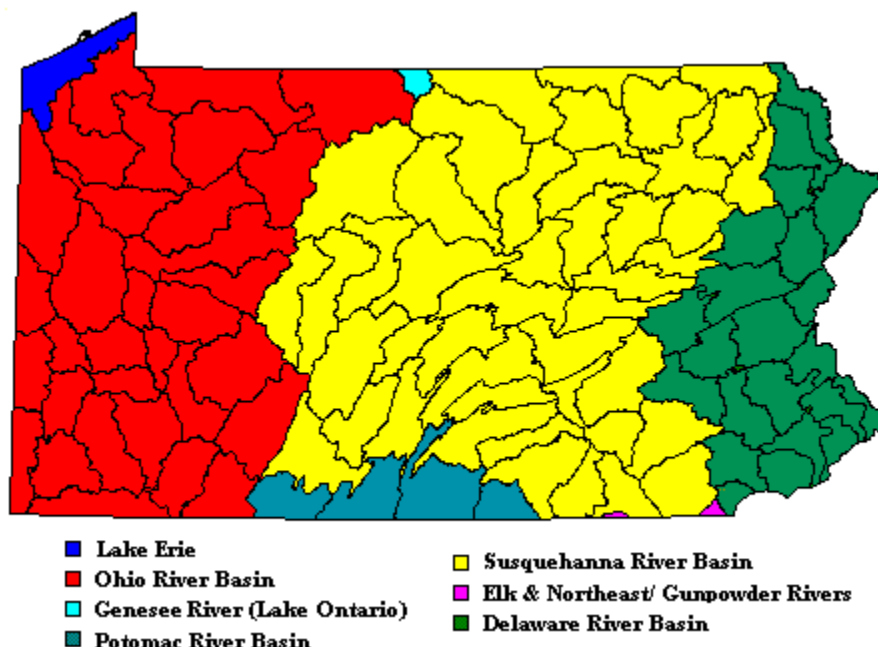
6. Watersheds

PaDEP has divided Pennsylvania into seven different major river basins based upon the major waterbody to which they are tributary, as shown in PLAN Figure 4.1. These include: Lake Erie Basin, Ohio River Basin, Genesee River Basin, Susquehanna River Basin, Potomac River Basin, Elk & Northeast / Gunpowder Rivers Basin, and Delaware River Basin. These are the largest basins within the Commonwealth.

These major river basins are further divided into "subbasins" and "Act 167 Designated Watersheds" for stormwater management purposes. Act 167 divided the Commonwealth into 29 subbasins and 357 designated watersheds. Allegheny County lies completely within the Ohio River Basin, but is tributary to three different subbasins: the Ohio River (from the confluence with the Allegheny River to the northwestern corner of Allegheny County), Monongahela River (from the southern tip of Allegheny County to the confluence with the Ohio River), and the Lower Allegheny River (from the northern edge of Allegheny County to the confluence with the Ohio River).

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PLAN Figure 4.1. Pennsylvania's Major River Basins as Delineated by PaDEP (PaDEP, 2009)



Allegheny County is approximately equally divided by area between the Ohio River, Allegheny River, and Monongahela River subbasins. The western portion of the County drains to the Ohio River, the northeastern portion drains to the Allegheny River, and the southeastern portion drains to the Monongahela River subbasin. The Monongahela River forms part of the County's border with Washington County to the south, and the Allegheny River forms part of the County's border with Westmoreland County to the east.

ACT 167 DESIGNATED WATERSHEDS

Allegheny County contains at least a portion of twenty-five (25) different Act 167 Designated Watersheds. PLAN Map 2 shows the Act 167 Designated Watersheds in Allegheny County. The Allegheny County Act 167 watersheds are:

- The Ohio River and its tributaries: Allegheny River, Big Sewickley Creek, Breakneck Creek, Chartiers Creek, Connoquenessing Creek, Flougherty Run, Little Sewickley Creek, Lowries Run, Monongahela River, Montour Run, Raccoon Creek, Robinson Run, and Sawmill Run.
- Tributaries to the Allegheny River: Buffalo Creek, Bull Creek, Deer Creek, Girtys Run, Pine Creek, Plum Creek, Pucketa Creek, and Squaw Run.
- Tributaries to the Monongahela River: Peters Creek, Turtle Creek (Thompson Run portion), and Youghiogheny River.

The above watersheds highlighted in yellow were completed previously and are updated with this PLAN, while the watersheds highlighted in blue were completed as part of this PLAN. Those which are not highlighted remain to be completed in the future.

7. Stormwater Problem Areas and Obstructions

One of the Goals of this PLAN is to "Provide guidance for problem areas identified by the WPAC." WPAC members were encouraged to complete information via web-based interactive map, forms, and surveys.

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The results were compiled and presented at WPAC Meetings #1 and #2. Throughout Phase 1, however, the project team continued working to increase municipal participation through direct contact, providing help with forms, and other assistance. The purpose of the Information Request Form and Form A was to gather information to help determine the level of commitment from each municipality, to reveal what the major stormwater issues were that affected each municipality, and to determine the location of existing problem areas and significant obstructions. The data collected was utilized in technical and non-technical aspects of the planning process.

PLAN Table 5.1 presents the information for the 241 stormwater problem areas and other responses submitted by the WPAC members in 2012. It is possible that some of these problems have since been studied, resolved, or perhaps worsened. For the Problem Areas provided, a Map Point Number was assigned to each and shown on PLAN Map 9. The descriptions, explanations, and type of problem were provided by the submitter. Each of the Stormwater Problem Areas was reviewed and a Generalized Cause of the problem was assigned by the PLAN. The PLAN explains each type of Generalized Cause and provides a recommendation for potential typical solutions for improvement. The Generalized Causes include: Streambank Erosion, Sediment/Debris Accumulation, Landslide–Concentrated Drainage onto Slope, Flooding–Inadequate or Lack of Drainage System, Flooding–Inadequately Sized Stream Culvert/Bridge and Other Floodplain Obstructions, Flooding–Development within Floodplain, Bridge Scour, and Acid Mine Drainage.

