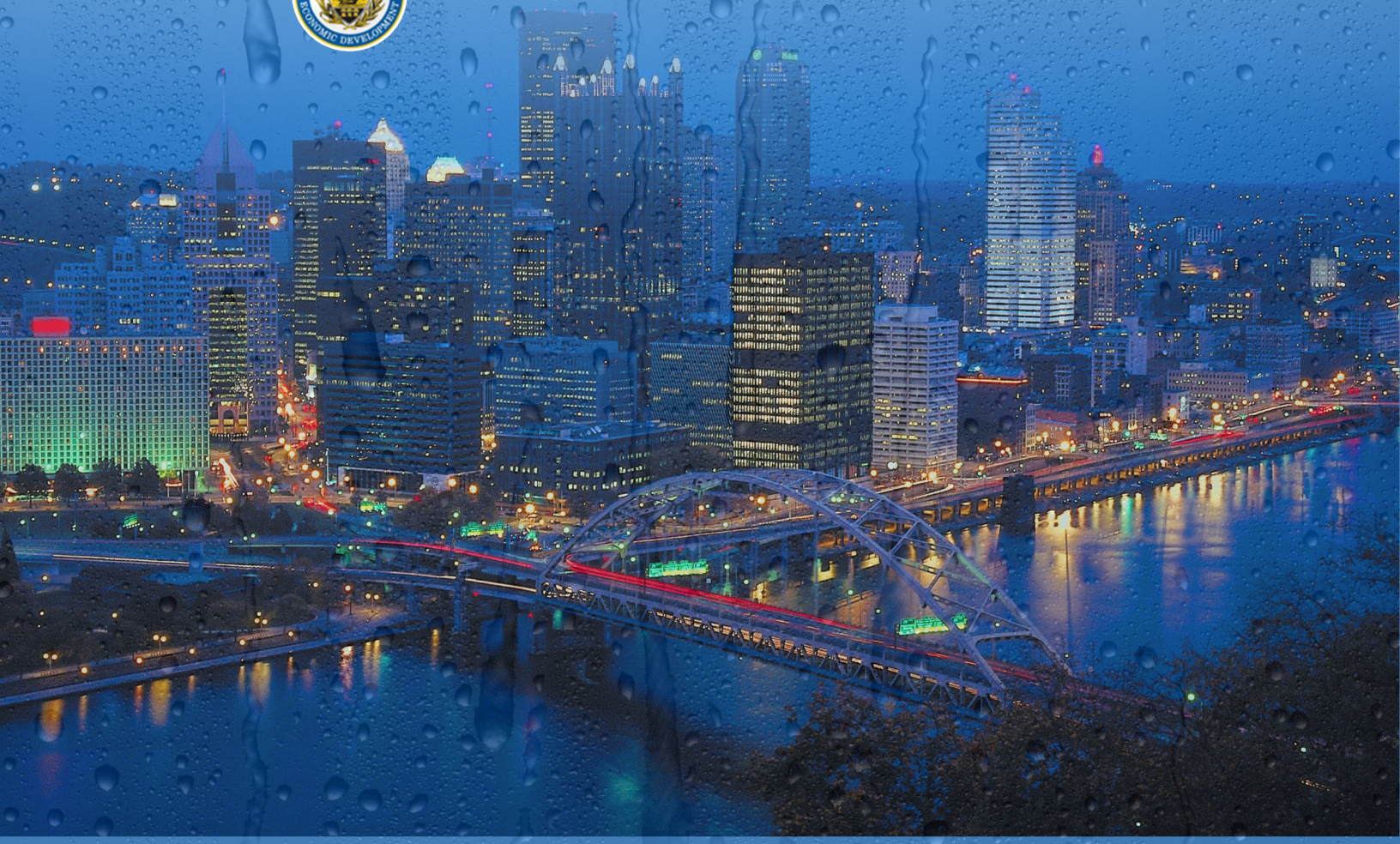
May 31, 2018

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

Allegheny County Department of Economic Development
One Chatham Center
112 Washington Place, Suite 900
Pittsburgh, PA 15219

Michael Baker International, Inc.
100 Airside Drive
Moon Township, PA 15108

Michael Baker
INTERNATIONAL



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Southwest Regional Office

May 31, 2018

Kay Pierce, Manager
Planning Division
Allegheny County Economic Development
One Chatham Center, Suite 900
112 Washington Place
Pittsburgh, PA 15219

RE: **Approval of Allegheny County Act 167 Countywide Storm Water Management Plan**

Dear Ms. Pierce:

On December 6, 2017, Allegheny County Council adopted the Allegheny County Act 167 Phase 2 Storm Water Management Plan (SMP). The SMP was submitted to the Department of Environmental Protection (DEP) for review and approval in accordance with Section 9 of the Storm Water Management Act (1978 Act 167) on January 3, 2018. The submittal included information showing compliance with the municipal and regional review and adoption procedures specified in Sections 6 and 8 of Act 167. On March 15, 2018 DEP provided comments to Allegheny County Economic Development on the SMP. A meeting was held on April 19, 2018 between representatives of DEP, Allegheny County Economic Development, and the Allegheny County Conservation District to discuss those comments. On May 7, 2018, Allegheny County submitted revised material that resolved all the comments. On May 22, 2018 DEP received copies of the SMP that included all revisions.

DEP has reviewed the SMP and found it to be consistent with the purpose and policy of the Act 167 Storm Water Management Act.

DEP hereby approves the SMP.

According to Section 11(b) of Act 167, municipalities subject to the SMP must enact or amend and implement such ordinances as necessary to regulate development in a manner consistent with the SMP within 6 months of approval of the SMP. As such, ordinances must be enacted or amended and implemented by December 1, 2018. Municipalities are encouraged to use the model ordinance included with the SMP. DEP requests that the status of the development or amending of ordinances by the affected municipalities in Allegheny County be provided to DEP by Allegheny County Economic Development within a reasonable time after December 1, 2018.

At this time, Act 167 Storm Water Management reimbursement funds have not been appropriated by the legislature to provide reimbursement for costs pursuant to Section 17 Grants and reimbursements of the Pennsylvania Storm Water Management Act. DEP approval of this SMP does not obligate DEP, in the absence of such legislative appropriation, to provide any reimbursement of costs associated with developing or amending the SMP or with any other associated costs.

Allegheny County has developed a Mini Grant Program to provide funding to assist municipalities in preparing and adopting storm water management ordinances consistent with the SMP. Program guidelines will be determined and all administrative functions will be managed by Allegheny County.

Any person aggrieved by this decision may appeal pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa. C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, PO Box 8457, Harrisburg PA 17105-8547, telephone number 717.787.3483. TDD users may contact the Board through the Pennsylvania Relay Service at 1-800-654-5984. Appeals must be filed within 30 days of receipt of written notice of this decision, unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice are also available in Braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in itself, create any right of appeal beyond that permitted by the applicable statutes and decisional law.

Thank you for participating in the Storm Water Management Program. We hope that Allegheny County receives many benefits as a result of adopting the SMP and its accompanying Storm Water Management Ordinance. If you have any questions or need further assistance, please contact me by e-mail at jfliss@pa.gov or by telephone at 412-442-4207.

Sincerely,

Jeffrey J. Fliss

Jeffrey J. Fliss, P.E.
Watershed Manager
Waterways and Wetlands Program
Department of Environmental Protection

cc: Lee Murphy, PADEP
Dana Drake P.E., PADEP
Heather Dodson, P.E., Michael Baker International
William McClain, Allegheny County Economic Development
Kelly McLaughlin, Allegheny County Conservation District

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Southwest Regional Office

May 31, 2018

To: Allegheny County Municipal Officials

RE: **Implementation of the Allegheny County Act 167 Phase 2 Storm water Management Plan (SMP)**

Dear Municipal Official:

The subject Act 167 SMP was adopted by Allegheny County Council on December 6, 2017 and approved by the Department of Environmental Protection (DEP) on May 31, 2018 pursuant to the Storm Water Management Act, Act of October 4, 1978, 32 P.S., P.L. 864, (No. 167), Section 680.1 et seq., as amended by Act 63 of May 24, 1984, and the Storm Water Management Guidelines as approved by the General Assembly on May 14, 1985.

Section 11(b) of the Storm Water Management Act requires each municipality within the area covered by the subject SMP to adopt or amend and implement such ordinances and regulations, including zoning, subdivision and development, building code, and erosion and sedimentation ordinances as are necessary to regulate development within the municipality in a manner consistent with the SMP and the provisions of the Storm Water Management Act. A model Storm Water Management Ordinance was prepared by Allegheny County as part of the SMP.

The deadline for enacting an ordinance or amending an existing ordinance to satisfy these requirements and be consistent with the model ordinance is December 1, 2018. That date is six (6) months from the approval date of the SMP by the DEP. Please provide a copy of this letter to your solicitor regarding your obligation to implement the subject SMP.

Please notify Allegheny County Economic Development immediately after your municipality enacts or amends ordinances as necessary to meet the requirements of the Storm Water Management Act. This notification shall include the SMP name, ordinance number, and date the ordinance was enacted to meet the requirements of the SMP and the Act.

At this time, Act 167 Storm Water Management reimbursement funds have not been appropriated by the legislature to provide grants or reimbursement for costs pursuant to Section 17 of the Pennsylvania Storm Water Management Act. DEP approval of the SMP does not obligate DEP, in the absence of such legislative appropriation, to provide any grants or reimbursement of costs associated with developing or amending ordinances or regulations associated with the SMP.

Allegheny County has developed a Mini Grant Program to provide funding to assist municipalities in preparing and adopting storm water management ordinances consistent with the SMP. Program guidelines will be determined and all administrative functions will be managed by Allegheny County.

Thank you for your interest and participation in the Storm Water Management Program.

Sincerely,

Jeffrey J. Fliss

Jeffrey J. Fliss, P.E.
Watershed Manager
Waterways and Wetlands Program
Department of Environmental Protection

cc: Lee Murphy, PADEP
Dana Drake P.E., PADEP
Heather Dodson, P.E., Michael Baker International
William McClain, Allegheny County Economic Development
Kelly McLaughlin, Allegheny County Conservation District
Kay Pierce, Allegheny County Economic Development

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 Flaugherty 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.

Executive Summary

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.

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).

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.

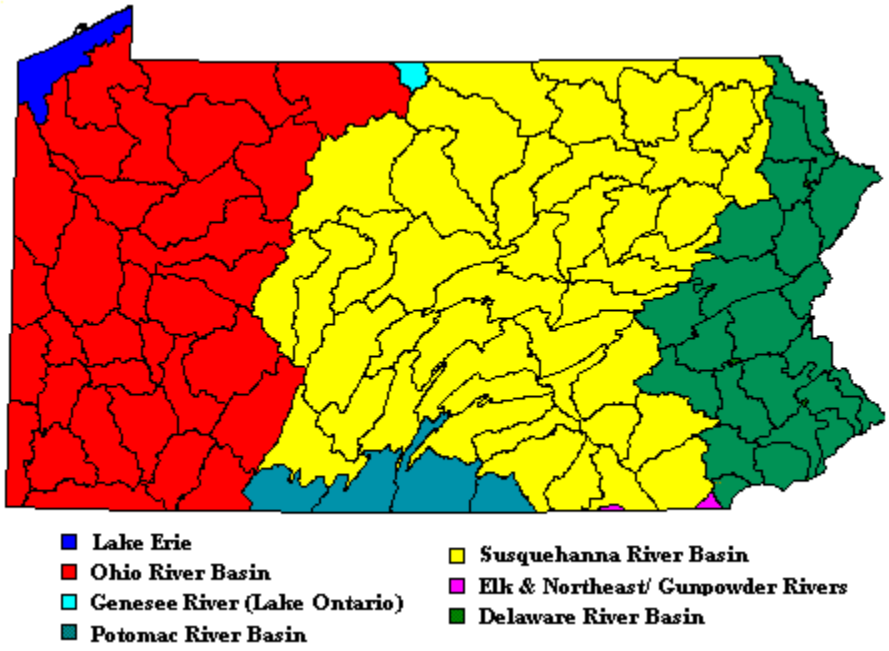
A WPAC was formed at the beginning of the planning process, as required by the Stormwater Management Act. The purpose of the WPAC is to serve as an access for input, assistance, voicing of concerns and questions, and to serve as a mechanism to ensure that inter-municipal coordination and cooperation 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).

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, Flaugherty 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.

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.

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

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.

PLAN Table 7.5 - Potential Impact Due to Flooding in Allegheny County (PEMA, 2009)		
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.

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, Wilkinsburg, 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.

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 Flaugherty 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.

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.

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.

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 Subdivsion 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

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.

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 Manual[4]), 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.

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 Manual[3]). 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 14[5] 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 Manual[3].

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.

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 Manual[3] 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 Manual[3]) 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.

B. The *Simplified Method* (CG-2 in the BMP Manual[3]) 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

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

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.

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.

ACKNOWLEDGEMENTS

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Montour Run Watershed Association	Mark Fedosick	President
Peters Creek Watershed Association	Tim Schumann	President
Raccoon Creek Watershed Association	Wayne Cumer	President
Streets Run Watershed Association	Ann Scott	Secretary
Nine Mile Run Watershed Association	Brenda Smith	Executive Director
Turtle Creek Watershed Association	Diane Selvaggio	President

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Section 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). 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 to be a living document. The PLAN also includes Part 2, a Model Stormwater Management Ordinance. As discussed in detail in *Section 11*, it is the responsibility of the individual municipalities within the County to adopt the provisions of 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., and in consultation with NTM Engineering, Inc. The Allegheny County Economic Development Project Manager was William D. McLain. PLAN development occurred over the course of six years: the Phase I Scope of Study took place in 2012 to 2014, and the Phase II Stormwater Management Plan took place in 2015 to 2017. PLAN adoption by the County Council is tentatively scheduled for May 2017. This Stormwater Management 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, regional planning agencies, watershed and environmental associations, governmental councils, County Council and staff, and other regional organizations. Additional details on the WPAC roles and meetings are provided in *Section 3* and *Appendix D-Public Involvement*.

The PLAN has been developed based on the requirements of the *Pennsylvania Stormwater Management Act*, Act 167 of 1978 and guidelines established by the Pennsylvania Department of Environmental Protection (PaDEP). The intent of these documents is to present the findings of a two-phased, multi-year study of the watersheds in the County. Generally, the study was undertaken to develop recommendations for improved stormwater management practices, to mitigate potential negative impacts of future land uses, and to improve stream water quality and the conditions of impaired waters. The specific goals of this PLAN are discussed in detail in *Section 2*. This Introduction section introduces some basic concepts relating the physical elements of stormwater management, the hydrologic concepts, and the planning approach used throughout this study.

STORMWATER MANAGEMENT

STORMWATER RUNOFF – ITS PROBLEMS AND ITS SOLUTIONS

The water that runs off the land into surface waters during and immediately following a rainfall event or snow/ice melt is referred to as stormwater. In watersheds undergoing urban expansion, the volume of

stormwater resulting from a particular rainfall event increases because of the increase of impervious land area (i.e., natural land covered by pavement, concrete, or buildings). That is, the alteration of natural land cover and land contours by residential, commercial, industrial, forestry and farmland uses results in decreased infiltration of rainfall and an increased rate and volume of stormwater runoff.

The need for stormwater management in Pennsylvania (PA) has been demonstrated repeatedly in the past. As a result of continued development, the increased volume and rate of stormwater runoff causes environmental impacts including flooding, stream channel erosion and siltation, water quality degradation, and reduced groundwater recharge. Cumulative effects of development in some areas of a watershed can result in flooding of natural watercourses with associated costly property damages.

History has shown that individual land development projects are often viewed as separate incidents and are not necessarily viewed as part of the bigger picture of urbanization. This has also been the case when the individual land development projects are scattered throughout a watershed within many different municipalities. The cumulative nature of individual land surface changes dramatically affects runoff and flooding conditions. This cumulative effect of development has resulted in flooding of both small and large streams with associated property damages and even causing loss of life. Therefore, given the distributed and cumulative nature of the land alteration process, a comprehensive approach must be taken if a reasonable and practical management and implementation strategy is to be successful.

PENNSYLVANIA STORMWATER MANAGEMENT ACT (ACT 167)

Recognizing the need to deal with the serious and growing problems of extensive damage from uncontrolled stormwater runoff, the Pennsylvania General Assembly enacted Act of Oct. 4, 1978, P.L. 864, No. 167 (Act 167). The Statement of Legislative Findings (Section 2) of Act 167 sums up the critical interrelationship among development, accelerated runoff, and floodplain management.