Twenty-one of the Problem Areas submitted by the WPAC members, that were judged to be either significant, regional, or illustrative stormwater related issues, were selected to be used for the purposes of providing Conceptual Solutions, rather than generalized causes and solutions. A field reconnaissance was subsequently conducted for each of these selected problem areas to: confirm problem area locations, assess existing conditions, identify the general drainage patterns, document with photographs, if possible confirm or identify the cause of the problem (usually flooding), and gather data to complete a planning level conceptual analysis. The field results and findings were then used to conduct a review of the upstream watershed to further define the causes of the stormwater issues. Conceptual solutions were then developed, along with conceptual costs and a brief report was prepared for each problem area. The Conceptual Solutions in Appendix B are intended to illustrate to the user of this PLAN the type of solutions that could be implemented for a range of stormwater problems.

A conceptual study of potential locations for siting regional detention basins was conducted. The study began by identifying tracts of public land situated in watersheds with a number of reported problem areas throughout Allegheny County. The study scope was limited to large tracts of public land because it could reasonably be assumed that these were more likely to be available for a regional stormwater project at an affordable cost than private property. Sites on Squaw Run, Flaugherty Run, Chalfant Run, Montour Run (southern location), and Falls Run are recommended for further evaluation when regional detention in each of those basins is considered in the future, as funding becomes available.

The FEMA Flood Profiles for Allegheny County were used to identify significant stream obstructions on the FEMA-mapped streams. The profile for each stream was reviewed and any feature that caused a rise in the water surface for the 10, 50, or 100-year storms was judged to be an obstruction. 657 obstructions were identified in this manner and each obstruction was assigned a unique Obstruction Number (O-1 to O-657) with a brief description/location of the obstruction. The obstructions and information are listed in the table of Appendix C-4, are shown on PLAN Map 9 – Stormwater Problems and Obstructions, and are included in the Project GIS.

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8. Water Quality

It is anticipated that the provisions of this PLAN and Model SWM Ordinance will improve the water quality of the County's waters through volume and rate controls, riparian buffers, and implementation of Green Infrastructure (GI) and Low Impact Development (LID) practices.

The Clean Water Act is a series of federal legislative acts that form the foundation for protection of U.S. water resources. Section 303(d) of the Act requires states to list all impaired waters not meeting water quality standards set by the state, even after appropriate and required water pollution control technologies have been applied (EPA, 2008). The law also requires that states establish priority rankings for waters on the list and develop Total Maximum Daily Loads (TMDLs) for these waters. A TMDL is the maximum amount of pollutant that a waterbody can receive and still safely meet the state's water quality standards for that pollutant. TMDLs are a regulatory tool used by states to meet water quality standards in impaired waterbodies where other water quality restoration strategies have not achieved the necessary corrective results.

Pursuant to the provisions of the Clean Water Act, PaDEP has an ongoing program to assess the quality of waters in Pennsylvania and identify streams, and other bodies of water, that are not attaining designated and existing uses as "impaired." Water quality standards are comprised of the uses that waters can support, and goals established to protect those uses. Each waterbody must be assessed for four different, designated uses as defined in PaDEP's rules and regulations:

1. Aquatic life,
2. Fish consumption,
3. Potable water supply, and
4. Recreation

If a stream segment is not attaining any one of its designated uses, it is considered to be "impaired" or "non-attaining" the designated uses. In Allegheny County, all but a few of the non-attaining streams were impaired for Aquatic Life use attainment, which is reflective of any component of the biological community (i.e. fish or fish food organisms). A tributary to Peters Creek is impaired for Recreational use attainment in addition to a large portion of Pine Creek and its tributaries. The main stem of Peters Creek is impaired for Potable Water Supply and Aquatic Life. The main stem of Chartiers is impaired for Fish Consumption and Aquatic Life. The source-cause of impairment varies from stream to stream. Oftentimes, there are multiple source-causes attributed for impairment of a particular stream segment. PLAN Table 6.1 shows a summary of the primary source of impairment in each Act 167 Designated Watershed within the County. It must be noted that this table does not reflect that most streams have multiple source-causes of impairment of a particular stream segment. PLAN Table 6.2 lists the non-attaining streams in Allegheny County and the source-cause of the impairment. PLAN Map 2 – Act 167 Designated Watersheds shows the impaired streams. The major source-causes of impairment in the County are: abandoned mine drainage (324 stream miles), agriculture (24 stream miles), industrial or municipal point source (e.g. sanitary sewage-SSO) (20 stream miles), urbanization (habitat modification) (140 stream miles), unknown sources (pathogens, sewage-SSO & CSO, oils/grease, metals, pH, suspended solids, etc.) (264 stream miles).

9. Stormwater Control Facilities and Floodplains

There are numerous stormwater control facilities (detention basins, wet ponds, and rain gardens) scattered throughout Allegheny County. Information on stormwater control facilities was requested from the WPAC members; a limited number of responses identified 193 stormwater control facilities. PLAN

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Table 7.2 lists these stormwater control facilities and their coordinate locations. The physical locations of these stormwater control facilities are shown on PLAN Map 13. Photographs of representative stormwater control facilities are provided in Appendix E.

Levees (typically an earthen embankment) and floodwalls are generally built along streams to prevent high stream flows from flooding lower lying areas behind the levees and floodwalls. In the event of a levee failure, flood waters will ultimately inundate the protected area landward of the levee. The extent of inundation is dependent on the flooding intensity. Failure of a levee during a 100-year flood will inundate the approximate 100-year flood plain previously protected by the levee. Residential and commercial buildings located nearest the levee overtopping or breach location will suffer the most damage from the initial embankment failure flood wave. Landward buildings will be damaged by inundation.

Municipalities in Allegheny County that have either a levee system or a floodwall within their jurisdiction are Etna Borough, City of Clairton, City of Duquesne and Shaler Township. PLAN Map 13 – Regulated Dams and Local Stormwater Control Facilities shows the locations of these levee and floodwall systems. A flood occurs when the capacity of a stream channel to convey flow within its banks is exceeded and water flows out of the main channel onto and over adjacent land. This adjacent land is known as the floodplain. For convenience in communication and regulation, floods are characterized in terms of return periods, e.g., the 50-year flood event. In regulating floodplains, the standard is the 100-year floodplain, the flood that is defined as having a one percent (1%) chance of being equaled or exceeded during any given year.

The National Flood Insurance Program (NFIP), for which Flood Insurance Rate Maps (FIRM) are published, identifies the 1% annual chance flood. These floodplain maps, or Flood Insurance Rate Maps (FIRMs), are provided to the public (<http://msc.fema.gov/>) for floodplain management and insurance purposes. This 1% annual chance flood event is used to delineate the Special Flood Hazard Area (SFHA) and identify Base Flood Elevations. The SFHA serves as the primary regulatory boundary used by FEMA, the Commonwealth of Pennsylvania and Allegheny County local governments. The FEMA SFHA for Allegheny County is illustrated on PLAN Map 14 – FEMA Flood Map.

The County-Wide Flood Insurance Study for Allegheny County was revised on September 26, 2014. This Study provides base flood information and delineates 100-year floodplains and floodways for the three major rivers and the main streams draining the County. Detailed studies that clearly define the 100-year flood elevation and the floodway and flood fringe are provided for all or portions of the streams listed in PLAN Table 7.3.

In 2007, the Pennsylvania Emergency Management Agency (PEMA) completed a statewide study of each county to determine potential damage estimates for all major flood events. The study computed damages in dollars for total economic loss, building and content damage, and also estimated the number of damaged structures per storm event (PEMA, 2009). It is important to note that these are estimates of damages and losses generated by the FEMA HAZUS flood analysis model. These estimates do not include all possible flood risk areas and are not based on actual past flood events. The following PLAN Table 7.5 summarizes the findings from this study for Allegheny County.

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STORM EVENT	NUMBER OF BUILDINGS AT LEAST MODERATELY DAMAGED	TOTAL ECONOMIC LOSS
10-Year Storm	5,929	\$7.05 billion
100-Year Storm	8,739	\$9.95 billion
500-Year Storm	12,872	\$11.4 billion

Historic flood economic losses can be good predictors of future flood losses. Table 7.6 in Section 7 – the Flood Vulnerability and Economic Impacts subsection of the PLAN shows the total amount of claims paid in each municipality according to community specific information from FEMA’s Community Information System (CIS) database. The City of Pittsburgh has the highest total paid claims (\$8.5 million) as well as the highest total premium and coverage. Other communities with notably high historic claims include: Emsworth Borough (\$5.8 million), City of McKeesport (\$3.9 million), Shaler Township (\$3.6 million), Bridgeville Borough (\$3.0 million), South Fayette Township (\$2.9 million), Oakdale Borough (\$2.5 million), and Elizabeth Borough (\$2.2 million). Communities with historic claims greater than \$1.0 million but less than \$2.0 million include: Brentwood Borough, Green Tree Borough, Hampton Township, McDonald Borough, North Fayette Township, Robinson Township, Ross Township, Sharpsburg Borough, and Turtle Creek Borough. The grand total of historic flood loss claims for all of Allegheny County is nearly \$60 million. The Report identifies the losses for all 130 municipalities in the County.

Many areas of stormwater-related flooding in Allegheny County communities, as identified above and in PLAN Section 5 (Problem Areas and Obstructions) are not in the Special Flood Hazard Area (100-year floodplain) but occur in areas distant from streams resulting from poor site design and lack of adequate stormwater management, highlighting the need to look at comprehensive stormwater management in Allegheny County. This PLAN seeks to reduce these stormwater-related floods through stormwater best management practices and updated ordinances. Other methods to reduce future flooding risk and potential future loss of life and property in floodplains include acquisition, elevation, and relocation of residential structures in high flood hazard areas and flood proofing of non-residential structures.

10. Watershed Modeling

Hydrologic models were prepared for three watersheds identified by the WPAC members and Allegheny County as the basis for the technical guidance in this Act 167 plan. PLAN Section 8–Technical Analysis and Watershed Modeling and Appendix A-Watershed Modeling Technical Data provide details of the extensive work done for the three modeled watersheds. The purpose of these models is to provide an understanding of how each watershed responds to various storm events. In addition to determining the discharge regulations in the studied watersheds, the model also provides a better understanding of specific issues identified by the individual communities in Allegheny County. The hydrologic methodology utilized for the purpose of this study is based on unit hydrograph theory and the runoff Curve Number (CN) method consistent with Technical Release 55 published by NRCS. This method was selected as it is highly applicable to the watersheds in this region and widely used for this type of study within Pennsylvania. The software selected for this study is HEC-HMS, the US Army Corps of Engineers’ Hydrologic Modeling System. These models provide a realistic rainfall-runoff response under both existing conditions and anticipated future development conditions. These were then used to develop their respective stormwater management districts and release rates within each watershed.

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The three watersheds within Allegheny County selected for detailed hydrologic modeling included Flaugherty Run, Robinson Run and Thompson Run. The Thompson Run watershed had a previous Act 167 study which will be superseded by this analysis. These watersheds were delineated into subbasins based on natural watershed divides as well as the locations of selected problem areas. Detailed descriptions of each studied watershed follow

Flaugherty Run Watershed

This watershed is located in the northwest region of Allegheny County and part of the watershed is located within Beaver County. Flaugherty Run flows to the north and discharges to the Ohio River. The watershed drains an area of approximately 8.8 square miles, of which 7.7 square miles are located in Allegheny County. The municipalities at least partially located in the watershed include Moon Township, Crescent Township, and Findlay Township. There are no PADEP permitted dams located within this watershed.

Robinson Run Watershed

This watershed is located in the southwest region of Allegheny County and part of the watershed is located within Washington County. Robinson Run flows to the north and discharges to the Ohio River. The watershed drains an area of approximately 39.9 square miles, of which 29.7 square miles are located in Allegheny County. The municipalities at least partially located in the watershed include North Fayette Township, Collier Township, South Fayette Township, Robinson Township, Oakdale Borough, and McDonald Borough. Two PADEP permitted dams are located within this watershed, namely, the Bayer Corporation Dam (PADEP Dam # 02-119) and the Lisowski Dam (PADEP Dam #02-137). Both of these dams are relatively small and their impacts to the overall watershed hydrology are considered negligible.

Thompson Run Watershed

This watershed is located in the eastern region of Allegheny County and is part of the larger Turtle Creek Watershed. Thompson Run flows into Turtle Creek, which then flows to the Monongahela River. The Thompson Run Watershed drains an area of approximately 17.9 square miles, all of which is located within Allegheny County. The municipalities at least partially located in the watershed include Penn Hills, Monroeville, Wilkins Township, Churchill, Plum, Turtle Creek, Wilkesburg, Chalfant, Forest Hills, and East Pittsburgh. There are no PADEP permitted dams located within this watershed.