Specifically, this statement points out that:

"Inadequate management of accelerated runoff of storm water resulting from development throughout a watershed increases flood flows and velocities, contributes to erosion and sedimentation, overtaxes the carrying capacity of streams and storm sewers, greatly increases the cost of public facilities to carry and control storm water, undermines floodplain management and flood control efforts in downstream communities, reduces groundwater recharge, and threatens public health and safety. A comprehensive program of stormwater management, including reasonable regulation of development and activities causing accelerated runoff, is fundamental to the public health, safety and welfare and the protection of the people of the Commonwealth, their resources, and the environment."

Prior to the passage of Act 167, management of stormwater had typically been regulated on a municipal level with little or no consistency among adjoining municipalities in the same watershed regarding the types or degree of stormwater control required. Stormwater management had been oriented primarily toward addressing the increase in peak runoff rates discharging from individual development sites to protect property immediately downstream. Minimal attention had been given to the effects on locations further downstream, frequently because they were located in another municipality, or to designing stormwater controls within the context of an entire watershed. Since many municipalities do not have stormwater management ordinances or controls, the impacts from stormwater runoff may be exacerbated by additional development.

Historically, the approach to stormwater management was to collect the runoff and deliver it via a system of inlets and pipes as quickly as possible to the nearest receiving waters. The increased volume of stormwater delivered quickly to receiving waters had a detrimental effect on channel morphology.

Negative impacts have resulted, such as severe channel erosion and significant in-stream sediment deposits. These impacts lead to unstable, deepened and widened channels, nuisance flooding, infrastructure damage, increased culvert and bridge maintenance requirements, and they have had a detrimental effect on the stream quality in terms of habitat for aquatic organisms. In addition, large amounts of rainfall are lost to the watershed and become unavailable for infiltration. Groundwater recharge and contaminants on the land surface enter the stream untreated. This approach cannot be considered stormwater management in any meaningful terms.

This approach was later replaced with the stormwater management standards that are currently in place in many municipalities. This more-recent approach requires that peak flows from development sites be managed, usually through detention ponds, such that the peak discharge from the site is no greater than 100% of the peak discharge rate from the site prior to development. While this may have helped reduce some stormwater problems, there were two significant weaknesses with this approach.

The first weakness is that it does not consider the watershed as a single interrelated hydrologic unit. An integrated watershed management approach is required to overcome this situation. Two points are emphasized regarding the need for an overall watershed management approach:

1. Stormwater regulatory responsibility mainly rests with the municipal governments in Pennsylvania. Therefore, stormwater management regulations, if applied at all, are implemented by a municipality only inside the boundaries of its own jurisdiction. There is no guarantee that all municipalities in a given watershed have comparable standards. When standards are implemented by individual municipalities the problems caused by unmanaged stormwater in an area with poor, or no, regulations are conveyed to municipalities downstream. Upstream municipalities often cause stormwater problems for downstream neighbors. In these situations, downstream municipalities are forced to deal with problems associated with increased water volume, increased sediment loads, and increased pollutants that originate in areas over which they have no control.
2. Each area of a watershed is unique in terms of its contribution to the overall watershed hydrology. When the same standards are implemented throughout a municipality, and the overall watershed hydrology is not considered, these standards can result in over-management in some areas and under-management in other areas. In some cases, this type of management could actually exacerbate stormwater problems. Further, this “one-size-fits-all” approach does not take into account conditions such as soil infiltration rates, slopes, or channel conditions, which vary throughout a watershed and municipality.

The second weakness is that this approach does not consider the aspects of water quality, channel protection, or the importance of infiltration in the hydrologic cycle. Simply managing the rate at which stormwater leaves a development site does not maintain the overall watershed hydrology. When implementing a peak rate control strategy as the sole method of controlling stormwater runoff, pollutants are still delivered to surface waters, rainfall is still unavailable to the watershed for recharge, and channel erosion and sedimentation still occur.

Beginning in 1978, Act 167 changed this approach by instituting a comprehensive program of stormwater planning and management on a watershed level. The Act requires Pennsylvania counties to prepare and adopt Stormwater Management Plans for each watershed located in the County, as designated by the Pennsylvania Department of Environmental Protection (PaDEP). Most importantly, these plans are to be prepared in consultation with the WPAC members.

Section 1 – Introduction

Traditionally, stormwater management plans provided stormwater standards and criteria for controlling rates of release and the volume of runoff for development for municipalities in each designated watershed, and the rules applied only to new development. 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 shown that stormwater management is more effective when evaluated on a watershed basis.

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).

Section 2 – Goals and Objectives

ALLEGHENY COUNTY OVERALL GOALS

The overall goal of Allegheny County is to promote growth and development in a manner that maintains the high quality of life for its residents. The mission of Allegheny County Economic Development (ACED) is to manage the economic and residential development for the County, a dynamic, multifaceted mission that includes these objectives:

- Attract new business to the County.
- Help businesses and institutions (already in the County) expand, modernize, and create jobs.
- Acquire and assemble sites for development and redevelopment.
- Assure that minority, woman-owned, veteran-owned, and disadvantaged businesses participate fully in the County's growth.
- Help residents, developers, and non-profit agencies increase the stability of the County's residential neighborhoods.
- Support homeowners in the acquisition and renovation of their dwellings.
- Improve the County's housing stock.
- Ensure the vitality of neighborhood business districts.
- Aid the County's municipalities in updating infrastructure, including sewer and water systems, highways, and recreation amenities.
- Provide leadership for special projects, such as the community's response to natural disasters.
- Monitor and report on the compliance status of all projects and programs with Federal or State support.

Act 167 POLICY AND PURPOSE

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)

GOALS OF THE ALLEGHENY COUNTY STORMWATER MANAGEMENT PLAN

The overall objective of this PLAN is to provide for comprehensive watershed stormwater management throughout Allegheny County.

This PLAN was developed to present the findings of a two-phased, multi-year study of the watersheds within Allegheny County. Watershed-based planning addresses the full range of hydrologic and hydraulic impacts from cumulative land developments within a watershed rather than simply considering and

addressing site-specific peak flows. Although this PLAN represents many things to many people, the principal purposes of the PLAN are to protect human health and safety and to improve quality of life by addressing the impacts of future land use on the current levels of stormwater runoff and to recommend measures to control accelerated runoff to prevent increased flood damages or additional water quality degradation.

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.

STRATEGIES TO ACHIEVE GOALS OF THE ALLEGHENY COUNTY STORMWATER MANAGEMENT PLAN

The following Strategies (a., b., etc.) are intended to achieve the stated Goals (1, 2, 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).
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 B).

STORMWATER PLANNING AND THE ACT 167 PROCESS

Recognizing the increasing need for improved stormwater management, the Pennsylvania legislature enacted the *Stormwater Management Act* (Act 167 of 1978). Act 167, as it is commonly referred to, enables the regulation of development and activities causing accelerated runoff. It encourages watershed based planning and management of stormwater runoff that is consistent with sound water and land use practices, and authorizes a comprehensive program of stormwater management intended to preserve and restore the Commonwealth's water resources.

The Act designates the Department of Environmental Resources as the public agency empowered to oversee implementation of the regulations and defines specific duties required of the Department. The Department of Environmental Resources was abolished by Act 18 of 1995. Its functions were transferred to the Pennsylvania Department of Conservation and Natural Resources (DCNR) and the Pennsylvania Department of Environmental Protection (PaDEP). Duties related to stormwater management became the responsibility of PaDEP (Act 18 of 1995).

As described in Act 167, each county must prepare and adopt a watershed stormwater management plan for each watershed located in the County, as designated by PaDEP, in consultation with the WPAC members, and should periodically review and revise such plan at least every five years. Within six months following adoption, and approval of the watershed stormwater plan, each municipality must adopt or amend, and must implement such ordinances and regulations, including zoning, subdivision and development, building code, and erosion and sedimentation ordinances, as are necessary to regulate development within the municipality in a manner consistent with the applicable watershed stormwater plan and the provisions of the Act.

Section 5 of Act 167 sets forth the Plan contents required for each Stormwater Management Plan. Section 5.b lists thirteen (13) elements to include in the Plan, and Section 5.c lists an additional two elements for inclusion. The following table addresses these elements in Section 5 of Act 167, and presents the necessary information to inventory and address issues with stormwater management in the County.

Table 2.1. Elements of Act 167

Act 167 SECTION 5b – Each watershed storm water plan shall include, but is not limited to:

(1) A survey of existing runoff characteristics in small as well as large storms, including the impact of soils, slopes, vegetation and existing development;

Section 4 identifies and analyzes factors that impact the hydrologic response of watersheds in Allegheny County including existing and future land use conditions. Section 8 discusses the technical analysis performed on selected watersheds. The other watersheds within the County should be considered for technical analyses in future Plans. Appendix A details the modeling completed to perform the technical analysis. In addition, relevant details of the factors and elements impacting the hydrologic response of the watersheds are shown graphically in the *Maps*.

(2) A survey of existing significant obstructions and their capacities;

Obstructions were identified from the FEMA Flood Insurance Stream Profiles and information provided by the WPAC members. Section 5 provides the inventory of obstructions as well as a discussion. *Map 9 – Stormwater Problems and Obstructions* shows the locations of identified obstructions.

(3) An assessment of projected and alternative land development patterns in the watershed, and the potential impact of runoff, quantity, velocity and quality;

A hydrologic model was developed and used to assess the impacts of future land development alternatives in order to address the potential impacts of increased runoff, as discussed in the following portions of the Plan: Section 4 (Land Use and Cover), Section 5 (Problem Areas and Obstructions), Section 6 (Water Quality), and Section 8 (Technical Analysis and Watershed Modeling), as well as Appendix A and the Maps.

(4) An analysis of present and projected development in the flood hazard areas, and its sensitivity to damages from future flooding or increased runoff;

The Allegheny County Hazard Mitigation plan provides excellent information on development in the flood hazard areas. The flood plain areas are shown on *Map 14.* Section 7 includes a discussion of the hazards and potential damages.

(5) A survey of existing drainage problems and proposed solutions;

The WPAC members responded to a survey, which was used to compile an inventory of existing problem areas. Section 5 provides the inventory as well as a general assessment of the problem areas. *Map 9* shows the locations of the identified problem areas and obstructions. Appendix B provides conceptual designs for selected problem areas.

(6) A review of existing and proposed stormwater collection systems and their impacts;

The more urbanized areas of the County contain storm sewer systems, as do the many roadways that traverse the County. Many of the older systems carry combined storm and sanitary flows dating from a time when it was normal to convey all flow to the nearest stream. Storm sewer collection systems have a significant effect on the hydrologic response of a watershed as pipe networks rapidly increase runoff rate. If stormwater control facilities do not intercept runoff from storm sewer systems, flooding often increases, as well as other stormwater problems such as streambank erosion and sedimentation.

(7) An assessment of alternative runoff control techniques and their efficiency in the particular watershed;

Section 8 of the PLAN describes the detailed analysis of selected watersheds and recommended alternative control criteria. Section 9 of the PLAN identifies a variety of stormwater management and runoff control techniques available for use in all watersheds in the County. It references and expands upon the Pennsylvania Stormwater Best Practices Manual to identify innovative methods of controlling runoff. In addition, traditional engineering solutions such as drainage structure replacement, streambank restoration, etc. were also identified in situations where alternative runoff controls are not applicable.

(8) An identification of existing and proposed State, Federal and local flood control projects located in the watershed and their design capacities;

Section 7 lists the local, state, and federal stormwater management facilities and flood control projects in the County which are shown on *Map 13 – Regulated Dams and Local Stormwater Control Facilities*.

(9) A designation of those areas to be served by storm water collection and control facilities within a ten-year period, an estimate of the design capacity and costs of such facilities, a schedule and proposed methods of financing the development, construction and operation of such facilities, and an identification of the existing or proposed institutional arrangements to implement and operate the facilities;

Stormwater control facilities were identified and documented by the WPAC members through the completion of the questionnaire sent out with the survey. Data was compiled and tabulated for those WPAC members that provided responses and information. Sections 8 and 9 identify recommended strategies to address runoff impacts from future development.

(10) An identification of flood plains within the watershed;

Flood insurance studies prepared under the National Flood Insurance Program were identified in Section 7 and floodplains for the County are shown on *Map 14 – FEMA Flood Map*.

(11) Criteria and standards for the control of storm water runoff from existing and new development which are necessary to minimize dangers to property and life and carry out the purposes of this act;

Standards and criteria for stormwater control were developed in Section 8, and will be implemented through the Model Stormwater Management Ordinance, provided in Part 2. Additional recommendations are contained in Section 9.

(12) Priorities for implementation of action within each plan; and

Section 9 contains recommended BMPs and standards for stormwater management controls. Section 11 details the process completed for County adoption of the draft Plan, and subsequent submission to PaDEP for approval. This will initiate the mandatory schedule of adoption of ordinances required to implement stormwater management criteria in each municipality.

(13) Provisions for periodically reviewing, revising and updating the plan.

Section 11 discusses the requirement of Section 5(a) of the Act that each plan must be reviewed and any necessary revisions made at least every five years after its initial adoption.

Act 167 SECTION 5c – Each watershed stormwater plan shall:

(1) Contain such provisions as are reasonably necessary to manage stormwater such that development or activities in each municipality within the watershed do not adversely affect health, safety and property in other municipalities within the watershed and in basins to which the watershed is tributary; and

With the adoption of a Stormwater Management Ordinance consistent with this PLAN, each municipality must enforce development, redevelopment, and other regulated activities consistent with the standards and criteria contained in the PLAN and Model Ordinance. These standards and criteria have been developed to ensure regulated activities will not adversely affect health, safety, and property in the County.

(2) Consider and be consistent with other existing municipal, county, regional and State environmental and land-use plans.

Sections 4 and 10 identify several planning efforts which the County has conducted. These include watershed Act 167 Plans, The County Comprehensive Plan including open space planning and land use plans, and the County's hazard mitigation planning. Section 10 contains identified existing stormwater regulations.

Section 3 – WATERSHED PLAN ADVISORY COMMITTEE (WPAC)

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.

Initially, the County was divided into three regions for Phase 1. Three meetings, one in each region, were held for WPAC #1 and two meetings for WPAC #2. With the start of Phase 2, only one meeting was conducted at a central location for each WPAC session.

As outlined in Act 167, the WPAC is responsible for advising the County throughout the planning process, evaluating policy and project alternatives, coordinating the watershed stormwater PLAN with other municipal plans and programs, and reviewing the PLAN prior to adoption. *Table 3.1* is a summary of the WPAC meetings that were held throughout the planning process. *Appendix D* provides a record of public participation and includes agendas, meeting notes, and attendance sheets from each of the Phase 1 and 2 WPAC meetings and the (future) Public Hearing.

Following internal County review, the Draft Allegheny County Act 167 Phase 2 County-Wide Stormwater Management Plan (PLAN) was provided to the public at WPAC Meeting #5 on September 20, 2016. The WPAC members were notified of the meeting and encouraged to attend by letter dated August 25, 2016 and by several reminder e-mails in advance of the meeting and during the comment period. The WPAC membership includes all 130 municipalities of Allegheny County since all are affected by the PLAN, and the regional planning agencies. Allegheny County is a home rule county and does not have a county planning commission. Allegheny County Economic Development is the designated planning agency for Allegheny County and is the PLAN sponsor.

The WPAC members were encouraged in the August 25 letter and during WPAC #5 to carefully review the PLAN to ensure that it meets each community's stormwater concerns and needs. While feedback/comments were requested within 2 months through November 21, 2016, we accepted and responded to comments received through January 13, 2017. The CDs of the Draft PLAN were distributed to the WPAC members at the September 20 meeting; were mailed on September 26 to those who did not attend; and was posted on the Allegheny County Stormwater Management Plan (SWMP) website on September 27 along with the WPAC #5 PowerPoint presentation.

Twenty-three WPAC members provided approximately 263 comments on the September 20 draft PLAN. The comments are included in *Appendix F* and range from comments on how to improve the wording to how the Model Ordinance is or is not consistent with other ordinances, plans, and programs for the County's watersheds. The submitted written comments encompassed all comments received during the

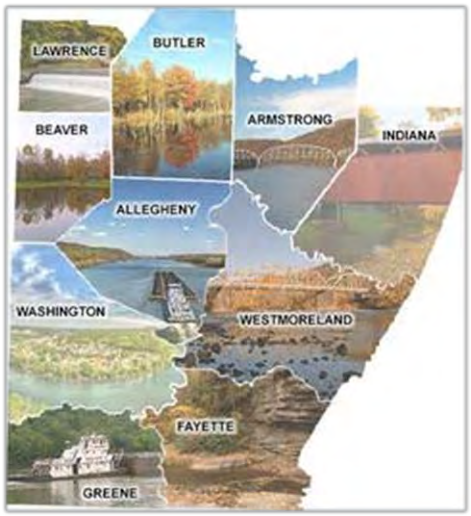
WPAC #5 meeting. Responses were developed for each comment, either describing how the comment was incorporated into the PLAN or explaining why it could not be. The responses were mailed to the respective commenter and are also included in *Appendix F*.