Once the existing conditions model was calibrated and the existing conditions peak flows were established, additional models were developed to assist in determining appropriate stormwater management controls for the watersheds. Based on a comparison of existing and future land use, most subbasins will experience varying degrees of development through the full build-out future condition. A future conditions model was developed and analyzed using the projected future land use coverage for the year 2025 provided by Allegheny County. The revised land use resulted in an increased CN and a decreased Tc for most subbasins. It was assumed that there was no required detention or any other stormwater controls in this simulation to see the impact of no proper stormwater management controls. A summary of the increase in flows is provided in PLAN Table 6.5. A full listing of the peak flow increase by each subbasin may be found in Appendix A.

When substantial increases are found in the HEC-HMS model due to additive effects of future development, it may be necessary to restrict post-development discharges to a fraction of pre-development flow. The fraction has historically ranged between 50 and 100 percent of the pre-development flow in previous Act 167 efforts. For example, a 70% release rate district would indicate that any future development within the district be required to restrict post-development flows to 70% of pre-development flows.

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The following criteria were examined before applying release rates to the modeled watersheds:

1. Numerous problem areas exist in a pattern that indicate systemic stormwater problems;
2. Historic, repeated flooding has been observed;
3. Future planning projections indicate growth patterns that have historically contributed to documented problems.

When the above criteria indicate a need for additional stormwater management controls, release rates are considered. The results from hydrologic models are used as guidance to establish appropriate release rates. Ultimately, reasonable hydrologic judgment is used in the final designation of release rates.

Modeled Watersheds

Evaluation of the Flaugherly Run, Robinson Run, and Thompson Run watersheds indicate a need for stormwater management districts. The watersheds have had numerous problem areas in patterns indicative of systemic problems and future growth is projected throughout the watershed. Stormwater management districts have been developed for the watersheds with release rates ranging between 50 and 100% plus conditional direct discharge districts.

Conditional direct discharge districts were used in areas of the watersheds where stormwater detention has the potential to increase peak flows at the points of interest. In the conditional direct discharge district, development sites that can discharge directly to the main channel or tributaries, or can discharge indirectly to the main channel through the existing stormwater drainage system may do so without control of post-development peak rate of runoff greater than the 5-year storm. Volume control and infiltration requirements will still apply and sites using the existing stormwater drainage system must provide any necessary improvements to the existing drainage system such that the system has adequate capacity to convey the 5-year post-development peak flow. If these requirements cannot be met, a release rate of 100% will be applied.

Watersheds Not Modeled

Evaluation of problem areas in the remaining watersheds in the County also indicates a need for stormwater management to alleviate systemic problems and manage the future growth projected throughout the County. Areas where detailed hydrologic modeling was not performed, either as part of this PLAN or previous Act 167 Plans, have been assigned release rates of 100%. Volume control, streambank erosion and infiltration requirements will still apply in these areas; even with a 100% release rate, the combination of controlling peak rates at current levels and reducing the total volume of runoff will serve to reduce flows to existing problem areas and will prevent new problem areas from occurring due to future development. See Section 9 – Stormwater Management and the subsection Criteria for Control of Stormwater Runoff for further details on these controls for modeled and non-modeled watersheds.

Maps showing the stormwater management districts from this PLAN's modeling and previous Act 167 plans are in the *Model Ordinance Subappendix A-1 - Stormwater Management Districts*.

Recommendations from the Watershed Modeling & Analysis

The modeling results discussed in this and previous sections provide technical guidance on provisions that are included in the Model Ordinance. The following recommendations follow from the technical analysis and data collection efforts in preparing this PLAN.

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CN and Tc methodologies should be restricted to reflect the observed runoff response in the hydrologic models. It is recommended for CN calculations to assume “good conditions” when using any CN table, which is consistent with proposed control guidance. It is recommended for Tc computations to use the maximum value provided by 1) the TR-55 segmental method and 2) the NRCS Lag Equation.

Implement a volume control guideline in addition to a traditional peak rate methodology. It has been shown that there is a definite reduction in peak discharge in all storm events with the implementation of the control guideline criteria. The control guideline criteria will provide a direct benefit with volume reduction and also an indirect benefit of channel protection.

Implement and enforce a flexible yet clearly documented release rate policy for specified watersheds. The stormwater management districts are provided in the Model *Ordinance Subappendix A-1*. These are to be used to determine the allowable post-development peak flow rate. The use of strategically placed regional facilities and watershed-scale conservation, drainage way, and critical recharge area easements should also be considered as an alternative to release rate implementation.

Provide a clear alternative volume control and peak rate control strategy for areas with poorly-drained soils or areas with geologic restrictions. Allegheny County has a substantial number of potential limitations to infiltration facilities: poorly drained soils, hydric soils, shallow bedrock, floodplains, other geologic restrictions, environmental concerns, and documented problem areas. Sections 303.A.2 and 303.B.2 provide an alternative to infiltration for those particular sites where removal of flow by reuse, evaporation, transpiration, and infiltration can be documented not feasible to the satisfaction of the municipal reviewer of the SWM site plan.

11. Control of Stormwater Runoff

The principal purpose of this PLAN is to develop criteria for control of stormwater runoff that are specific to the watersheds in Allegheny County. Mathematical modeling techniques, as discussed in the previous section, were used to simulate the existing conditions throughout the three watersheds modeled in Allegheny County and to determine the effects anticipated future development will have on stormwater runoff within these watersheds. The models were used to determine the outcome of a variety of different stormwater control scenarios. These results were then used to determine a group of control criteria that provides the best results on a watershed-wide basis. The outcome of each analysis is stormwater control criteria that are appropriate and applicable to that watershed.

The process of developing unique controls for individual watersheds is complicated by the reality that regulations must be implemented and enforced across varying jurisdictions. The more site-specific and complicated a regulatory structure is, the more difficult it becomes to implement the regulations. For this reason, it is most advantageous to develop a system of controls that are similar in structure but can also be adjusted as necessary to meet the specific requirements of each watershed. The need for balance between these two important concepts has led to the system of stormwater control criteria contained within this PLAN.

A broad and uniform approach has been developed for implementation of water quality, volume control, and channel protection controls. These criteria have been developed with adequate latitude in implementation to be applicable to most watersheds. Peak discharge rate control standards, which are unique to each watershed, have been developed to achieve watershed-specific controls.