The PLAN and Model Ordinance were revised in January to address the comments received to that point. The February 15, 2017 WPAC #6 was announced and the revised Model Ordinance was distributed to the entire WPAC membership on February 3, 2017 and placed on the SWMP website. As discussed at the WPAC meeting and noted in the announcement, an additional period was provided for comments on the revised Ordinance and PLAN. The comments provided by six WPAC members are included in *Appendix F* along with the responses which were sent to the respective commenter. The submitted written comments encompassed all comments received during the WPAC #6 meeting.

Table 3.1. Summary of WPAC Meetings

Meeting	Purpose of Meeting	Meeting Date(s)
WPAC #1	Phase 1 Start-up Meeting – Organization of the WPAC. Introduce the Act 167 planning process. Emphasize the importance of full municipal involvement. Present summary of the municipal survey results.	November 19, 20 & 28, 2012
WPAC #2	Review the role of the WPAC. Present updated summary of the municipal survey results. Open discussion of stormwater problems.	July 8 & 29, 2013
WPAC #3	Phase 2 Start-up Meeting – Review the role of the WPAC. Introduce the Phase 2 planning process and scope of work. Emphasize the importance of full municipal involvement.	February 3, 2015
WPAC #4 (MEC)	Municipal Engineer Focus - Technical review of the stormwater management provisions in the draft Model Ordinance. Gather general comments and feedback for development of the Model Ordinance.	January 20, 2016
WPAC #5	Distribute and review the Draft PLAN and Draft Model Ordinance, gather input from the WPAC, and begin a 60 day comment period. (Draft PLAN distributed to WPAC members).	September 20, 2016
WPAC #6 (LAC)	Solicitor Focus - Review Public comments received on the September 20 draft PLAN. Discuss the Draft Final PLAN and Model Ordinance. Comments received from Feb. 3 thru Feb. 28.	February 15, 2017
Public Hearing	Conduct the hearing as required by Act 167 to present the PLAN to the public.	April 2017

Section 4 – Allegheny County Information



INTRODUCTION

Allegheny County was formed from parts of Washington and Westmoreland Counties on September 24, 1788. Situated in the Appalachia Plateau Province in southwestern Pennsylvania, rolling hills punctuated by higher, sharper ridges and steeply chiseled stream and river valleys create the landscape. Numerous narrow, nearly level stream valleys with steep sides characterize the topography. Elevations range from about 1,200 feet on the ridge tops to 782 feet on the Ohio River in Crescent Township where the Ohio River leaves the County. Land use is reflected by a central urban core area, high-density residential, commercial and industrial areas, and suburban residential areas, coupled with parks and tracts of open space. A map of Allegheny County showing its location within the state, the surrounding counties, and its municipalities and watersheds is provided as *Map 1 – Base Map*.

The County encompasses the City of Pittsburgh and its suburbs, in addition to the river towns and rural villages outside of the urbanized area. Covering 730 square miles, or roughly half a million acres in size, the County is bordered by Butler, Armstrong, Westmoreland, Washington, and Beaver Counties. One of the County's greatest assets is Pittsburgh, the County seat and economic and cultural center. Once the city was the center of the nation's steel industry; today it embraces both high-tech corporations, world class educational and health care institutions, and old world neighborhoods. Additionally, the County is host to tremendous water resources including the Allegheny River, the Monongahela River, the Ohio River, and the Youghiogheny River.

According to the 2010 United States Census Bureau, the population of Allegheny County is 1,223,348; making it the second largest county in the Commonwealth of Pennsylvania and the 31st largest county by population in the United States. The populations of the municipalities range from 305,704 in the City of Pittsburgh to 70 in the Borough of Haysville. The County is home to great diversity not only in terms of population, but also in terms of the regulatory standards governing each city, borough, and township. The Act 167 Allegheny County Stormwater Management Plan aims to adapt sound stormwater management practices to each of the municipalities that comprise the County in order to mitigate the harmful impacts of stormwater.

POLITICAL JURISDICTIONS

The County is comprised of 130 municipalities. The political jurisdictions include four cities, four home rule municipalities, 82 boroughs, and 40 townships. Allegheny County is classified as a second class county based on population. The municipalities and their associated land areas and populations are as follows:

Table 4.1 - Allegheny County Municipalities and Statistics

NAME	AREA (sq. miles)	POPULATION (2010 census)
Cities (4)		
Clairton	3.02	6,796
Duquesne	2.04	5,565
McKeesport	5.41	19,731
Pittsburgh	58.34	305,704
Townships (40)		
Aleppo	1.77	1,916
Baldwin	0.51	1,992
Collier	13.93	7,080
Crescent	2.31	2,640
East Deer	2.53	1,500
Elizabeth	23.27	13,271
Fawn	12.95	2,376
Findlay	32.29	5,060
Forward	19.82	3,376
Frazer	9.34	1,157
Hampton	16.21	18,363
Harmar	6.33	2,921
Harrison	7.89	10,461
Indiana	17.57	7,253
Kennedy	5.53	7,672
Kilbuck	2.60	697
Leet	1.50	1,634
Marshall	15.46	6,915
McCandless	16.60	28,457
Moon	24.22	24,185

NAME	AREA (sq. miles)	POPULATION (2010 census)
Home Rule Municipalities (4)		
Bethel Park	11.67	32,313
Monroeville	19.74	28,386
Mount Lebanon	6.08	33,137
Penn Hills	19.36	42,329
Townships (cont.)		
Neville	2.35	1,084
North Fayette	25.18	13,934
North Versailles	8.19	10,229
O'Hara	7.37	8,407
Ohio	6.86	4,757
Pine	16.98	11,497
Reserve	2.06	3,333
Richland	14.63	11,100
Robinson	15.03	13,354
Ross	14.47	31,105
Scott	3.91	17,024
Shaler	11.17	28,757
South Fayette	20.39	14,416
South Park	9.27	13,416
South Versailles	0.97	351
Springdale	2.40	1,636
Stowe	2.30	6,362
Upper St. Clair	9.83	19,229
West Deer	28.87	11,771
Wilkins	2.74	6,357

NAME	AREA (sq. miles)	POPULATION (2010 census)
Boroughs (82)		
Aspinwall	0.38	2,801
Avalon	0.69	4,705
Baldwin	5.89	19,767
Bell Acres	5.37	1,388
Bellevue	1.12	8,370
Ben Avon	0.46	1,781
Ben Avon Heights	0.17	371
Blawnox	0.44	1,432
Brackenridge	0.56	3,260
Braddock	0.65	2,159
Braddock Hills	0.96	1,880

NAME	AREA (sq. miles)	POPULATION (2010 census)
Boroughs (cont.)		
Jefferson Hills	16.68	10,619
Leetsdale	1.18	1,218
Liberty	1.49	2,551
Lincoln	5.01	1,072
McDonald	0.20	383
McKees Rocks	1.12	6,104
Millvale	0.68	3,744
Mount Oliver	0.34	3,403
Munhall	2.39	11,406
North Braddock	1.55	4,857
Oakdale	0.47	1,459

Section 4 – Allegheny County Information

NAME	AREA (sq. miles)	POPULATION (2010 census)
Bradford Woods	0.89	1,171
Brentwood	1.45	9,643
Bridgeville	1.10	5,148
Carnegie	1.62	7,972
Castle Shannon	1.60	8,316
Chalfant	0.16	800
Cheswick	0.55	1,746
Churchill	2.19	3,011
Coraopolis	1.46	5,677
Crafton	1.14	5,951
Dormont	0.76	8,593
Dravosburg	1.06	1,792
East McKeesport	0.41	2,126
East Pittsburgh	0.39	1,822
Edgewood	0.59	3,118
Edgeworth	1.68	1,680
Elizabeth	0.41	1,493
Emsworth	0.69	2,449
Etna	0.79	3,451
Forest Hills	1.56	6,518
Fox Chapel	7.87	5,388
Franklin Park	13.53	13,470
Glassport	1.79	4,483
Glenfield	0.99	205
Glen Osborne	0.56	547
Green Tree	2.08	4,432
Haysville	0.23	70
Heidelberg	0.28	1,244
Homestead	0.64	3,165
Ingram	0.43	3,330

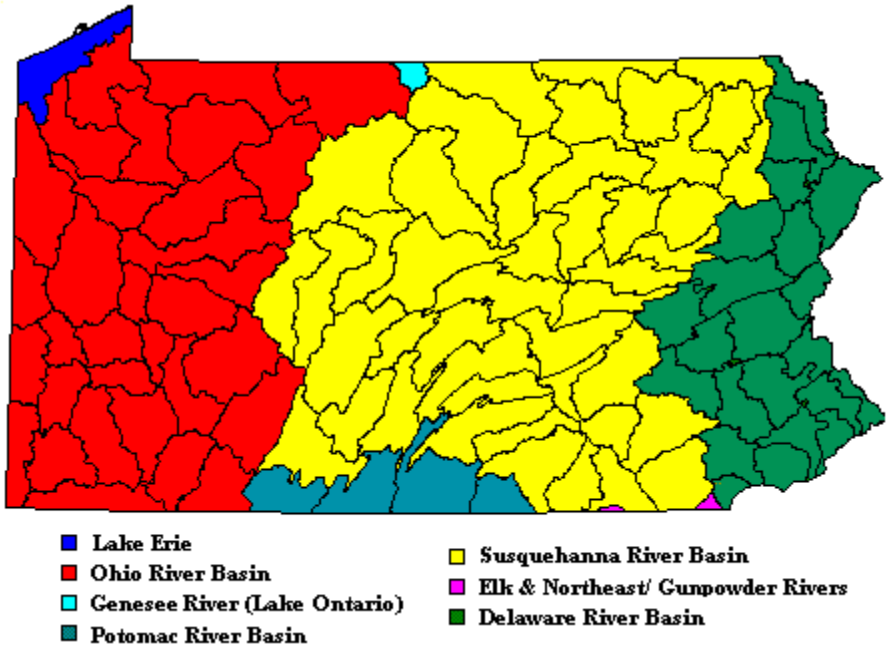
NAME	AREA (sq. miles)	POPULATION (2010 census)
Oakmont	1.77	6,303
Pennsbury Village	0.08	661
Pitcairn	0.51	3,294
Pleasant Hills	2.78	8,268
Plum	28.96	27,126
Port Vue	1.17	3,798
Rankin	0.50	2,122
Rosslyn Farms	0.56	427
Sewickley	1.14	3,827
Sewickley Heights	7.26	810
Sewickley Hills	2.53	639
Sharpsburg	0.64	3,446
Springdale	1.09	3,405
Swissvale	1.24	8,983
Tarentum	1.39	4,530
Thornburg	0.43	455
Trafford	0.22	61
Turtle Creek	0.97	5,349
Verona	0.60	2,474
Versailles	0.54	1,515
Wall	0.44	580
West Elizabeth	0.25	518
West Homestead	1.01	1,929
West Mifflin	14.51	20,313
West View	1.01	6,771
Whitaker	0.33	1,271
Whitehall	3.33	13,944
White Oak	6.67	7,862
Wilkinsburg	2.25	15,930
Wilmerding	0.43	2,190

WATERSHEDS

PaDEP has divided Pennsylvania into seven different major river basins based upon the major waterbody to which they are tributary, as shown in *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).

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. *Map 2* shows the Act 167 Designated Watersheds in Allegheny County. The Allegheny County Act 167 watersheds and their drainage areas within the County are summarized in the following Table 4.2 (note that the drainage area for the Ohio River, for example, is that area not draining to any of the other Designated Watersheds):

Table 4.2 - Allegheny County Act 167 Watersheds

Watersheds of the Ohio River		
Act 167 Designated Watershed	Drainage Area (sq. miles)	Subbasin
Big Sewickley Creek	16.9	Ohio River
Breakneck Creek	4.1	Ohio River
Chartiers Creek	65.2	Ohio River
Connoquenessing Creek	10.0	Ohio River
Flaugherty Run	7.7	Ohio River
Little Sewickley Creek	9.6	Ohio River
Lowries Run	17.0	Ohio River
Montour Run	36.6	Ohio River
Ohio River	48.1	Ohio River
Raccoon Creek	17.7	Ohio River
Robinson Run	29.7	Ohio River
Sawmill Run	19.4	Ohio River
Monongahela River	96.7	Monongahela River
Peters Creek	35.6	Monongahela River
Turtle Creek	48.9	Monongahela River
Youghiogheny River	35.1	Monongahela River
Allegheny River	66.3	Allegheny River
Buffalo Creek	0.13	Allegheny River
Bull Creek	15.9	Allegheny River
Deer Creek	48.7	Allegheny River
Girtys Run	13.4	Allegheny River
Pine Creek	67.2	Allegheny River
Plum Creek	21.2	Allegheny River
Pucketa Creek	4.5	Allegheny River
Squaw Run	8.6	Allegheny River

Table 4.3 - Act 167 Watersheds Contained Within Each Municipality

MUNICIPALITY NAME	ACT 167 WATERSHEDS
Cities (4)	
Clairton	Monongahela River, Peters Creek
Duquesne	Monongahela River
McKeesport	Youghiogheny River, Monongahela River
Pittsburgh	Allegheny River, Chartiers Creek, Girtys Run, Monongahela River, Ohio River, Sawmill Run, Squaw Run
Municipalities (4)	
Bethel Park	Chartiers Creek, Peters Creek, Sawmill Run
Monroeville	Turtle Creek
Mount Lebanon	Chartiers Creek, Sawmill Run
Penn Hills	Allegheny River, Monongahela River, Plum Creek, Turtle Creek
Townships (40)	
Aleppo	Ohio River
Baldwin	Monongahela River, Peters Creek, Sawmill Run
Collier	Chartiers Creek, Robinson Run
Crescent	Flaugherty Run, Ohio River
East Deer	Allegheny River
Elizabeth	Monongahela River, Youghiogheny River
Fawn	Allegheny River, Bull Creek
Findlay	Flaugherty Run, Montour Run, Raccoon Creek
Forward	Monongahela River, Youghiogheny River
Frazer	Allegheny River, Bull Creek, Deer Creek
Hampton	Deer Crrek, Pine Creek
Harmar	Allegheny River, Deer Creek, Squaw Run
Harrison	Allegheny River
Indiana	Allegheny River, Deer Creek, Pine Creek, Squaw Run
Kennedy	Chartiers Creek, Ohio River
Kilbuck	Lowries Run, Ohio River
Leet	Big Sewickley Creek, Little Sewickley Creek, Ohio River
Marshall	Big Sewickley Creek, Connoquenessing Creek, Pine Creek
McCandless	Girtys Run, Lowries Run, Pine Creek
Moon	Flaugherty Run, Montour Run, Ohio River
Neville	Ohio River
North Fayette	Montour Run, Racoon Creek, Robinson Run
North Versailles	Monongahela River, Turtle Creek, Youghiogheny River
O'Hara	Allegheny River, Pine Creek, Squaw Run
Ohio	Ohio River
Pine	Breakneck Creek, Connoquenessing Creek, Pine Creek
Reserve	Allegheny River, Girtys Run
Richland	Breakneck Creek, Connoquenessing Creek, Deer Creek, Pine Creek
Robinson	Chartiers Creek, Montour Run, Ohio River, Robinson Run
Ross	Allegheny River, Girtys Run, Lowries Run, Ohio River, Pine Creek
Scott	Chartiers Creek, Sawmill Run
Shaler	Allegheny River, Girtys Run, Pine Creek
South Fayette	Chartiers Creek, Robinson Run
South Park	Peters Creek
South Versailles	Youghiogheny River
Springdale	Allegheny River
Stowe	Chartiers Creek, Ohio River
Upper St. Clair	Chartiers Creek
West Deer	Allegheny River, Bull Creek, Connoquenessing Creek, Deer Creek
Wilkins	Turtle Creek
Boroughs (82)	
Aspinwall	Allegheny River
Avalon	Ohio River
Baldwin	Monongahela River, Peters Creek, Sawmill Run
Bell Acres	Big Sewickley Creek, Little Sewickley Creek
Bellevue	Ohio River
Ben Avon	Lowries Run, Ohio River
Ben Avon Heights	Lowries Run, Ohio River
Blawnox	Allegheny River
Brackenridge	Allegheny River
Braddock	Monongahela River
Braddock Hills	Monongahela River, Turtle Creek
Bradford Woods	Big Sewickley Creek, Connoquenessing Creek, Pine Creek
Brentwood	Monongahela River, Sawmill Run
Bridgeville	Chartiers Creek
Carnegie	Chartiers Creek
Castle Shannon	Chartiers Creek, Sawmill Run

Table 4.3 - Act 167 Watersheds Contained within Each Municipality (continued)

MUNICIPALITY NAME	ACT 167 WATERSHEDS
Boroughs (82)	
Chalfant	Turtle Creek
Cheswick	Allegheny River
Churchill	Turtle Creek
Coraopolis	Montour Run, Ohio River
Crafton	Chartiers Creek, Sawmill Run
Dormont	Sawmill Run
Dravosburg	Monongahela River
East McKeesport	Turtle Creek
East Pittsburgh	Turtle Creek
Edgewood	Monongahela River
Edgeworth	Little Sewickley Creek, Ohio River
Elizabeth	Monongahela River
Emsworth	Lowries Run, Ohio River
Etna	Allegheny River, Pine Creek
Forest Hills	Monongahela River, Turtle Creek
Fox Chapel	Allegheny River, Deer Creek, Pine Creek, Squaw Run
Franklin Park	Big Sewickley Creek, Little Sewickley Creek, Lowries Run, Ohio River, Pine Creek
Glassport	Monongahela River, Youghiogheny River
Glenfield	Ohio River
Glen Osborne	Ohio River
Green Tree	Chartiers Creek, Sawmill Run
Haysville	Ohio River
Heidelberg	Chartiers Creek
Homestead	Monongahela River
Ingram	Chartiers Creek, Ohio River, Sawmill Run
Jefferson Hills	Monongahela River, Peters Creek
Leetsdale	Big Sewickley Creek, Little Sewickley Creek, Ohio River
Liberty	Monongahela River, Youghiogheny River
Lincoln	Monongahela River, Youghiogheny River
McDonald	Robinson Run
McKees Rocks	Chartiers Creek, Ohio River
Millvale	Allegheny River, Girtys Run
Mount Oliver	Monongahela River, Sawmill Run
Munhall	Monongahela River
North Braddock	Monongahela River, Turtle Creek
Oakdale	Robinson Run
Oakmont	Allegheny River, Plum Creek
Pennbury Village	Chartiers Creek
Pitcairn	Turtle Creek
Pleasant Hills	Peters Creek
Plum	Allegheny River, Plum Creek, Pucketa Creek, Turtle Creek
Port Vue	Monongahela River, Youghiogheny River
Rankin	Monongahela River
Rosslyn Farms	Chartiers Creek
Sewickley	Big Sewickley Creek, Ohio River
Sewickley Heights	Little Sewickley Creek, Ohio River
Sewickley Hills	Big Sewickley Creek, Little Sewickley Creek, Ohio River
Sharpsburg	Allegheny River, Pine Creek
Springdale	Allegheny River
Swissvale	Monongahela River
Tarentum	Allegheny River, Bull Creek
Thornburg	Chartiers Creek
Trafford	Turtle Creek
Turtle Creek	Turtle Creek
Verona	Allegheny River, Plum Creek
Versailles	Youghiogheny River
Wall	Turtle Creek
West Elizabeth	Monongahela River
West Homestead	Monongahela River
West Mifflin	Monongahela River, Peters Creek
West View	Girtys Run, Lowries Run, Ohio River
Whitaker	Monongahela River
Whitehall	Monongahela River, Peters Creek, Sawmill Run
White Oak	Monongahela River, Youghiogheny River
Wilkinsburg	Monongahela River, Turtle Creek
Wilmerding	Turtle Creek

Section 4 – Allegheny County Information

EXISTING ACT 167 PLANS

As of 2016, Act 167 Stormwater Management Plans had been completed and approved by PaDEP for seven of the twenty-five Act 167 Designated Watersheds.

The Montour Run Watershed Stormwater Management Plan was developed in 1989 for the Allegheny County Planning Department. The plan addressed stormwater peak flow and encompasses 36.6 square miles. The plan was approved by PaDEP in February 1990.

The Turtle Creek Watershed Act 167 Stormwater Management Plan was developed for Allegheny and Westmoreland Counties. This plan encompasses approximately 146 square miles. The plan was approved by PaDEP in December 1991. It should also be noted that the Turtle Creek Watershed River Conservation Plan was developed in 2002 for the Turtle Creek Watershed Association. The plan was written in 2002 but has not been officially adopted.

The Monongahela River Watershed Act 167 Stormwater Management Plan was developed in 1993 for the Allegheny County Department of Planning and encompasses approximately 98 square miles. The plan addressed stormwater peak flow and volume. The plan was approved by PaDEP in June 1994.

The Flaugherty Run Watershed Act 167 Stormwater Management Plan was developed in 1998 for the Allegheny County Department of Economic Development. The plan addressed stormwater peak flow. The Flaugherty Run Act 167 Plan encompasses approximately 8.9 square miles. The plan was approved by PaDEP in November 1998.

The Little Sewickley Creek Watershed Act 167 Stormwater Management Plan was developed in 2002 for the Allegheny County Department of Planning. The plan addressed stormwater peak flow. The Little Sewickley Creek Watershed Act 167 Plan encompasses approximately 10.1 square miles. It has not yet been approved by PaDEP.

The Act 167 Stormwater Management Plan for the Girty's Run, Pine Creek, Squaw Run, and Deer Creek watersheds was prepared in 1981 and approved by PaDEP in March 1986. It was most recently updated in April 2008 for the North Hills Council of Governments. The updated plan addressed stormwater peak flow, volume, and water quality. It encompasses 140 square miles. The updated plan was approved in March 2008.

WATERSHEDS MODELED IN PHASE 2

In Phase 1, eight watersheds were proposed for additional study due to significant stormwater problem areas within the watersheds; however, due to data availability issues, as well as limited available funding, only three of the watersheds were studied in detail during this Phase 2 Stormwater Management PLAN process. These three watersheds were selected based on the availability of data provided by the municipalities, the quantity and quality of data available for the watershed, and the severity of stormwater management problems within the watershed. The three watersheds selected for detailed study and modeling are:

1) Flaugherty Run Watershed
2) Robinson Run Watershed
3) Thompson Run Watershed (part of Turtle Creek Watershed)

The technical analysis and modeling results for these three watersheds are described in *Section 8* and the modeling technical data is provided in *Appendix A*.

Section 4 – Allegheny County Information

DATA COLLECTION

The following data was collected on the physical features of the County:

1. Base Map: The base mapping for the Geographic Information System (GIS) was generated from data received from the PaDEP and the Pennsylvania Department of Transportation (PennDOT). Streams, lakes, and the watershed boundaries were obtained from the PaDEP. County and municipal boundaries, roads and railroads were obtained from PennDOT.

2. Elevation Data: A Digital Elevation Model (DEM) for the County was developed from elevation data obtained from the United States Geological Survey (USGS). Subwatersheds or subareas used in the watershed modeling process were derived from the DEM. Subareas, drainage courses, land slopes and lengths, and drainage element lengths and slopes were determined from the DEM within the GIS.

3. Soils: Soil mapping data was obtained from the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS). Two sets of data were used, the State Soil Geographic Database (STATSGO) and the Soil Survey Geographic Database (SSURGO).

STATSGO maps are statewide soil maps made by generalizing the detailed county soil survey data. The STATSGO data was used to create the generalized soils map for the project. SSURGO data is the most detailed level of soil mapping done by the NRCS. SSURGO mapping are digital duplications of the original County soil survey maps. Generalized soil maps were used for all other soil maps.

4. Geology: The digital geology coverage from Allegheny County was obtained from the Pennsylvania Department of Conservation and Natural Resources (DCNR).

5. Land Cover: National Land Cover Database (NLCD) products are created through a cooperative project by the Multi-Resolution Land Characteristics (MRLC) Consortium, which is a partnership of various federal agencies. (www.mrlc.com) NLCD 2011, which is the most up-to-date iteration of this database, was used as a reference for this report.

6. Wetlands: Wetland information was obtained from the United States Fish and Wildlife Service (USFWS) in the form of digital National Wetlands Inventory (NWI) Maps.

7. Obstructions: Obstructions were evaluated by analyzing the water surface profiles produced by Federal Emergency Management Agency (FEMA) in the Flood Insurance Study (FIS) report for Allegheny County.

8. Problem Areas: Problem areas were identified by, and obtained from, WPAC members as well as the Allegheny County Conservation District. Field work was performed on 21 of the 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, and gather data to complete a planning level analysis.

9. Stormwater Management Facilities: Stormwater management facilities were identified and obtained by WPAC members and the Allegheny Conservation District.

10. Stormwater Collection Systems: Stormwater collection systems were identified by, and obtained from, WPAC members.

11. Local, State, and Federal Flood Control Projects: Local flood control projects were identified by, and obtained from, WPAC members and the Allegheny Conservation District; state flood control projects were obtained from the PaDEP; federal flood control projects were obtained from the Army Corps of Engineers.

12. Abandoned Mined Lands (AML) and FEMA Flood Plains: Mapping information obtained from Pennsylvania Spatial Data Access (PASDA), an open GIS data access for Pennsylvania.

SOILS

Allegheny County's land area is comprised of different soils with varying degrees of slope, ranging from nearly level plateaus to severe sloping along the rivers in the County. The Allegheny County Soil Survey identifies 80 different soil types within the County. These soil types fall within one of the ten soil associations listed and described below. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern. The general characteristics, development potentials and limitations for each category of soil are described as follows:

Soil Associations:

Gilpin-Upshur-Atkins Association; 15% of County: Moderately deep and deep, well drained soils underlain by red and gray shale on uplands and deep, poorly drained soils on floodplains. This association is mainly on steep and very steep sides of valleys, but it includes narrow, nearly level floodplains. Seepage spots in wet periods are common on the valley sides and there is evidence of recent landslides. This association is mostly wooded. It has severe limitations for uses other than trees, mainly because of slides and the hazard for flooding on floodplains.

Gilpin-Weikert-Atkins Association; 5% of County: Shallow and moderately deep, well drained soils underlain by gray shale and on uplands and deep, poorly drained soils on floodplains. This association is mainly on steep and very steep sides of valleys, but it includes narrow, nearly level floodplains. This association is mostly wooded. It has severe limitations for uses other than trees, mainly because of the hazard of flooding on the floodplains and steep slopes.

Culleoka-Weikert-Newark Association; 4% of County: Shallow and moderately deep, well drained soils underlain by shale and limestone on uplands and deep, somewhat poorly drained and poorly drained soils on floodplains. This association is mainly on steep and very steep sides of valleys, but it includes narrow, nearly level floodplains. This association is mostly wooded. It has severe limitations for use other than trees, mainly because of the hazard of flooding on the floodplains and steep slopes.

Gilpin-Wharton-Upshur Association; 32% of County: Moderately deep and deep, well drained and moderately well drained soils underlain by red and gray shale on the uplands. This association is on undulating to hilly uplands and is highly dissected by small streams.

Gently sloping ridgetops are generally long and narrow and high rounded knobs are scattered throughout the area. This association is in the northern half of the County and is the most extensive in the County. Much of this association has been cleared and farmed, but now it is under continuing suburban development. Beyond the areas of suburban growth some areas are idle, others are used for recreation, and there are scattered farms.

Dormont-Guernsey-Culleoka Association; 18% of County: Moderately deep and deep, well drained and moderately well drained soils underlain by shale and limestone on uplands. This association is on undulating to hilly uplands and is highly dissected by small streams. Gently sloping ridgetops are generally long and narrow and high rounded knobs are scattered throughout the area. This association is in the southern half of the County. Much of this association has been cleared for farming, but now most areas are used for suburban development or for recreation. There are scattered farms and some areas are idle.

Urban Land-Philo-Rainsboro Association; 6% of County: Deep, moderately well drained soils and urban land on floodplains and terraces. This association is mainly on nearly level bottom land adjacent to major streams. Most of this association is used for residential, commercial, and major industrial developments and for major highway and railroad routes. When the natural soils are undisturbed, the hazard of flooding and a seasonal high water table are limitations for use. Localized areas within the developed areas also have a hazard of flooding.

Urban land-Rainsboro-Allegheny Association; 3% of County: Deep, well drained and moderately well drained soils and urban land on terraces. This association is on nearly level to rolling terraces 200 to 300 feet above the major streams. Much of this association has been cleared and farmed, but now it is used mainly for urban developments. Some areas are idle, and others are used for recreation. Some areas of the Allegheny variant soils have been mined for sand and gravel. A seasonal high water table is a limitation for most land uses.

Urban Land-Wharton-Gilpin Association; 3% of County: Moderately deep and deep, well drained soils and urban land underlain by gray shale on uplands. This association is in the northern half of the County. It is on nearly level to hilly uplands and is highly dissected by small streams. Gently sloping ridgetops are generally long and narrow. This association is used mainly for urban developments. A seasonal high water table is a limitation for most land uses.

Urban Land-Dormont-Culleoka Association; 9% of County: Moderately deep and deep, well drained soils and urban land underlain by shale and limestone on uplands. This association is in the southern half of the County. It is on nearly level to hilly uplands and is dissected by small streams. Gently sloping ridgetops are generally elongated. This association is mainly used for urban development. A seasonal high water table is a limitation for most land uses.

Strip Mines-Guernsey-Dormont Association; 5% of County: Deep, moderately well drained soils and strip mines underlain by shale and limestone on uplands. This association is in the southern half of the County. It consists mainly of rolling to very steep areas that have been strip mined. Much of this association is idle land. Depressions within the strip mined areas are filled with acid water. Vegetation is sparse. Only isolated areas have been reclaimed.

HYDROLOGIC SOIL GROUPS

The soil types within a watershed, along with the type of cover, directly impact the amount of precipitation that infiltrates into the soil, thus impacting on the quantity and rate of stormwater runoff. Soils are grouped into four hydrologic soils groups (HSGs) based on the minimum infiltration rate of the soil. Soils with high infiltration rates (sands and gravels) and high storage capacity produce less stormwater runoff than soils with lower infiltration rates (silts and clays). Understanding the existing soil type within the watershed is important since a change in the soil profile can significantly change its infiltration characteristics and therefore increase or decrease the quantity of stormwater runoff.

An indicator of the response to rainfall of the soils in Allegheny County is the hydrologic soil group assigned to each soil. This classification varies between "A" which has very low runoff potential and high permeability and "D" which typically has very high runoff potential and low permeability. The table below depicts a summary of the hydrologic soil groups for Allegheny County. Some soils have variable runoff potential depending on whether or not they are drained or undrained. For example, agricultural field with tile drainage may decrease the runoff potential from hydrologic soil group D to hydrologic soil group A. Over three-quarters of the soils in Allegheny County are hydrologic soil group C or D, indicating a moderate to high runoff potential. Refer to *Map 4 – Soils Information* for more information.

Table 4.4 - Hydrologic Soil Groups in Allegheny County

Hydrologic Soil Group	Runoff Potential	Approx. % of County
A	Low	1
B	Low to moderate	14
B/D		3
C	Moderate to high	30
C/D		21
D	High	24
Other	Variable	7

HYDRIC SOILS

Hydric soils are those soils that are sufficiently wet in the upper part to develop anaerobic conditions during the growing season. The analysis of hydric soils has recently become an important consideration when performing almost any kind of development review. These soils are important to identify and locate because they provide an approximate location where wetlands may be found. Wetland areas are lands where water resources are the primary controlling environmental factor as reflected in hydrology, vegetation, and soils. Thus, the location of hydric soils is one indication of the potential existence of a wetland area. Wetland areas are now protected by PaDEP and the Army Corps of Engineers and should be examined before deciding on any type of development activity.

According to NRCS, the hydric soils groups are found within Allegheny County: Atkins silt loam, Brinkerton sit loam, Cavode silt loam, Caneadea silt loam, Clarksburg silt loam, Cookport loam, Dormont silt loam, Ernest silt loam, Ernest-Vandergrift silt loam, Guernsey-Vandergrift silt loam, Huntington silt loam, Lindside silt loam, Newark silt loam, Philo silt loam, Rainsboro silt loam, Urban land-Guernsey complex, Urban land-Rainsboro complex, Urban land-Wharton complex, and Vandergrift-Cavode silt loam.

WETLANDS

Wetlands mapping was obtained from the NWI Maps in digital format and incorporated into the project's GIS database. Wetlands serve an important part in stormwater management by attenuating flood flows, filtering nonpoint source pollutants, buffering streams and providing evapotranspiration opportunities. As these wetland areas serve an important function in the water cycle and provide wildlife habitat, they should be preserved as much as possible. The joint permit application process is the vehicle or tool used by the PaDEP and United States Army Corps of Engineers (USACOE) to control development within wetland areas and limit their destruction or alteration.

Wetlands within Allegheny County are displayed on *Map 8 - Wetlands*.

GEOLOGY

The geologic setting and features within a watershed impact the quantity and rate of stormwater runoff within the watershed. The slope of the land within the watershed, depth of the water table, type, depth and condition of the existing bedrock, and the soil properties derived from the various bedrock types determine the amount of water that is captured and the amount of stormwater runoff.