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Peak Discharge Rate Controls

Peak discharge rate controls have been the primary method of implementing stormwater management controls for many years. Peak rate controls are generally applied to individual sites with little to no consideration given to how the site discharge impacts overall stream flows. It is necessary to consider the cumulative effects of site level peak rate controls and their contribution to the overall watershed hydrology in order to control regional peak flows. This is accomplished through mathematical modeling of the watershed. The intent of the modeling is to analyze the flow patterns of the watershed, the impact of development on those patterns, and, if necessary, develop a release rate for various subwatersheds such that the rate of release of the increased volumes of runoff generated is not detrimental to downstream areas. This, in conjunction with the volume controls, is a sound stormwater management policy.

In some subbasins, it is necessary to implement release rates that require sites to discharge at flows lower than those calculated for pre-development flows. This is due to the timing of the peak flows from all of the subbasins and how flows from the subbasin in question impact the overall stream flows. Variable release rates for subbasins throughout a watershed are an important part of achieving regional peak flow controls. The proposed release rates calculate no peak flow increase above the existing condition peak flows at any point throughout the County watersheds. Strict release rates for the more frequent design storms are necessary to meet this criterion in some subwatersheds.

Volume Controls

Developed sites experience an increased volume of runoff during all precipitation events. The increased volume of stormwater is the cause of several related problems such as increased channel erosion, increased main channel flows, and reduced water available for groundwater recharge. Reducing the total volume of runoff is key in minimizing the impacts of development. Volume reduction can be achieved through reuse, infiltration, transpiration, and evaporation. When infiltration is used as a stormwater management technique, multiple goals are achieved through implementation of a single practice. Infiltrating runoff reduces release rates, reduces release volumes, increases groundwater recharge, and provides a level of water quality improvement. These opportunities will be provided by use of stormwater Best Management Practices (BMPs), such as infiltration structures, replacement of pipes with swales, and disconnecting roof drains. Other methods that may be used are decreased impervious cover, maximizing open space, and preservation of soils with high infiltration rates. However, for sites with poorly drained soils, hydric soils, shallow bedrock, floodplains, other geologic restrictions, or environmental concerns, an alternative to infiltration should be provided. It is not possible within this PLAN or Model SWM Ordinance to describe every possible site condition that may occur so the decisions regarding whether a particular site is appropriate for infiltration begin with the developer providing justification and the municipality's qualified professional reviewing the SWM site plan must agree. Where approved, the extended detention of stormwater on site will reduce the volume flowing to the streams during the critical time for flooding. In addition, the extended detention will aid in the reduction of overflow volumes from combined sanitary sewer systems by delaying flow to the interceptors and treatment plant.

The proposed volume controls for this PLAN include two pieces:

1. Reduction of runoff generated through utilization of Green Infrastructure and Low Impact Development (LID) practices to the maximum extent practicable.
2. Permanent removal of a portion of the runoff volume generated from the total runoff flow to the maximum extent practicable.

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Water Quality Controls

Urban runoff is one of the primary contributors to water pollution in developed areas. The most effective method for controlling nonpoint source pollution is through reduction, or elimination, of the sources. It is not reasonable to assume that all sources of pollution can be reduced or eliminated. For this reason, implementation of natural and engineered systems must be used to achieve the desired results. The water quality control standards will be achieved through the use of various BMPs to reduce the sources of water pollution and treat those that cannot be eliminated.

A combination of source reduction measures through non-structural BMPs and water quality treatment through use of structural BMPs is the proposed water quality control strategy of this PLAN. Reducing the amount of runoff to be treated is the preferred strategy to meet this goal:

- Minimize disturbance to floodplains, wetlands, natural slopes over 15%, and existing native vegetation.
- Preserve and maintain trees and woodlands. Maintain or extend riparian buffers and protect existing forested buffer. Provide trees and woodlands adjacent to impervious areas whenever feasible.
- Establish and maintain non-erosive flow conditions in natural flow pathways.
- Minimize soil disturbance and soil compaction. Over disturbed areas, replace topsoil to a minimum depth equal to the original depth or four (4) inches, whichever is greater. Use tracked equipment for grading when feasible.
- Disconnect impervious surfaces by directing runoff to pervious areas, wherever possible.
- Establish riparian buffers along streams to slow overland flow to the stream through the presence of a band of native grasses, trees and shrubs, allowing infiltration/groundwater recharge, causing deposition of sediment, nutrients, pesticides, and other pollutants in the buffer rather than in the stream, and reducing erosion by providing stream bank stabilization. The buffer trees will provide shade for the streams, keeping the waters cooler and reduction in-stream evaporation.

Treating the runoff that cannot be eliminated is the secondary strategy for attaining the water quality standards. By directing runoff through one or more BMPs, runoff will receive some treatment for water quality, thereby reducing the adverse impact of contaminants on the receiving body of water.

12. Stormwater Regulations and Related Plans

It is helpful to assess the current regulations when undertaking a comprehensive planning effort. At the federal level the regulations are generally broad in scope and aimed at protecting health and human welfare, protecting existing water resources and improving impaired waters. Regulations generally become more specific as their jurisdiction becomes local. This system enables specific regulations to be developed, which are consistent with national policy, yet meet the needs of the local community. Existing federal regulations affecting stormwater management are very broad in scope and provide a national framework within which all other stormwater management regulations are developed. Pennsylvania has developed stormwater regulations that meet the federal standards and provide a statewide system for stormwater regulation, and are more specific than federal regulations. In Pennsylvania, stormwater management regulations generally exist at the municipal level, but must meet the overarching requirements of the Federal and State laws. A review of the existing municipal regulations helps us understand the complex system of local regulations and develop watershed-wide policy that fits local needs and also provides regional benefits.

On April 17, 2012, Allegheny County adopted an update to the Subdivision and Land Development Ordinance (SALDO), Ordinance 09-12-OR. The Allegheny County SALDO governs the subdivision and development of land in municipalities within the County that have not enacted their own SALDO. PLAN

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Table 10.6 provides a summary of existing regulations for the municipalities in Allegheny County including Zoning, SALDO, Stormwater, and Floodplain Ordinances. PLAN Table 10.7 is a brief summary of specific regulations within the SALDO of each municipality with regard to stormwater management provisions for roads, grading, erosion & sedimentation, water quality, release rates, infiltration requirement, and sustainable/green infrastructure.

13. Stormwater Management Model Ordinance

Providing stormwater management standards throughout the County is one of the stated goals of the PLAN. From a regulatory perspective, the stormwater management standards and criteria developed in the PLAN will be implemented through municipal adoption or amendment of a stormwater management ordinance by all of the municipalities in Allegheny County. PLAN *Section 11 – Provisions for Plan Implementation, Review, and Update* and Section 14 of this Executive Summary provide details for Municipal adoption and implementation.