Pennsylvania is divided into numerous physiographic provinces. A province is defined as a region in which all parts are similar in geologic structure, climate, and relief and have a unified geomorphic depositional history. Allegheny County is located mostly within the Pittsburgh Low Plateau Section of the Appalachian Plateau Physiographic Province. This Plateau was formed as the Appalachian Mountains were uplifted to the east and at a time when the present day Allegheny County location acted as a delta for materials eroding and draining off the newly forming mountains. This area was uplifted as a large broad plateau as opposed to the intense folding and faulting that occurred to the east in the central part of the state as part of the Appalachian mountain building activities. The present day landforms were created through millions of year of uplifting and subsiding, geologic erosion, and stream/river down cutting. These processes changed what had previously been a nearly level surface formed by freshwater inland seas to a highly dissected, rolling, and hilly relief. Most of the County is hilly, but some parts are only slightly dissected.

The Appalachian Plateau Province is by far the largest province in the state. It contains mostly rock that is not faulted and folded, but sits relatively flat. This province is a highland that has been eroded by streams and rivers that have created deep valleys and hilly topography. The Pittsburgh Low Plateau Section (most of Allegheny County) consists of a smooth undulating upland surface cut by numerous, narrow, relatively shallow valleys and the larger and broader valleys associated with the rivers. The dissecting streams are all controlled by the three major base level rivers including the Monongahela River flowing from the south, the Allegheny River from the northeast, combining together near the center of Allegheny County to form the Ohio River which drains to the west

BEDROCK FORMATIONS

The bedrock formations in Allegheny County consist of nearly level or very gently dipping sedimentary rock. Depth to bedrock generally varies from 5 to 50 feet below ground surface. Bedrock in the County is primarily sedimentary in origin and includes four different geologic Groups and their associated Formations that range from Permian-age (248 – 290 million years ago) to Pennsylvanian-age (290 – 323 million years ago) (Barnes and Sevon, 2002). The formations consist of cyclic sequences of sandstone, siltstone, mudstone, shale, and conglomerate as well as some clay, claystone, limestone, and significant coal measures. The formation names, in order of increasing age, and their relative areas are as follows:

Table 4.5 - Geologic Formations

Group	Formation	Dominant Lithology	Location within County
Dunkard	Green Formation	Claystone/shale	Not present
	Waynesburg Formation	Sandstone/coal	Not present
	Washington Formation	Sandstone / shale	Southern hilltops
Monongahela	Pittsburgh Formation	Limestone / sandstone/coal	Southern and middle
Conemaugh	Cassellman Formation	Shale / claystone	Northern half
	Glenshaw Formation	Claystone/limestone	Northern half
Allegheny		Coal/ limestone/sandstone	Northern stream

As exhibited on *Map 5 - Geology*, the youngest rocks present are of the Permian age derived from the Washington Formation of the Dunkard Group, and they are exposed on hilltops in the southern portion of Allegheny County. The rock strata of the Monongahela Group are exposed over most of the southern and middle half of Allegheny County. The Pittsburgh Coal Seam, which has been mined extensively in the County, lies at the base of the Pittsburgh Formation of the Monongahela Group. The Conemaugh Group strata are exposed over most of the northern portion of the County and in some areas in the south. The Allegheny Group, the oldest rock strata in the County, is exposed only in a few river and stream valleys in the northern part of the County.

OUTSTANDING AND UNIQUE FEATURES

Pennsylvania's outstanding and unique scenic geological features have been identified by the *Outstanding Scenic Geological Features of Pennsylvania* (Geyer and Bolles, 1979). Allegheny County contains one of these resources as identified below.

Cold Valley – Located in Hampton Township, this valley feature remains cold through much of the summer months. Narrow valley walls channel and trap winter air currents so that the valley bottom remains col throughout the year. The wildflower, snow trillium, is found here as well as other plants that are normally found in more northern climates. Rocks exposed in the valley walls are sandstones, siltstones, and shales of the Conemaugh Formation, Pennsylvanian age.

A notable geologic feature in Allegheny County is coal, both the Pittsburgh and Upper Freeport seams. The presence of significant coal and associated historic mining has shaped the landscape, influenced drainage patterns and water quality while also greatly impacting the development of industry centered around the presence of this key resource. The landscape reflects this by the presence of some operating surface mines, abandoned strip mines with highwalls/open pits/spoil piles, reclaimed strip mines, deep mine portals, streams polluted with acid mine drainage, and areas of mine subsidence.

Also of geologic interest in Allegheny County is the fact that some of the land surface is very susceptible to landslides. Portions of the County are susceptible to significant slope movements and these types of movements have been recorded in the past. This susceptibility is based on a combination of factors, but greatly influenced by the presence of claystone bedrock units, including redbeds, that deeply weather producing thick residual and colluvial landslide prone soils. Stormwater can often influence the development of landslides and once landslides occur, they often influence or restrict existing drainage patterns.

SLOPES

Slopes play a significant role when determining land use and the extent and type of land development that can be planned. When slopes in excess of 15% are disturbed, problems with erosion, sedimentation, increased stormwater runoff, and instability can result. Other factors including soil type, underlying geology, intensity of development, and extent of proposed disturbance must be taken into account. As a rule, however, the steeper the slopes the greater the likelihood of problems occurring.

Article V of Allegheny County's Subdivision and Land Development Ordinance (Michael Baker Jr., Inc. 2012) includes limitations on development on land with slopes of 25% or greater. No development or disturbance of land on slopes greater than 40% is permitted.

If steep slopes are disturbed or vegetation is removed, the soils will become prone to erosion. Allegheny County's soils generally have a high clay content. The amount of rainfall in the area causes the soil to become slip-prone. Slopes greater than fifteen (15) percent are prevalent throughout Allegheny County, and account for over 50% of the land area. Slope values are broken into four categories as shown in *Table 3.3* below, and the general slope restrictions associated with each category.

Table 4.6 - Summary of Slopes in Allegheny County

Slope Classification	Slope Range	Portion of Total Area(1)	Slope Restrictions
Flat to Moderate	0-8%	24%	Capable of all normal development for residential, commercial, and industrial uses; involves minimum amount of earth moving; suited to row crop agriculture, provided that terracing, contour planting, and other conservation practices are followed
Rolling Terrain and Moderate Slopes	8 - 15%	21%	Generally suited only for residential development; site planning requires considerable skill; care is required in street layout to avoid long sustained gradients; drainage structures must be properly designed and installed to avoid erosion damage; generally suited to growing of perennial forage crops and pastures with occasional small grain plantings
Steep slopes	15 - 25%	25%	Generally unsuited for most urban development; individual residences may be possible on large lot areas, uneconomical to provide improved streets and utilities; overly expensive to provide public services; foundation problems and erosion usually present; agricultural uses should be limited to pastures and tree farms
Severe and Precipitous Slopes	> 25%	26%	No development of an intensive nature should be attempted; land not to be cultivated; permanent tree cover should be established & maintained; adaptable to open space uses (recreation, game farms, & watershed protection)

(1) Remaining 4% of land area is classified as "Urban Land", and is not categorized by slope.

CLIMATE

Allegheny County is situated in southwestern Pennsylvania and the climate is classified as humid continental, which is marked by extreme seasonal temperature changes. Most weather systems that affect the area originate in the Central Plains or Midwest and are steered eastward by the prevailing westerly flow aloft. The primary source of moisture is the Gulf of Mexico. Due to the long overland trajectory, cold Canadian high-pressure air masses are many times considerably modified by the time they reach southwestern Pennsylvania. The mean temperature for Allegheny County is 53° Fahrenheit (F) with a maximum mean monthly temperature of 74°F in July and mean monthly low of 30°F in January. Cloudiness is rather persistent during the winter months of December through February due to the frequent rotation of weather systems through the area. Precipitation averages approximately 38 inches per year and is fairly evenly distributed throughout the year. Snowfall averages 42 inches per year with most of it falling between December and March.

RAINFALL

Figures 4.2 and 4.3 show the rainfall statistics for Allegheny County. The annual rainfall, shown in Figure 4.2, portrays the total amount of precipitation for each year from 1985 - 2015. As shown, there is significant variation in the total annual rainfall in this time period (from 27 to 57 inches annually). While this variation can have a significant impact on water supply and vegetative growth, it is the quantity of rain in a relatively short time period (1-hour, 6-hour, 24-hour, or 48-hour) that impacts stormwater runoff and receives the focus of most stormwater regulations.

Figure 4.3 shows the annual maximum 24-hour rainfall events recorded over the same time period graphed and the NOAA Atlas 14 values for the 2-year, 24-hour storm (2.33 inches) and 100-year, 24-hour storm (4.87 inches) events, derived using partial series data. The annual maximum rainfall for a station is constructed by extracting the highest precipitation amount for a particular duration in each successive year of record. A partial duration series is a listing of period of record greatest observed precipitation depths for a given duration at a station, regardless of how many occurred in the same year. Thus, a partial data series accounts for various storms that may occur in a single year.

Historical focus on the annual maximum rainfall and the larger magnitude, low frequency storm events, as has been done in previous stormwater planning efforts, does not consider the fact that the majority of storm events are much smaller than the annual maximum rainfall event, and the inclusion of every storm event may increase the 24-hour rainfall total typically used in design. The majority of rainfall volume in Allegheny County comes from storms of low magnitude. Thus, any stormwater policy should incorporate provisions such as water quality, infiltration, or retention BMPs that account for these small events. It is also important to acknowledge that many of these smaller rainfall events lead to larger runoff events as they may be saturating the soils prior to a larger storm, or they may occur within a short time period and still overwhelm existing conveyance facilities.

For the gage shown in Figure 4.2 and 4.3, the NOAA Atlas 24-hour, 2-year storm event total of 2.33 inches was exceeded 15 times in the past 30 years of data. Best management practices should incorporate the NOAA Atlas 14, partial duration data series to ensure the best available data is being used for design purposes.

Figure 4.2 - Annual Precipitation at Pittsburgh International Airport (Coop ID #366933)

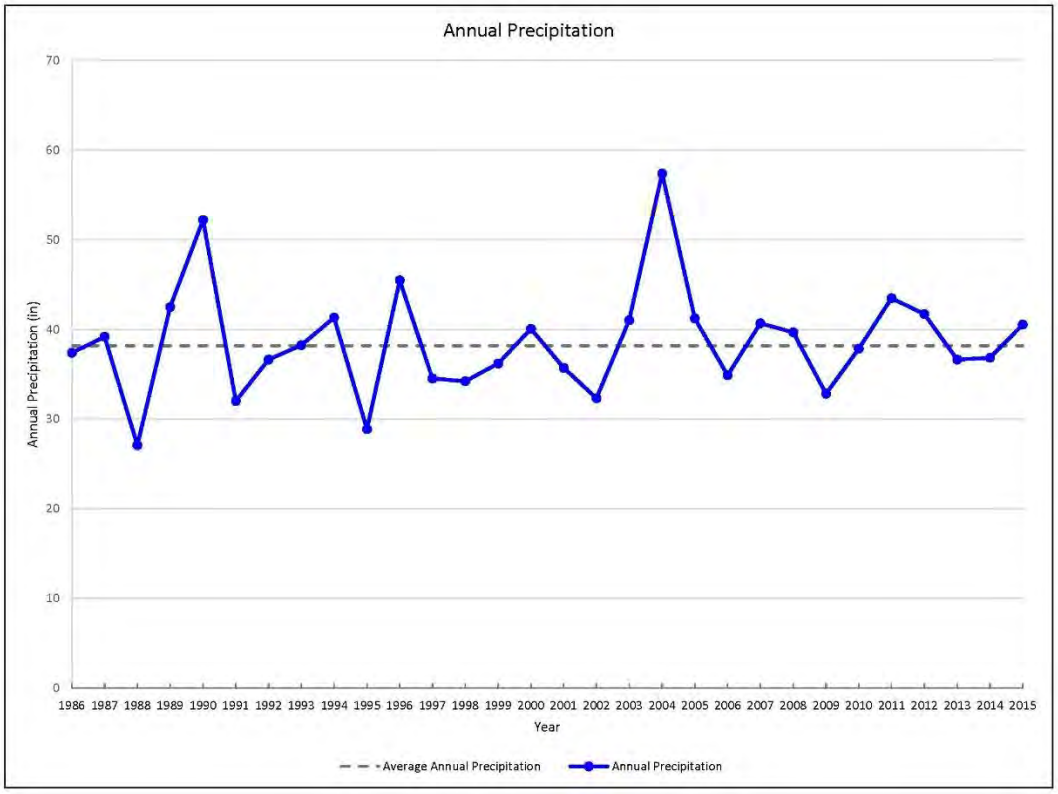
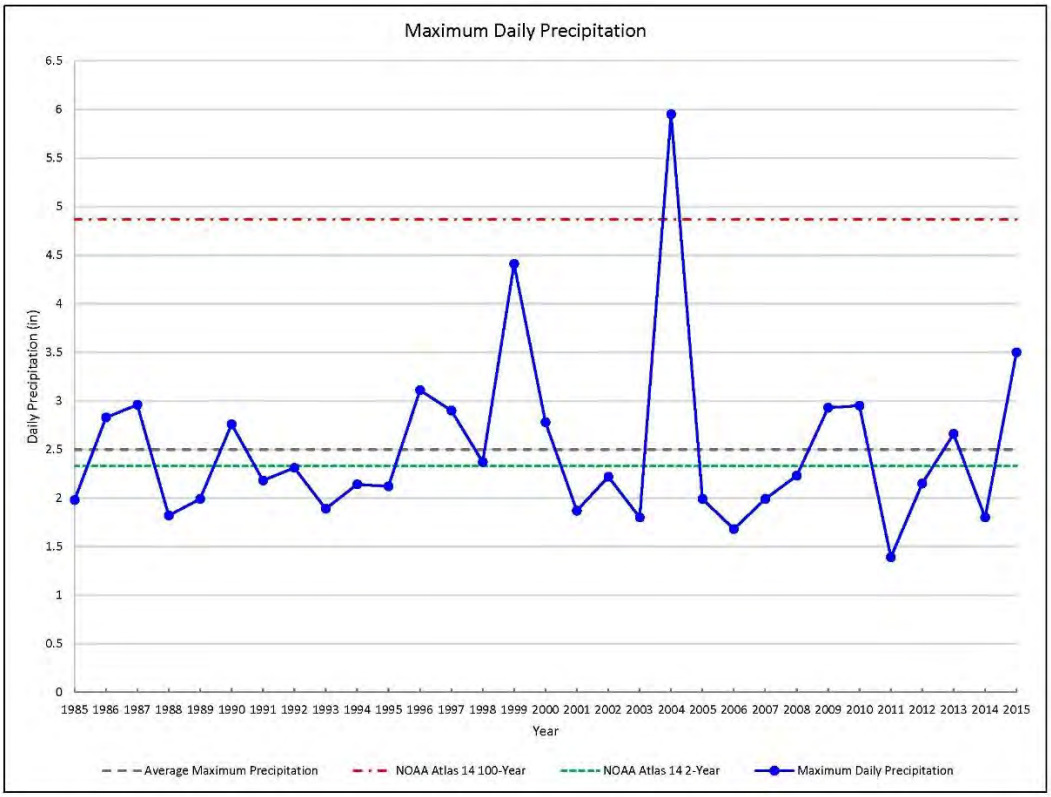


Figure 4.3 - Daily Precipitation at Pittsburgh International Airport (Coop ID #366933)



Rainfall data used in the modeling effort for this PLAN incorporated rainfall data from PaDOT's Storm-Intensity-Duration-Frequency (PDT-IDF) curves, based on the NOAA Atlas 14. NOAA Atlas 14 provides the most up-to-date precipitation frequency estimates, with associated confidence limits, for the US and is accompanied by additional information, such as temporal distributions and seasonality. An IDF Curve is a graphical representation of the probability that a given average rainfall intensity will occur over a given amount of time. PaDOT's PDT-IDF curves were developed from frequency analyses of hourly records from NOAA Atlas 14 to provide regional rainfall depths in Pennsylvania by region. PDT-IDF curves are presented in Chapter 7, Appendix A, Field Manual for Pennsylvania Design Rainfall Intensity Charts from NOAA Atlas 14 Version 3 Data. The following Table 4.7 provides the rainfall estimates used for various design storm frequencies for Allegheny County (PennDOT, 2015):

Table 4.7 - Rainfall Values for Allegheny County

Design Storm (years)	24-hour Rainfall Depth (inches)
1	2.04
2	2.44
5	2.99
10	3.44
25	4.09
50	4.65
100	5.24

These single rainfall quantities could be applied uniformly over the entire County. Additionally, the rainfall quantities were applied to the NRCS Type II storm distribution. This combination of PDT-IDF curve data with the NRCS Type II storm distribution is consistent with the guidelines in the *Pennsylvania BMP Manual* (DEP, 2006)

LAND USE

CURRENT LAND USE

As described in *Allegheny Places*, the Allegheny County comprehensive plan (ACED, 2008), development patterns in Allegheny County during the 1980s and 1990s mostly took the form of low-density urban sprawl, as a result of population redistribution patterns in which residents moved from core urban communities to the outer perimeter ring of suburbs, particularly to the northern and western portions of the County. However, a number of prominent development projects have been completed within the core urban communities in recent years that typify important development trends taking place in the County. Brownfield redevelopment incorporates (some or all of) residential, commercial, light industrial, and research and development uses into attractively landscaped settings. Prominent examples include Carrie Furnace (development ready), Pittsburgh Technology Center, South Side Works, the Waterfront, Washington's Landing, and Edgewater in Oakmont Borough (mixed use). Through these types of developments, abandoned and vacant former industrial properties are being redeveloped and riverfronts are being revitalized. Current Land Use plans are presented on *Map 6 – Existing Land Use/Land Cover*.