Under Act 167, PaDEP is directed to develop a model stormwater ordinance. In the past decade, PADEP has updated its guidance documents and developed model stormwater ordinances to address water quality in addition to quantity, and to encourage counties to prepare plans on a county-wide basis as an alternative to the individual watershed planning approach. The new PADEP policy also stresses the opportunity for municipalities to retrofit existing sites to improve existing water quality impairments or existing problem area flooding sources. Furthermore, the PLAN goals and objectives are to be developed and implemented to be consistent with the anti-degradation criteria of the Pennsylvania Clean Streams Law and the federal National Pollutant Discharge Elimination System (NPDES) Phase II requirements.

In May 2016 PaDEP issued an updated Model Stormwater Management Ordinance. PaDEP's stated intention in publishing the May 2016 Model Ordinance is that its use will satisfy both Act 167 requirements and, for MS4s, regulatory requirements as implemented through NPDES permits. The Model Ordinance includes provisions to address federal regulations at 40 CFR § 122.34 that require the use of ordinances by small MS4s to address 1) the prohibition of unauthorized non-stormwater discharges (MCM #3), 2) erosion and sediment controls for construction activities involving earth disturbances of one acre or more (or disturbances less than one acre if the construction activity is part of a larger common plan of development or sale that would disturb one acre or more) (MCM #4), and 3) post-construction stormwater management for new development and redevelopment projects (MCM #5).

From the practical development viewpoint, the stormwater management controls will be brought into existence through use of comprehensive stormwater management site planning and various stormwater BMPs. Site designs that integrate a combination of source-reducing, non-structural BMPs and runoff control structural BMPs will be able to achieve the proposed standards.

The ordinances to be adopted by the municipalities will apply to all Regulated Activities defined as any earth disturbance activity or any activities that involve the alteration or development of land in a manner that may affect stormwater runoff.

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Article III of the Model Ordinance sets forth the Stormwater Management requirements:

Section 301. General Requirements

- A. For all regulated activities, unless preparation of an SWM Site Plan is specifically exempted in Section 302:
 - 1. Preparation and implementation of an approved SWM Site Plan is required.
 - 2. No regulated activities shall commence until the Municipality issues written approval of an SWM Site Plan, which demonstrates compliance with the requirements of this Ordinance.
- B. SWM Site Plans approved by the Municipality, in accordance with Section 406, shall be on site throughout the duration of the regulated activity.
- C. These standards apply to the landowner and any person engaged in regulated activities.
- D. For all regulated earth disturbance activities, erosion and sediment control BMPs shall be designed, implemented, operated, and maintained during the regulated earth disturbance activities (e.g., during construction) to meet the purposes and requirements of this Ordinance and to meet all requirements under Title 25 of the Pennsylvania Code and the Clean Streams Law. Various BMPs and their design standards are listed in the *Erosion and Sediment Pollution Control Program Manual (E&S Manual⁴)*, No. 363-2134-008, as amended and updated.
- E. Impervious areas:
 - 1. The measurement of impervious areas shall include all of the impervious areas in the total proposed development even if development is to take place in stages.
 - 2. For development taking place in stages, the entire development plan must be used in determining conformance with this Ordinance.
 - 3. For projects that add impervious area to a parcel, the total impervious area on the parcel is subject to the requirements of this Ordinance; except that the volume controls in Section 303 and the peak rate controls of Section 304 do not need to be retrofitted to existing impervious areas that are not being altered by the proposed regulated activity.
- F. Stormwater flows onto adjacent or downstream property shall not be created, increased, decreased, relocated, impeded, or otherwise altered without written notification of the affected property owner(s). Notification shall include a description of the proposed development and the stormwater flows that are being created, increased, decreased, relocated, impeded, or otherwise altered. Adjacent property shall at a minimum include any property having a shared boundary with the subject property of the SWM Site Plan, however, if in the judgement of the Designated Plan Reviewer additional properties are being affected, additional notifications may be required. Proof of notification (signed postal receipt for example) shall be included as part of the SWM Plan submission to the Municipality. Such stormwater flows shall be subject to the requirements of this Ordinance.
- G. All regulated activities shall include such measures as necessary to:
 - 1. Protect health, safety, and property.
 - 2. Meet the water quality goals of this Ordinance by implementing measures to:
 - a. Minimize disturbance to floodplains, wetlands, and wooded areas.
 - b. Maintain or extend riparian buffers.

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- c. Avoid erosive flow conditions in natural flow pathways.
 - d. Minimize thermal impacts to waters of this Commonwealth.
 - e. Disconnect impervious surfaces by directing runoff to pervious areas, wherever possible.
3. Incorporate methods described in the *Pennsylvania Stormwater Best Management Practices Manual* (BMP Manual³). If methods other than green infrastructure and LID methods are proposed to achieve the volume and rate controls required under this Ordinance, the SWM Site Plan must include a detailed justification, acceptable to the Designated Plan Reviewer, demonstrating that the use of LID and green infrastructure is not practicable.
- H. Infiltration BMPs should be dispersed throughout the project site at strategic locations, made as shallow as practicable, and located to maximize use of natural on-site infiltration features while still meeting the other requirements of this Ordinance.
 - I. Normally dry, open top, storage facilities should completely drain both the volume control and rate control capacities over a period of time not less than 24 and not more than 72 hours from the end of the design storm.
 - J. The design storm precipitation depths to be used in the analysis of peak rates of discharge shall be as obtained in PennDOT's Drainage Manual, Publication 584, Appendix 7A; or obtained from the latest version of the Precipitation-Frequency Atlas of the United States, National Oceanic and Atmospheric Administration (NOAA), National Weather Service, Hydrometeorological Design Studies Center, Silver Spring, Maryland. NOAA's Atlas 14⁵ can be accessed at: <http://hdsc.nws.noaa.gov/hdsc/pfds/>.
 - K. For all regulated activities, SWM BMPs shall be designed, implemented, operated, and maintained to meet the purposes and requirements of this Ordinance and to meet all requirements under Title 25 of the Pennsylvania Code, the Clean Streams Law, and the Storm Water Management Act.
 - L. Various BMPs and their design standards are listed in the BMP Manual³.
 - M. The municipality may, after consultation with PaDEP, approve measures for meeting the state water quality requirements other than those in this Ordinance, provided that they meet the minimum requirements of, and do not conflict with, state law including, but not limited to, the Clean Streams Law.

Section 302. Exemptions

- A. Regulated activities that result in cumulative earth disturbances less than one (1) acre are exempt from the requirements in Section 401 of this ordinance except as provided in paragraph B below.
- B. Earth disturbances between one-quarter (0.25) acre (10,890 square feet) and one (1) acre of earth disturbance must submit a SWM Site Plan to the Municipality which shall consist of the following items and related supportive material needed to determine compliance with Sections 303 through 305. The applicant can use the protocols in the Small Project Stormwater Management Site Plan if Municipality has adopted Appendix C.
 - a. General description of proposed stormwater management techniques, including construction specifications of the materials to be used for stormwater management facilities.
 - b. An erosion and sediment control plan, including all reviews and letters of adequacy from the Conservation District where appropriate.
 - c. Limits of earth disturbance, including the type and amount of impervious area that is proposed; proposed structures, roads, paved areas, and buildings; and a statement, signed by the Applicant, acknowledging that any revision to the approved drainage plan must be approved by the Municipality, and that a revised erosion and sediment control plan must be submitted to the Municipality or Conservation District for approval.

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- d. All stormwater management facilities must be located on a plan and described in detail; and all calculations, assumptions, and criteria used in the design of the stormwater management facilities must be shown.
- C. Agricultural activity is exempt from the SWM Site Plan preparation requirements of this Ordinance provided the activities are performed according to the requirements of 25 Pa. Code Chapter 102.
- D. Forest management and timber operations are exempt from the SWM Site Plan preparation requirements of this Ordinance provided the activities are performed according to the requirements of 25 Pa. Code Chapter 102.
- E. Roadway resurfacing and maintenance projects, which do not increase impervious area, and underground infrastructure projects are exempt from the provisions of this Ordinance, provided the activities meet the requirements of all other Municipal, State and Federal requirements.
- F. Exemptions from any provisions of this Ordinance shall not relieve the applicant from the requirements in Sections 301.D. through J.
- G. The Municipality may deny or revoke any exemption pursuant to this Section at any time for any project that the Municipality believes may pose a threat to public health and safety or the environment.
- H. Voluntary Green Stormwater Infrastructure (GSI) retrofit projects that are solely intended to better manage runoff from existing development and are not part of new development or redevelopment, are exempt from the stormwater management provisions of this Ordinance. This does not exempt such projects from any other municipal, state, or federal regulation.

Section 303. Volume Controls

The green infrastructure and low impact development practices provided in the BMP Manual³ shall be utilized for all regulated activities wherever possible. Water volume controls shall be implemented using the *Design Storm Method* in Subsection A or the *Simplified Method* in Subsection B below. Water volume controls shall be implemented using the Design Storm Method in Subsection A or the Simplified Method in Subsection B below, or alternative design criteria as allowed by PA Code Title 25, Chapter 102.

- A. The *Design Storm Method* (CG-1 in the BMP Manual³) is applicable as a method to any size of regulated activity. This method requires detailed modeling based on site conditions. The following shall be incorporated into the CG-1 method:
 1. Do not increase the post-development total runoff volume for all storms equal to or less than the 2-year 24-hour duration precipitation.
 2. At least the first one inch of runoff from the net increase in impervious surfaces shall be permanently removed from the runoff flow, i.e., it shall not be released into the surface waters of this Commonwealth. Removal options include reuse, evaporation, transpiration, and infiltration. If the developer provides justification that the listed removal options are not feasible, and the Designated Plan Reviewer agrees, runoff shall be detained in a facility designed for a 24 to 72-hour dewatering time in an area with a dedicated stormwater system (not contributory to a combined sewer system) and shall be detained in a facility designed for a 72-hour dewatering time in an area contributory to a combined sewer system before discharge to local stormwater systems or the environment.
 3. For modeling purposes:
 - a. Existing (predevelopment) non-forested pervious areas must be considered meadow in good condition.
 - b. 20% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions.

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- B. The *Simplified Method* (CG-2 in the BMP Manual³) provided below is independent of site conditions and should be used if the *Design Storm Method* is not followed. This method is not applicable to regulated activities greater than one acre or for projects that require design of stormwater storage facilities. For new impervious surfaces:
1. Stormwater facilities shall capture at least the first two (2) inches of runoff from the net increase in impervious surfaces.
 2. At least the first one inch of runoff from the net increase in impervious surfaces shall be permanently removed from the runoff flow, i.e., it shall not be released into the surface waters of this Commonwealth. Removal options include reuse, evaporation, transpiration, and infiltration. If the developer provides justification that the listed removal options are not feasible, and the Designated Plan Reviewer agrees, runoff shall be detained in a facility designed for a 24-hour dewatering time in an area with a dedicated stormwater system (not contributory to a combined sewer system) and shall be detained in a facility designed for a 72-hour dewatering time in an area contributory to a combined sewer system before discharge to local stormwater systems or the environment.
 3. Wherever possible, infiltration facilities should be designed to accommodate infiltration of the entire permanently removed runoff; however, in all cases at least the first 0.5 inch of the permanently removed runoff should be infiltrated.
 4. This method is exempt from the requirements of Section 304, Rate Controls.

Section 304. Rate Controls

- A. For areas not covered by a release rate map from an approved Act 167 Stormwater Management Plan:
- Post-development discharge rates shall not exceed the pre-development discharge rates for the 1-, 2-, 5-, 10-, 25-, 50-, and 100-year, 24-hour storm events. If it is shown that the peak rates of discharge indicated by the post-development analysis are less than or equal to the peak rates of discharge indicated by the pre-development analysis for 1-, 2-, 5-, 10-, 25-, 50-, and 100-year, 24-hour storms, then the requirements of this section have been met. Otherwise, the applicant shall provide additional controls as necessary to satisfy the peak rate of discharge requirement. Peak flows should be computed using the methods included in the Chapter titled "Stormwater Calculations and Methodology" of the PADEP Stormwater Management BMP Manual.
- B. For areas covered by a release rate map from an approved Act 167 Stormwater Management Plan:
- For the 1-, 2-, 5-, 10-, 25-, 50-, and 100-year, 24-hour storm events, the post-development peak discharge rates will follow the applicable approved release rate maps. For any areas not shown on the release rate maps, the post-development discharge rates shall not exceed the pre-development discharge rates for the specified design events. Peak flows should be computed using the methods included in Chapter 8 of the PADEP Stormwater Management BMP Manual.