FUTURE LAND USE

Allegheny Places presents a thorough analysis of the existing economic conditions of the County as well as detailed recommendations to lead the effort for economic sustainability and revitalization. The *Allegheny Places* economic development plan supports economic development in a number of "growth

areas" identified in Allegheny County. These areas are as follows: Pittsburgh International Airport (I-376 and I-79 corridors); Downtown Pittsburgh and Oakland; riverfronts along the three major rivers (Allegheny, Monongahela, and Ohio); major highway corridors including Routes 8, 19, 28, 30, 50, 65, 88, 837, and 910; and Brownfield properties. The future development growth patterns should be directed in a manner that promotes the overall economic health of the County by capitalizing on the strengths and minimizing negative impacts of each area within the County. Future Land Use plans are presented on *Map 7 – Future Land Use Conditions 2025*.

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Section 5 - Problem Areas and Obstructions

INTRODUCTION

One of the Goals of this PLAN is to "Provide guidance for problem areas identified by the WPAC." The strategy for achieving this goal required identification of the existing significant stormwater problem areas and then evaluation of the identified problem areas.



Problem areas were identified by the WPAC members and others by way of a questionnaire. The problem areas were reviewed and categorized by problem type. Generalized solutions are offered for each general category of stormwater problem. Twenty-one significant problem areas having a regional character were selected for field observation and data gathering. Additional analyses and conceptual solutions were then developed for these selected areas. Additional river and stream obstructions were identified from the FEMA flood insurance profiles where features caused a rise in the stream water surface. These problem areas and obstructions are shown on *Map 9 – Stormwater Problems & Obstructions* and in the project GIS.

IDENTIFICATION OF PROBLEM AREAS

The "Allegheny County Watersheds Act 167 Stormwater Management Plan Information Request Form" and the "Form A – Stormwater Problem Areas" were developed and distributed to the WPAC members in 2012 prior to WPAC Meeting #1. The data requested on these forms was collected via the Allegheny County Stormwater Management Plan website (http://www.alleghenycountyswmp.com/). The Information Request Form (see Appendix C-1) solicited information relating to the municipal ordinances, support for the plan, relative importance of various plan criteria, interest in best management practices, and the level of coordination efforts with neighboring municipalities/entities. Form A (see Appendix C-2) requested information regarding stormwater problem location, problem type (flooding, accelerated erosion, groundwater, landslide, sedimentation, and/or water pollution), frequency, and severity. The provided data was downloaded and the summarized data is provided in Appendix C-3.

WPAC members were encouraged to complete information via web-based interactive map, forms, and surveys. 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.

Table 5.1 presents the stormwater problem areas 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 *Map 9*. The descriptions, explanations, and type of problem were provided by the submitter. The Generalized Cause of Stormwater Problem was assigned by the PLAN and corresponds to one of the Generalized Problem Area Recommendations.

Section 5 - Problem Areas and Obstructions

Table 5.1 - Stormwater Problem Areas Submitted by WPAC members

Stormwater Problem Area Map Point	Municipality	Municipal description/explanation of the stormwater problem	Description of the Damage Experienced	Type of Stormwater Problem	Generalized Cause of Stormwater Problems
0 - map location not provided	Aspinwall Borough	Stormwater from O'Hara Twp. and Fox Chapel Borough enters the Aspinwall combined sewer system causing the sewer in Brilliant Avenue to surcharge.	10 homes and 2 businesses experience flooding of basements from the surcharging sewer along Brilliant Avenue damaging appliances, furnishings and heating systems.	Flooding	Flooding - inadequate or lack of drainage system
1	Baldwin Township	Flooding on road and businesses	1 business with damaged inventory Several businesses with water in building	Flooding	Flooding - Inadequate drainage system and bridge/ culvert/other obstructions; Sediment/debris
0 - map location not provided	Baldwin Township	Flooding to buildings and roadway	business with damaged inventory	Flooding, Sedimentation	Flooding - inadequate culvert or bridge
2	Ben Avon	Flooding - Extends beyond where Spruce ties into Ohio, upstream through Avalon at time. Accelerated Erosion - Degradation of stream bank and private property. Sedimentation - Erosion leads to portions having sediment build up. Landside - Four sections of retaining walls have collapsed. This has cost Ben Avon Boro over $300,000 since 1996. There have been other costs borne by homeowners and business owners. Stormwater retention ponds near Interstate 279 have sediment and their capacity is reduced due to lack of maintenance on these ponds.	Private property damage: Four homes with flooding in the basement and first floor. Five or six light industrial buildings have experienced some flooding and/or inaccessibility. Also Boro Public Works garage is inaccessible during flooding. More than one owner: Four homes	Flooding, Accelerated Erosion, Sedimentation, Landslide	Flooding-Inadequate culvert/bridge; Development w/i floodplain; Sediment/Debris accumulation; Streambank erosion
3	Ben Avon Heights Borough	Cambride Road needed to be closed to Vehicular traffic since 2006 due to damage from Hurricane Ivan Flooding	The Borough Roadway was washed out and needed to be closed and has been since due to lack of funding	Flooding, Accelerated Erosion	Streambank Erosion
123	Bethel Park	Stormwater Compliance Issues if redeveloped	n/a	Other	Flooding - lack of drainage system
124	Bethel Park	Stormwater Compliance Issues if redeveloped	n/a	Other	Flooding - lack of drainage system
0 - map location not provided	Borough of Dormont	This location is at the bottom of a "bowl" and all of the stormwater that does not get into our system cascades down from 3 sides and winds up at this spot. The last big rain caused a retaining wall to collapse which had been placed there to keep the regular flooding off of the property.	Retaining walls, landscaping, garages and exterior house walls have been damaged over the years.	Flooding	Flooding - inadequate or lack of drainage system
54	Borough of Dormont	The Borough has hired Hazen and Sawyer to determine designs for alleviating continual flooding at this location.	Retaining walls, backyards, exterior house walls have all been damaged over the years by flooding at this location.	Flooding	Flooding – inadequate/ lack of drainage system
78	Borough of Glen Osborne	Near 607 Davis Lane		Flooding, Accelerated Erosion	Streambank Erosion
79	Borough of Glen Osborne	Near 1008 Beaver Road	Stream bank erosion and damage to bridge base	Flooding, Accelerated Erosion	Bridge Scour
76	Borough of Glen Osborne	Erosion of fill area at parking lot of Critmore Medical Center	Erosion of fill area at parking lot of Critmore Medical Center	Accelerated Erosion	Streambank Erosion
77	Borough of Glen Osborne	Flooding at culvert under Route 65; channel formed around overflow pipe		Flooding	Flooding - inadequate culvert or bridge
74	Borough of Glen Osborne	Parks Run - Accelerated erosion at culvert under Beaver Road		Accelerated Erosion	Flooding - inadequate culvert or bridge
75	Borough of Glen Osborne	Parks Run - Accelerated erosion at driveway culvert at 529 Glen Mitchell Rd.		Accelerate Erosion	Flooding - inadequate culvert or bridge
73	Borough of Glen Osborne	Parks Run - Accelerated erosion at culvert at 535-539 Glen Mitchell Rd.	Stream undermined large trees which fell across road and damaged power lines and guardrail	Accelerated Erosion	Flooding - inadequate culvert or bridge
80	Borough of Glen Osborne	Excessive groundwater drains onto Beaver Rd., approx. 1,200 ft. east of Beaver Rd./Glen Mitchell Rd. intersection	In winter, drainage onto Beaver Road creates icy conditions	Groundwater	Flooding – inadequate/ lack of drainage system
72	Borough of Glen Osborne	Accelerated erosion at berm along retaining wall across from 520 Sycamore Road	Sink hole developing; erosion of berm along retaining wall	Accelerated Erosion, Groundwater	Streambank Erosion
NA	Borough of Pennsbury Village	Reported: no stormwater problems within municipality			NA
NA	Braddock Borough	Reported: no stormwater problems within municipality			NA
6	Bradford Woods	Stormwater runoff causes erosion and flooding of private property and sedimentation on the same private property.	Private in-ground pool has runoff and sediment and house has had some damage from water and runoff.	Flooding, Accelerated Erosion, Sedimentation	Flooding-inadequate or lack of drainage system
4	Bradford Woods	During heavy storm events runoff from the roadway flows to the adjacent properties and flooding of the yards occurs.	debris in yards and damage to landscaping	Flooding	Flooding – inadequate/ lack of drainage system
5	Bradford Woods	Flooding of private property during heavy stormwater events	Stormwater damage to existing lawns and landscaping and debris on private property.	Flooding	Flooding – inadequate/ lack of drainage system

Section 5 - Problem Areas and Obstructions

Stormwater Problem Area Map Point	Municipality	Municipal description/explanation of the stormwater problem	Description of the Damage Experienced	Type of Stormwater Problem	Generalized Cause of Stormwater Problems
7	Bradford Woods	Stormwater runoff from surrounding roads and properties flows from walking trail and ends up in local pond, filling with debris and sedimentation.	Local walking path has been damaged continuously and sediment from roads and path ends up in pond as pollution.	Sedimentation, Water Pollution	Flooding – inadequate/ lack of drainage system
8	Bradford Woods	Sedimentation from runoff deposits onto private properties.	landscaping and property damage	Sedimentation	Flooding – inadequate/ lack of drainage system
NA	Bridgeville Borough	Reported: no stormwater problems within municipality			NA
NA	Chalfant Borough	Reported: no stormwater problems within municipality			NA
9	Cheswick Borough	Excessive stormwater gets into Sanitary sewer from groundwater and downhill into manhole covers.	6 residences had water in basement.	Infiltration of groundwater into Sanitary Sewer plus roots problems	Flooding – inadequate/ lack of drainage system
0 - map location not provided	Churchill	Flooding has caused damage to private property.	Residence with water in basements.	Flooding	Flooding – inadequate/ lack of drainage system
NA	City of Duquesne	Reported: no stormwater problems within municipality			NA
37	Collier Township	Stormwater runoff causes flooding and erosion.	Commercial business flooding in lower areas.	Flooding, Accelerated Erosion, Sedimentation	Flooding – inadequate/ lack of drainage system
38	Coraopolis	Roadway Flooding: Limited pipe conveyance on State Route 51	Impedes traffic, roadway flooding	Flooding	Flooding - inadequate culvert or bridge
39	Coraopolis	Roadway Flooding, limited stormwater conveyance in State Stormsewer	Private property damage: Flooding backs up from roadway to private property, basement flooding	Flooding	Flooding – inadequate/ lack of drainage system
40	Coraopolis	Roadway flooding of Thorn Run from Thorn Street to Kendall Street on Fourth Avenue during Hurricane Ivan.	Flooding of commercial structure	Flooding, Accelerated Erosion, Sedimentation	Flooding – inadequate/ lack of drainage system
45	Coraopolis	Erosion and Sedimentation from stream blocking an existing storm sewer system resulting in surface flooding	Private property damage: resident with water in garage and debris on property Public Property damage: roadway erosion, etc.	Flooding, Accelerated Erosion, Sedimentation	Flooding - stream or floodplain obstruction
46	Coraopolis	Surface flooding from plugged culvert under state roadway and county property	Public Property Damage - Surface flooding on borough property Also impedes traffic on SR 51 (surface roadway flooding)	Flooding, Sedimentation	Sediment/Debris Accumulation
42	Coraopolis	Surface flooding on private property adjacent to Montour Run	Private Property Damage: Surface flooding on property from Montour run. Public Property Damage: Floodwater backs up into sewage lift station	Flooding	Flooding-Inadequate culvert/bridge; Development w/i floodplain
44	Coraopolis	Flooding: Surface flooding resulting from downstream culvert capacity and increased peak flow from upstream	Private Property Damage: Surface flooding in resident yards Public Property Damage: Roadway Flooding	Flooding, Sedimentation	Flooding - inadequate culvert or bridge
43	Coraopolis	Stormwater runoff eroding upstream ditch lines and surface flooding	Private Property Damage: Erosion of ditch lines next to private drives, surface flooding. Public Property Damage: Surface flooding and sedimentation on public roadways	Flooding, Accelerated Erosion, Sedimentation	Flooding – inadequate/ lack of drainage system
41	Coraopolis	Surface flooding of street	Private Property Damage: water backs up into private garage Public Property Damage - Roadway flooding	Flooding	Flooding – inadequate/ lack of drainage system
49	Crescent Township	Flooding of Roadway during heavy rain events	Multiple yards had sediment and debris build-up after water receded.	Flooding	Flooding – inadequate/ lack of drainage system
50	Crescent Township	Flooding at the Spring Run Road/SR 51 area which is a low lying area that floods during rain events	erosion and sediment in private yards during the events	Flooding	Sediment/debris; Streambank erosion
51	Crescent Township	Flooding in low lying area between SR 51 and Riverview Road	Township Park and private property was damaged by flooding and erosion	Flooding	Flooding - inadequate culvert or bridge
52	Crescent Township	Sediment buildup from rain events blocking shoulder and pushing water into roadway	n/a	Sedimentation	Flooding - inadequate culvert or bridge
47	Crescent Township	Erosion of stream embankment has caused roadway shoulder and bank to begin to move	Road shoulder and stream embankment is eroding and sliding towards stream	Landslide	Streambank Erosion
53	Crescent Township	Vegetation around the stream is overgrowing the steam channel and obstructing the channel flow	overflow of water onto the roadway due to obstruction causing minor roadway damage	vegetative overgrowth	Flooding - stream or floodplain obstruction
48	Crescent Township	Flooding during heavy rain events from the Ohio River to local municipal rivers and property	Until waters receded flooding occurred on both public and private property	Flooding	Flooding - stream or floodplain obstruction
NA	Dravosburg Borough	Reported: no stormwater problems within municipality			NA

Section 5 - Problem Areas and Obstructions

Stormwater Problem Area Map Point	Municipality	Municipal description/explanation of the stormwater problem	Description of the Damage Experienced	Type of Stormwater Problem	Generalized Cause of Stormwater Problems
NA	East McKeesport Borough	Reported: no stormwater problems within municipality			NA
0 - map location not provided	East Pittsburgh Borough	Flooding along Electric Avenue.	Loss of utility service Private property damage - 13 properties Public property damage - clogging of sewers	Flooding	Flooding – inadequate/ lack of drainage system
55	Edgewood	Flooding causing local basement flooding along Greendale Avenue between Boyd Street and S. Braddock A venue	6 Residents with Basement flooding	Flooding	Flooding – inadequate/ lack of drainage system
60	Edgeworth Borough	see above	n/a	Flooding, Accelerated Erosion, Sedimentation	Flooding – inadequate/ lack of drainage system
58	Edgeworth	Stormwater backs up from Ohio River and floods park	open space flooding-public bridge damage, access road damage, pedestrian bridge destroyed	Flooding	Flooding - stream or floodplain obstruction
56	Edgeworth Borough	Erosion along the Stream	erosion exposes infrastructure, weakens trees long embankments causing trees to fall--large trees in excess of 3-foot diameter	Accelerated Erosion, Sedimentation	Streambank Erosion; Sediment/debris accumulation
59	Edgeworth	erosion	yard flooding	Flooding, Accelerated Erosion	Streambank Erosion
57	Edgeworth	Stream Bank Erosion which deposits sediment in Stream	stream bank erosion	Accelerated Erosion, Sedimentation	Streambank Erosion
NA	Elizabeth Borough	Reported: no stormwater problems within municipality			NA
65	Etna Borough	Flooding of intersection	Commercial business flooded - loss of inventory; private residence substantially damaged - actually eventually torn down.	Flooding	Flooding - inadequate culvert or bridge
61	Etna Borough	Storm culvert at the bottom of a large drainage area - upstream communities have storm water piped into and above culvert and storm water volume can exceed capacity of culvert causing flooding; velocity and volume of storm water carry sedimentation down the valley into the culvert causing capacity issues with the culvert.	Private residence has been flooded due to debris clogging culvert and coming up through floor of home during aftermath of Hurricane Ivan. At this same time, large debris carried into the culvert damaged the culvert pipe, Walls and ceiling of culvert.	Flooding, Sedimentation	Flooding - inadequate culvert or bridge
63	Etna Borough	Flooding: Stormwater runoff causes flooding of this culvert; Accelerated Erosion: Location at the base of a large stormwater drainage area with very steep shale slopes, stormwater causes accelerated erosion which has blocked the culvert entrance; Sedimentation: buildup of sedimentation from erosion of steep slopes on both sides of the natural run causes culvert blockage.	Private property located below at the intersection of Washington and Parker Streets (site of Etna 1) - commercial property with damaged inventory and single family residential home with first floor flooding. Home was eventually demolished due to repeated events.	Flooding, Accelerated Erosion, Sedimentation	Flooding - inadequate culvert or bridge; Streambank Erosion; Sediment accumulation
62	Etna Borough	Sedimentation: Stormwater runoff causes sedimentation build-up at culvert from hillside drainage area upstream; Flooding: Stormwater runoff and sedimentation build-up at culvert has caused blockage of culvert entrance and subsequent overtopping of culvert structure.	Private residential property damage: water in first floor which came through kitchen door	Flooding, Sedimentation	Sediment/Debris Accumulation
66	Etna Borough	Street: Stormwater causes street flooding during heavy rainfall events	No damage to either private or public property	Flooding	Flooding – inadequate/ lack of drainage system
64	Etna Borough	Water coming through basement walls	One owner experiencing basement flooding	Groundwater	Flooding – inadequate/ lack of drainage system
69	Findlay Township	Flooding occurs during very heavy rains	Residential property damage to 2 properties	Flooding, sedimentation	Flooding – inadequate/ lack of drainage system
67	Findlay Township	Flooding occurs during very heavy rains	Commercial property damage to 2 properties	Flooding	Flooding – inadequate/ lack of drainage system
68	Findlay Township	Flooding occurs during very heavy rains	Residential and Commercial property damage to 10 properties	Flooding	Flooding – inadequate/ lack of drainage system
70	Forest Hills	Kenmore Avenue near Yost Blvd. experiences flooding during large storm events. Flooding has occurred twice in the last 15 years. This is the low point where water from Route 30, Yost Blvd and local Forest Hills and Braddock Hills streets collects and pools when the rainfall overloads the piped stream (Fall Run). The majority of the water is from Route 30.	10 homes had water in their basements resulting in damage to heating systems and appliances. Of these, 6 had more serious damage including furniture.	Flooding	Flooding - inadequate culvert or bridge
71	Franklin Park Borough	Creek overflows onto road at this location.	Residential basement flooding.	Flooding	Flooding - stream or floodplain obstruction

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Stormwater Problem Area Map Point	Municipality	Municipal description/explanation of the stormwater problem	Description of the Damage Experienced	Type of Stormwater Problem	Generalized Cause of Stormwater Problems
NA	Homestead Borough	Reported: no stormwater problems within municipality			NA
85	Jefferson Hills Borough	Flooding along the Mon Riverfront.	Commercial property damage	Flooding, Water pollution	Flooding-development w/i floodplain
90	Jefferson Hills Borough	Flooding along Peters Creek.	residential property damage	Water pollution, Flooding, Accelerated erosion, Sedimentation	Flooding - development within floodplain; Streambank erosion; Acid mine drainage
91	Jefferson Hills Borough	Flooding along Walton Road	residential property damage	Water pollution, Flooding, Accelerated erosion, Sedimentation	Flooding - stream or floodplain obstruction
87	Jefferson Hills Borough	Landslide along Bedell Road, east of Gill Hall Road	road	Landslide	Landslide- drainage onto slope
88	Jefferson Hills Borough	Landslide along East Waterman.	road	Landslide	Landslide- drainage onto slope
86	Jefferson Hills Borough	Flooding along Route 51 Corridor along Lewis Run	residential property damage	Flooding, Accelerated erosion, Sedimentation, Water pollution	Flooding - stream or floodplain obstruction
89	Jefferson Hills Borough	Landslide along West Waterman Road	road	Landslide	Landslide- drainage onto slope
92	Kennedy	Severe storm events often cause flooding and erosion of secondary gravel road. This is an isolated location zoned General Industrial use, albeit there is only a vehicle junk yard and several residential houses.	Private Property damage 3 residences with flooding confined to ancillary grounds.	Flooding	Flooding – inadequate/ lack of drainage system
93	Kennedy		Public property damage: Road slide	Landslide	Landslide- drainage onto slope
NA	Liberty Borough	Reported: no stormwater problems within municipality			NA
94	Marshall Township	Flooding: Narrow stream channel causes rear yard flooding during significant rainfall events.	Private property damage, 1 resident, streambank erosion.	Flooding	Flooding - stream or floodplain obstruction
130	Monroeville	Unfavorable hydraulics and sedimentation causes localized roadway flooding.	None. Flooding creates a dangerous traffic situation.	Flooding, Sedimentation	Sediment/Debris Accumulation
132	Monroeville	Sedimentation has caused shallow lake and stream to "silt in" and diminish capacity of storm sewers and culverts resulting in roadway flooding on Logans Ferry Road and Old Frankstown Road.	Roadway has been damaged by floodwaters. Flooding causes a danger to motorists.	Flooding, Sedimentation	Sediment/Debris Accumulation
125	Monroeville	96" RCP storm sewer pipe serving approximately 400 acres of heavily commercial land which is heavily polluted with mine drainage, detergents, and sewage discharges at this location.	None.	Water Pollution	Mine Drainage
127	Monroeville	Possibly undersized or failing series of individually-owned culverts result in road and property flooding.	Basement flooding and damage to yards of roughly 10 homes	Flooding	Flooding - inadequate culvert or bridge
131	Monroeville	Drainage from upgradient causes flooding and sediment on tri-boro expressway.	Expressway must be closed by police, once flooding subsides PennDOT must clean the roadway.	Flooding, Sedimentation	Flooding-inadequate or lack of drainage system & maintenance; sediment accumulation
126	Monroeville	Past flooding caused erosion that collapsed a residential private bridge which now obstructs Dirty Camp Run stream.	Collapsed private bridge used for driveway.	Flooding, Accelerated Erosion, Obstruction	Flooding - stream or floodplain obstruction
129	Monroeville	Insufficient storm sewer capacity causes roadway flooding which endangers motorists. Streambank erosion in many areas has damaged Mosside Boulevard repeatedly. Problem spans Route 48/ Mosside Blvd from Cambridge Square Drive to Route 130/ Broadway Boulevard.	Firefighter lost lifesaving victim trapped in car. Many cars have been damaged after being caught in floodwaters. Damage at Compunetix and other businesses. Damage to roadway.	Flooding, Accelerated Erosion	Flooding-inadequate or lack of drainage system

Stormwater Problem Area Map Point	Municipality	Municipal description/explanation of the stormwater problem	Description of the Damage Experienced	Type of Stormwater Problem	Generalized Cause of Stormwater Problems
134	Monroeville	Flooding - Uncontrolled runoff from Haymaker Road causes downstream storm sewer system to be overwhelmed and flood Route 130. Erosion - Uncontrolled runoff from Haymaker Road erodes streambeds and deposits sediment into downstream storm sewer system and onto roadway. Sedimentation and uncontrolled runoff from Haymaker Road erodes streambeds and deposits sediment into downstream storm sewer system and onto roadway. Landslide - Uncontrolled runoff from Haymaker Road saturates slope area and has caused or exacerbated at least 3 landslides.	Private property - 3 homes have had damage to yard/ lawn areas. Public property - Each event requires sediment removal by Municipality and PennDOT including occasional storm sewer cleaning. Landslides have damaged two roads.	Flooding, Accelerated Erosion, Sedimentation, Landslide	Landslide-slope drainage; Flooding - inadequate drainage system; Sediment accumulation
128	Monroeville	Elevated runoff upstream results in flooding along Abers Creek Road roughly between Northern Pike and the Pennsylvania Turnpike after heavy rains.	Private property - Flooding of property and damage to contents of roughly 8 homes Public property - Flooding has damaged the road and storm sewers multiple times as well as the sanitary sewer system and a park.	Flooding	Flooding-development In floodplain & inadequate bridge; Sediment accumulation
133	Monroeville	Failing private storm sewer pipe causes roadway flooding on Verlinden Drive and Old Frankstown Road.	Damage to lawn, driveway, parking lot of businesses and damage to contents of one building. Danger to motorists.	Flooding	Flooding-inadequate culvert/bridge (maintenance); Sediment accumulation; Stream erosion
135	Mt Lebanon		2 Homes damaged	Flooding	Flooding-inadequate or lack of drainage system
136	Mt Lebanon		4 Homes damaged	Flooding	Flooding-inadequate or lack of drainage system
137	Mt Lebanon		2 Homes damaged	Flooding	Flooding-inadequate or lack of drainage system
138	Mt Lebanon		1 property damaged	Flooding	Flooding-inadequate or lack of drainage system
139	Mt Lebanon			Flooding	Flooding-inadequate or lack of drainage system
140	Mt Lebanon		1 Home damaged	Flooding	Flooding-inadequate or lack of drainage system
141	Mt Lebanon			Groundwater	Flooding-inadequate or lack of drainage system
142	Mt Lebanon			Accelerated Erosion	Flooding-inadequate or lack of drainage system
0 - map location not provided	Mt Oliver	a groundwater spring leaks out onto Walter Street and causes hazard in cold weather	no property damage	Groundwater	Flooding-inadequate or lack of drainage system
NA	North Braddock Borough	Reported: no stormwater problems within municipality			NA
143	North Fayette Township	None	Stream Bank Erosion and Road Shoulder erosion	Flooding	Streambank erosion
145	North Fayette Township	Flooding from Storm Water run off	None	Flooding	Flooding – development in floodplain exceeds capacity of stream
146	North Fayette Township	Stream Sedimentation Restricting Flow	None	Sedimentation	Sediment/Debris Accumulation
147	North Fayette Township	Build-up of Sediment in Stream, restricting flow	remove sediment	Sedimentation	Sediment/Debris Accumulation
144	North Fayette Township	Flooding during heavy rains	None	Flooding, Sedimentation	Sediment/Debris Accumulation
NA	North Versailles	Reported: no stormwater problems within municipality			NA
149	O'Hara Township	Low PADOT bridge causes backups and stream overflow	Private property damage to 15 properties	Flooding, Accelerated Erosion, Sedimentation, Landslide	Flooding - inadequate culvert or bridge

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Stormwater Problem Area Map Point	Municipality	Municipal description/explanation of the stormwater problem	Description of the Damage Experienced	Type of Stormwater Problem	Generalized Cause of Stormwater Problems
152	O'Hara Township	Sedimentation from unnamed tributary to Squaw Run	none	Sedimentation	Sediment Accumulation
150	O'Hara Township	none		Landslide	Landslide- drainage onto slope
151	O'Hara Township	none		Landslide	Landslide- drainage onto slope
148	O'Hara Township	none	private property damage to 2 properties	Flooding	Flooding-inadequate or lack of drainage system
14	Pittsburgh	Flooding, auto entrapment	N/A	Flooding	Flooding-inadequate or lack of drainage system
21	Pittsburgh	Report of road flooding, vehicles floating on water	unknown	Flooding	Flooding-inadequate or lack of drainage system
22	Pittsburgh	Flooding in intersection, water up to cars doorway & trapped in vehicle	unknown	Flooding	Flooding-inadequate or lack of drainage system
36	Pittsburgh	Flooding, Manhole Surcharging	unknown	Flooding	Flooding-inadequate or lack of drainage system
23	Pittsburgh	Flooding, vehicles stuck	unknown	Flooding	Flooding-inadequate or lack of drainage system
24	Pittsburgh	Flooding for 3 blocks, about 2 ft. deep	unknown	Flooding	Flooding-inadequate or lack of drainage system
25	Pittsburgh	Flooding in intersection, cars stuck	unknown	Flooding	Flooding-inadequate or lack of drainage system
26	Pittsburgh	Flooding up to cars windows	unknown	Flooding	Flooding-inadequate or lack of drainage system
27	Pittsburgh	Flooding at intersection - cars stuck	unknown	Flooding	Flooding-inadequate or lack of drainage system
28	Pittsburgh	Flooding at intersection - vehicles stuck	unknown	Flooding	Flooding-inadequate or lack of drainage system
29	Pittsburgh	Flooding in intersection - cars stuck	unknown	Flooding	Flooding-inadequate or lack of drainage system
13	Pittsburgh	Flooding	auto entrapment	Flooding	Flooding-inadequate or lack of drainage system
30	Pittsburgh	Street flooded, cars stuck	unknown	Flooding	Flooding-inadequate or lack of drainage system
12	Pittsburgh	Flooding on road from the Creek	unknown	Flooding	Flooding - inadequate culvert or bridge
31	Pittsburgh	Flooding in intersection, car stuck	unknown	Flooding	Flooding-inadequate or lack of drainage system
16	Pittsburgh	Home Flooding, Water coming in through 1st floor windows	unknown	Flooding	Flooding-inadequate or lack of drainage system
32	Pittsburgh	Intersection Flooded	unknown	Flooding	Flooding-inadequate or lack of drainage system
34	Pittsburgh	Intersection Flooded, car trapped	unknown	Flooding	Flooding-inadequate or lack of drainage system
17	Pittsburgh	Stormwater causes landslide onto roadway	closed roadway	Landslide	Landslide- drainage onto slope
33	Pittsburgh	Stormwater floods Washington Boulevard during large rain events	no residence in area	Flooding	Flooding - inadequate culvert or bridge
10	Pittsburgh	Auto Entrapment	unknown	Flooding	Flooding-inadequate or lack of drainage system
11	Pittsburgh	Basement Flooding - Homeowner says it's flooding and getting worse at a rapid rate	unknown	Flooding	Flooding-inadequate or lack of drainage system
15	Pittsburgh	Flooding, Auto entrapment - Caller stuck in car with waters rising	unknown	Flooding	Flooding-inadequate or lack of drainage system
18	Pittsburgh	Reports of road flooding	unknown	Flooding	Flooding-inadequate or lack of drainage system
35	Pittsburgh	Flooding on roadway and debris washing down from hillside onto lane of travel	unknown	Flooding, Debris washing down from hillside onto road	Flooding-inadequate or lack of drainage system
19	Pittsburgh	Pitt. university police report flooding at intersection and cars getting stuck	unknown	Flooding	Flooding-inadequate or lack of drainage system
20	Pittsburgh	Report of 5-foot-deep flooding on Saline St	unknown	Flooding	Flooding-inadequate or lack of drainage system
NA	Port Vue Borough	Reported: no stormwater problems within municipality			NA
174	Scott Twp.	Sedimentation causes blockage beneath the lower chord of bridge	Road closure and debris on roadway.	Sedimentation	Flooding - inadequate culvert/bridge/channel; Sediment accumulation
160	Scott Twp.	Debris is collected at entrance to culvert. Limits capacity.	Debris cleanup.	Flooding	Sediment/Debris Accumulation
166	Scott Twp.	Ground movement with undetermined cause.	Ground and foundation (single family homes) movement	Ground Movement	Landslide- drainage onto slope

Stormwater Problem Area Map Point	Municipality	Municipal description/explanation of the stormwater problem	Description of the Damage Experienced	Type of Stormwater Problem	Generalized Cause of Stormwater Problems
154	Scott Twp.	Stream Flooding - Conveyance Capacity Limited	Private Property damage: private drains and public utilities	Flooding	Flooding - inadequate culvert or bridge
159	Scott Twp.	Stormwater: Low lying residential structure with basement flooding	Basement wall collapse	Flooding, Groundwater	Flooding-inadequate or lack of drainage system
161	Scott Twp.	Surface Flooding: Stormwater runoff from collapsed/destroyed PennDOT stormwater conveyance system	Private Property Damage: Yard Flooding/Erosion	Flooding, Accelerated Erosion	Flooding - inadequate culvert or bridge
169	Scott Twp.	Landslide: Private Property chronic landslide (fill)	Private property damage resulting from fill failure	Landslide	Landslide- drainage onto slope
171	Scott Twp.	Landslide - Backyard of private residences	Private property damage, landslide behind private residences, may be result of stormwater	Landslide	Landslide- drainage onto slope
172	Scott Twp.	Landslide: Private landslide, cause unknown, could be partial runoff	Private property damage: structural damage from landslide/soil movement and yard area slipping.	Landslide	Landslide- drainage onto slope
153	Scott Twp.	Accelerated Erosion: Stormwater runoff from private storm sewer system in disrepair	Private property damage: backyard erosion to several residences	Accelerated Erosion	Flooding-inadequate or lack of drainage system
170	Scott Twp.	Groundwater spring causing yard saturation/nuisance/mosquitos, etc.	Private property damage: soil saturation, nuisance for residences	Groundwater	Flooding-inadequate or lack of drainage system
167	Scott Twp.	Groundwater Spring: spring from private property causes public roadway icing and occupies capacity in existing public storm sewer	Private property damage: saturated yards and basement wall damage Public Property damage: runoff onto public roadways, freezing/icing during cold weather	Groundwater	Flooding-inadequate or lack of drainage system
168	Scott Twp.	Landslide: stormwater runoff (possibly downspouts) and improper fill placement on private property	Private property damage: loss of yard area	Landslide	Landslide- drainage onto slope
173	Scott Twp.	Stream erosion, surface flooding and localized roadway flooding	heavy storm results in stream bank erosion, surface flooding on roadway Hurricane Ivan - Flooding damage to multiple residences	Flooding, Accelerated Erosion	Streambank Erosion
176	Scott Twp.	Abandoned Mine Drainage enters stream	AMD freezes on County owned road	Water Pollution	Mine Drainage
163	Scott Twp.	Flooding on industrial property during Hurricane Ivan	Private property damage on industrial property/structure(s)	Flooding	Flooding - inadequate culvert or bridge
164	Scott Twp.	Flooding of Industrial property during hurricane Ivan	Private Property Damage to Industrial property and structural damage	Flooding	Flooding - stream or floodplain obstruction
165	Scott Twp.	Flooding of Industrial property during hurricane Ivan	Flooding of Industrial property during hurricane Ivan, damaged property and structure	Flooding	Flooding - stream or floodplain obstruction
177	Scott Twp.	AMD enters state owned storm sewer. Flooding caused if opening at RT 50 state owned/maintained CB is obstructed	Private property damage to the 3 commercial buildings. Public property damage when AMD enters into the state roadway storm sewer	AMD, Flooding, Sedimentation, Groundwater	Mine Drainage