Section 305. Riparian Buffers

- A. In order to protect and improve water quality, a Riparian Buffer Easement shall be created and recorded as part of any subdivision or land development that encompasses a Riparian Buffer. The intent of this ordinance in establishing a Riparian Buffer is to protect and improve stream water quality. The Riparian Buffer is intended to slow overland flow to the stream through the presence of native grasses, trees and shrubs, allowing infiltration/groundwater recharge; causing deposition of sediment, nutrients, pesticides, and other pollutants in the buffer rather than in the stream; and reducing erosion by providing stream bank stabilization. The trees provide shade for streams; keeping waters cooler and reducing evaporation.
- B. Except as required by PA Code Title 25 Chapter 102, the Riparian Buffer Easement shall be required for all streams (as defined in Article II) with a contributing watershed area of greater than 10 acres. The

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Riparian Buffer Easement shall be measured to be a minimum of 35 feet from the top of the streambank (on each side).

- C. Minimum Management Requirements for Riparian Buffers.
 - 1. No use or construction within the Riparian Buffer shall be permitted that is inconsistent with the intent of the Riparian Buffer as described in Section 305.A.
 - 2. Existing native vegetation shall be protected and maintained within the Riparian Buffer Easement.
 - 3. Whenever practicable, invasive vegetation shall be actively removed and the Riparian Buffer Easement shall be planted with native trees, shrubs and other vegetation to create a diverse native plant community appropriate to the intended ecological context of the site.
- D. The Riparian Buffer Easement shall be enforceable by the Municipality and shall be recorded in the appropriate County Recorder of Deeds Office, so that it shall run with the land and shall limit the use of the property located therein. The easement shall allow for the continued private ownership and shall count toward the minimum lot area required by Zoning, unless otherwise specified in the municipal Zoning Ordinance.
- E. Any permitted use within the Riparian Buffer Easement shall be conducted in a manner that will maintain the extent of the existing 100-year floodplain, improve or maintain the stream stability, and preserve and protect the ecological function of the floodplain.
- F. Stormwater drainage pipes shall be permitted within the Riparian Buffer Easement, but they shall cross the Easement in the shortest practical distance. Other structural stormwater management facilities are not permitted within the Riparian Buffer Easement.
- G. The following conditions shall apply when public and/or private recreation trails are permitted by the Municipality within Riparian Buffers:
 - 1. Trails shall be designed to be permeable and for non-motorized use only.
 - 2. Trails shall be designed to have the least impact on native plant species and other sensitive environmental features.
- H. Septic drainfields and sewage disposal systems shall not be permitted within the Riparian Buffer Easement and shall comply with setback requirements established under 25 Pa. Code Chapter 73.
- I. New sanitary sewage conveyance pipes shall be permitted within the Riparian Buffer Easement but the Easement shall not be used as a linear utility easement. Pipes shall cross the Easement in the shortest practical distance. Existing utilities may remain and be maintained as required.

End Article III of the Model Ordinance

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14. County and Municipal Responsibilities

The Stormwater Management Plan preparation process will be completed with the County adoption of the PLAN and submission of the adopted PLAN to PaDEP for approval (circa May 2017). This will set in motion the mandatory schedule of adoption of ordinances needed to implement stormwater management criteria. The municipalities have six months from PaDEP approval to adopt the necessary ordinance provisions.

Upon final approval by PaDEP, each municipality within the County will become responsible for implementation of the PLAN, which encompasses the following activities:

- Review of existing municipal ordinances to determine compliance with the PLAN;
- Adoption of municipal ordinances that enable implementation of the PLAN's provisions; noting that the PLAN requires:
 - A Municipality, that does not have a stormwater management ordinance, to adopt a stormwater management ordinance in conformance with the PLAN including the Model Stormwater Management Ordinance;
 - A Municipality that has a stormwater management ordinance, that Municipality must review and amend their existing ordinance to conform to the PLAN including the Model Ordinance;
 - A Municipality with watersheds included in a previously approved Act 167 Stormwater Management Plan, the Municipality must, for those watersheds, adopt or amend their stormwater management ordinance with provisions that are the stricter of either the PLAN or the previously approved Act 167 Stormwater Management Plan;
 - A Municipality with watersheds not included in an approved Act 167 Stormwater Management Plan but with a stormwater management ordinance with stricter provisions than those in the PLAN, the Municipality is encouraged to incorporate those stricter provisions into any amended stormwater management ordinances.
- Review of drainage plans for all activities regulated by the PLAN and the resulting ordinances; and
- Enforcement of the municipal regulations.

Each municipality will need to determine how to best implement the provisions of this PLAN within their jurisdiction. Four basic models for PLAN implementation are presented in PLAN Table 11.1 below. It may be advantageous for multiple municipalities to implement the PLAN cooperatively or even on a county-wide basis.

PLAN Table 11.1 - Models for Municipal Plan Implementation

Individual Municipal Model	Each municipality passes, implements, and enforces the Stormwater Management Ordinance individually. Reviews may be conducted at the local level or by MOU with an agency such as the ACCD.
Multi-Municipal Model	Several municipalities cooperate through a new or existing service-sharing agreement (COG, Sewage Association, etc.)
Multi-Municipal Stormwater Authority	A regional stormwater authority with the ability to impose stormwater fees and borrow capital for projects that could provide effective and uniform implementation.
County-wide Service Provider Model	County level agency, or office, (e.g. Allegheny County Conservation District) provides Stormwater Management Ordinance implementation and enforcement services to the municipalities.

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Regardless of which model is used for implementation, each municipality will need to adopt regulations that enable the chosen implementation strategy. For municipalities that choose the Individual Municipal Model, this means municipal adoption of the Model Ordinance or integration of the PLAN's provisions into existing municipal regulations. For the other three models, this will require ordinance provisions that designate the regulatory authority and adoption of an inter-municipal agreement or service-sharing agreement.

It is important that the standards and criteria contained in the PLAN are implemented correctly, especially if the municipality chooses to integrate the standards and criteria into existing regulations. In either case, it is recommended that the resulting regulatory framework be reviewed by the municipal engineer, the local planning commission, and the municipal solicitor for compliance with the provisions of the PLAN and consistency among the various related regulations. Additionally, the adopted regulations may be reviewed by PaDEP for compliance with this PLAN.