Stormwater Problem Area Map Point	Municipality	Municipal description/explanation of the stormwater problem	Description of the Damage Experienced	Type of Stormwater Problem	Generalized Cause of Stormwater Problems
162	Scott Twp.	Limited capacity in PennDOT stormwater conveyance system	None	Flooding	Flooding-inadequate or lack of drainage system
158	Scott Twp.	Limited capacity in County Stormwater culvert	Private Property Damage: Damage to existing commercial structure	Flooding, Accelerated Erosion	Flooding-inadequate or lack of drainage system
155	Scott Twp.	Areas submerged during flood events (Ivan)	Private property damage: residential structures damaged, ~5 houses with water in basements	Flooding	Flooding – development within floodplain
156	Scott Twp.	Culvert pipe blown out	Private property damage: surface erosion on private property (residential)	Flooding	Flooding - inadequate culvert or bridge
175	Scott Twp.	Streambank flooding, abutment washout behind private driveway stream crossings along PennDOT roadway	Private property damage: washout behind private driveway bridge abutments	Flooding, Accelerated Erosion	Bridge Scour
157	Scott Twp.	Surface Flooding	Private property damage: Multiple residences, basement and yard damage	Flooding	Flooding-inadequate or lack of drainage system
181	Shaler Township		Residential property damage to 30 properties, damage to public park	Flooding, Homes in 100-year floodplain	Flooding – development within floodplain
182	Shaler Township		Residential property damage to 15 properties	Flooding, Accelerated Erosion, Sedimentation, Landslide, Homes in 100-year floodplain	Flooding – development within floodplain
178	Shaler Township	Upstream limit of stream bank erosion of Little Pine Creek West	Inadequate Stream Capacity - just above Etna Borough	Accelerated Erosion, Sedimentation	Flooding - inadequate bridge; Streambank erosion, Sediment accumulation
179	Shaler Township	Downstream limit of stream bank erosion of Little Pine Creek West	Inadequate Stream Capacity - just above Etna Borough	Accelerated Erosion, Sedimentation	Flooding - inadequate bridge; Streambank erosion, Sediment accumulation
180	Shaler Township		Residential property damage to 25 properties, Sanitary sewer damage	Flooding, Sedimentation	Streambank Erosion
183	Sharpsburg Borough	A stream coming from O'Hara Twp. Shaler Twp. and carrying drainage from PennDOT's Route 28 enters the Sharpsburg Combined sewer system at Ravine Street. During heavy rain events, this stream flow increases causing sewer surcharging along Ravine Street.	Sewer surcharging in the basements of 20 homes and 2 businesses. Appliances, heating systems and furnishings were damaged.	Flooding	Flooding-inadequate or lack of drainage system
186	South Fayette	Area floods in rains over 3".	Erosion of yards.	Flooding	Flooding-inadequate or lack of drainage system
193	South Fayette	Area floods in rains over 4".	Erosion of road berm.	Flooding	Flooding-inadequate or lack of drainage system
195	South Fayette	Area floods in rains over 4".	Erosion of road berm.	Flooding	Flooding-inadequate or lack of drainage system
196	South Fayette	Area floods in rains over 4".	Erosion of road berm.	Flooding	Flooding-inadequate or lack of drainage system
194	South Fayette	Area floods in rains over 4".	Private: erosion of yards. Public: erosion of road berm.	Flooding	Flooding-inadequate or lack of drainage system
197	South Fayette	Area floods in rains over 6".	Erosion of yards.	Flooding	Flooding-inadequate or lack of drainage system
198	South Fayette	Area floods in rains over 2".	Erosion of road berm.	Flooding	Flooding-inadequate or lack of drainage system
199	South Fayette	Area floods in rains over 2".	Erosion of road berm.	Flooding	Flooding-inadequate or lack of drainage system

Section 5 - Problem Areas and Obstructions

Stormwater Problem Area Map Point	Municipality	Municipal description/explanation of the stormwater problem	Description of the Damage Experienced	Type of Stormwater Problem	Generalized Cause of Stormwater Problems
184	South Fayette	Area floods in rains over 2".	Erosion of road berm	Accelerated Erosion	Bank Erosion
187	South Fayette	Area floods in rains over 3".	None	Flooding	Flooding-inadequate or lack of drainage
185	South Fayette	Erosion of collection ditch during heavy rains.	Erosion of collector ditch that leads to development detention pond.	Accelerated Erosion	Flooding-inadequate or lack of drainage
0 - map location not provided	South Fayette	Area floods in rains over 6".	None	Flooding	Flooding-inadequate or lack of drainage system
188	South Fayette	Area floods in rains over 6".	Erosion of yards and house water damage.	Flooding	Flooding-inadequate or lack of drainage
189	South Fayette	Area floods in rains over 6".	Erosion of yards and house water damage.	Flooding	Flooding-inadequate or lack of drainage
190	South Fayette	Area floods in rains over 6".	Erosion of yards and house water damage.	Flooding	Flooding-inadequate or lack of drainage
191	South Fayette	Area floods in rains over 3".	House water damage.	Flooding	Flooding-inadequate or lack
192	South Fayette	Area floods in rains over 2".	Erosion of road berm.	Flooding	Flooding-inadequate or lack of drainage
201	South Park Township		1 business - (Owl's Club - Cochran Mills Rd.)	Flooding, Sedimentation, Low Bridges	Flooding - inadequate culvert or bridge
200	South Park Township		1 business was damaged (American Legion), Several residences with water in basement	Flooding	Flooding - inadequate culvert (or maintenance); Sediment accumulation
NA	Swissvale Borough	Reported: no stormwater problems within municipality			NA
202	Tarentum Borough	Flooding from Bull Creek escaping streambank	Damage to Borough Garage	Flooding, Accelerated Erosion, Sedimentation, Landslide	Flooding - stream or floodplain obstruction
81	Township of Hampton	Flooding - The area floods on a regular basis	commercial: building and site formally located on this site was damaged by flooding along with a channel wall	Flooding	Flooding - inadequate culvert or bridge
82	Township of Hampton	Area has experienced flooding on a regular basis	Several private single family dwellings were highly damaged in basements and on first floors. Township VFD building also damaged	Flooding	Flooding-inadequate or lack of drainage system
83	Township of Hampton	Area flooding regularly	Public Facility: Buildings and site highly damaged during flood events. Facility off line for several days.	Flooding	Flooding - development within floodplain; Streambank erosion
84	Township of Hampton	Area historically flooded.	Commercial: Daycare facility located in this area required evacuation and sustained extensive basement and first floor damage.	Flooding	Flooding - inadequate culvert or bridge
96	Township of Moon	Storm water causes the stream to leave its bank causing flooding	Private properties and business with damaged inventory	Flooding	Flooding - Development within the floodplain
105	Township of Moon	Storm water runoff causing landslide at the Hanger Restaurant causing hillside to bulge onto parking lot and nearby restaurant building. Ongoing problem	Business property damage	Landslide	Landslide- drainage onto slope
113	Township of Moon	Landslide -Storm water runoff and soil conditions cause hillside to give way and slide into Shafer Road at this location up from the intersection with Stoops Ferry Road.	Township Road damaged	Landslide	Landslide- drainage onto slope

Section 5 - Problem Areas and Obstructions

Stormwater Problem Area Map Point	Municipality	Municipal description/explanation of the stormwater problem	Description of the Damage Experienced	Type of Stormwater Problem	Generalized Cause of Stormwater Problems
104	Township of Moon	Landslide took out storm water retention system. Area kept sliding towards and encroached into Flaugherty Run stream.	Private property damage. Excessive costs were borne by the developer for repairs.	Landslide	Landslide- drainage onto slope
112	Township of Moon	Landslide form storm water and soil saturation along Brodhead Road below the intersection of Purdy Road. The pavement and ground gave way towards Boggs School Road.	Slide repaired along state right of way and private property and roadway restored	Landslide	Landslide- drainage onto slope
108	Township of Moon	Erosion and storm water contributed to landslide near Staunton Drive off of Stoops Ferry Road. Soil gave way down onto Railroad Right of Way	Two residential lots plus active railroad. Material encroached into right of way but did not impede train passage.	Accelerated Erosion, Landslide	Landslide- drainage onto slope
109	Township of Moon	Landslide on lower side of Boggs School Road near intersection with Spring Run Road. Roadway is showing early signs of a slip. Excess water runoff and soil conditions contribute to the problem along this area	Private property and township road	Landslide, Groundwater	Landslide- drainage onto slope
0 - map location not provided	Township of Moon	Landslide on lower side of Boggs School Road near intersection with Spring Run Road. Roadway is showing early signs of a slip. Excess water runoff and soil conditions contribute to the problem along this area	Private property and township road	Landslide, Groundwater	Landslide- drainage onto slope
95	Township of Moon	Accelerated erosion along stream and landslide onto Hirshinger Road between Hookstown Grade Road and Montour Run Road	Township road -Hirshinger Road has experience damage due to landslide and erosion	Accelerated Erosion, Landslide	Landslide- drainage onto slope
97	Township of Moon	Accelerated erosion and flooding occur along Flaugherty Run stream upstream from Jerry's Junkyard	Flood damage to homes and businesses have occurred along this corridor of Flaugherty Run	Flooding, Accelerated Erosion	Flooding - development within floodplain; Streambank erosion
115	Township of Moon	Stream leaves its banks causing flooding at various properties at the corner of Brodhead and Flaugherty Run Roads and along several properties upstream and downstream from this point.	parking lot flooded, basements flooded	Flooding	Streambank erosion (current condition)
98	Township of Moon	Accelerated erosion has occurred at runoff points into this property. Flooding occurs at the base of the property closer to Flaugherty Run Road	Accelerated erosion has occurred at runoff points into this public park property. Flooding occurs at the base of the property closer to Flaugherty Run Road	Flooding, Accelerated Erosion	Flooding-inadequate or lack of drainage system
99	Township of Moon	Flooding and accelerated erosion has occurred at several locations along the Flaugherty Run Road corridor including property at 334 Flaugherty Run and Brodhead Trailer Park at 273 Flaugherty Run Road	Flooding and accelerated erosion has occurred at several locations along the Flaugherty Run Road corridor including private residential property at 334 Flaugherty Run and Brodhead Trailer Park at 273 Flaugherty Run Road	Flooding, Accelerated Erosion	Flooding - stream or floodplain obstruction
100	Township of Moon	Flooding and accelerated erosion has occurred at several locations along the Flaugherty Run Road corridor including property at 334 Flaugherty Run and Brodhead Trailer Park at 273 Flaugherty Run Road	Flooding and accelerated erosion has occurred at several locations along the Flaugherty Run Road corridor including private residential property at 334 Flaugherty Run and Brodhead Trailer Park at 273 Flaugherty Run Road	Flooding, Accelerated Erosion	Flooding - development within floodplain; Streambank erosion

Section 5 - Problem Areas and Obstructions

Stormwater Problem Area Map Point	Municipality	Municipal description/explanation of the stormwater problem	Description of the Damage Experienced	Type of Stormwater Problem	Generalized Cause of Stormwater Problems
101	Township of Moon	Accelerated erosion and flooding has occurred along the Montour Coketown Road Area off of Route 51 near the beginning of the Montour Trail	Accelerated erosion and flooding has occurred on properties along the Montour Coketown Road Area off of Route 51 near the beginning of the Montour Trail. The Trail Association has worked to minimize erosion of the trail area.	Flooding, Accelerated Erosion	Streambank erosion and flooding
117	Township of Moon	Results from MS4 testing indicate bacteria at this Flaug8 outfall	Not determined	Water Pollution	NA
118	Township of Moon	Outfall testing from MS4 found bacteria at the McC10A outfall along Thorn Run Road across form Crown Plaza	Not determined	Water Pollution	NA
119	Township of Moon	Outfall testing due to MS4 requirement determined bacteria at Narro2 outfall near the intersection of Stoops Ferry Road and Shafer Road.	Not determined	Water Pollution	NA
120	Township of Moon	Water pollution form Mine Drainage	Mine drainage infiltrates basements of homes and drains out on to street and into storm drains causing icing problems on the road in winter months and pollution into storm drains	Water Pollution	Mine Drainage
121	Township of Moon	Mine drainage runs out of the ground and drains out into yards and on to street and into storm drains causing icing problems on the road in winter months and pollution into storm drains. Some instances it drains directly into the stream at Timberyoke between Nyetimber Parkway and Hayeswold Drive	Water pollution problem along Timberyoke and Great Oaks Drives	Water Pollution	Mine Drainage
122	Township of Moon	Water pollution from Mine Drainage near Bendix Drive	Water pollution from Mine Drainage near Bendix Drive directly into stream	Water Pollution	Mine Drainage
116	Township of Moon	Narrows Run stream over flows its bank. Flooding occurs at the Honda Dealership along University Blvd	Private property	Flooding	Flooding - stream or floodplain obstruction
102	Township of Moon	Accelerated erosion and Flooding has occurred into basements of homes along Timberyoke Road.	Erosion has redirected the water flow towards the homes along the beginning of the stream along Timberyoke Drive	Flooding, Accelerated Erosion	Flooding-inadequate or lack of drainage system
114	Township of Moon	All along the Flaugherty Run corridor from Jackson Road to Stoops Ferry Road, there have been instances of landslides due to the redbed soils	Various types of damage consistent with landslides; loss of roads, encroachment into streams, loss of parking lot,	Landslide	Landslide- drainage onto slope
106	Township of Moon	Landslide along Boggs School Road cause the road way to drop off. Major repair and reconstruction had to occur	Road way dropped and had to be closed. Road gave way into private property.	Landslide	Landslide- drainage onto slope
111	Township of Moon	Landslide caused Hassam Road to collapse and fall towards the stream	Slide from state road caused road way material to drop onto private property	Landslide	Landslide- drainage onto slope
110	Township of Moon	Landslide caused hillside to give way. It caused damage to township road and blocked stream along becks Run Road	Township property and 1 private property owner	Landslide	Landslide- drainage onto slope
107	Township of Moon	Landslide at Shelbourne Road above Flaugherty Run Road caused problems during construction of the single family development. Geological testing was done and procedures were in place but methods did not prevent the slide from occurring	Private property damage, delays in project.	Landslide	Landslide- drainage onto slope

Stormwater Problem Area Map Point	Municipality	Municipal description/explanation of the stormwater problem	Description of the Damage Experienced	Type of Stormwater Problem	Generalized Cause of Stormwater Problems
103	Township of Moon	Landslide caused problems with Downing Drive off of Hassam Road. The hillside on the high side came down onto the road way and slid towards the stream on lower side.	Private property damaged, Township roadway damaged. After the repairs were done, much of the property was donated to the Park to help protect the adjacent stream and prevent additional problems with slides due to land development.	Landslide	Landslide- drainage onto slope
NA	Trafford Borough	No areas of stormwater problems in the part of Trafford in Allegheny County			NA
203	Turtle Creek Borough	Thompson Run floods during heavy rain events affecting Church Street, Larimer Avenue, Railroad Street and Thompson Street in Turtle Creek Borough.	Public property damage included pavement wash-out and sewer damage. Private property damage included flooded basements and first floors, damage to heating units, appliances and furnishings as well as structural damage to residential and commercial buildings. 125 private property buildings affected/damaged.	Flooding	Flooding-roadway & development w/i floodplain; Streambank erosion
204	Turtle Creek Borough	Flooding along Lynn Avenue and Monroeville Avenue during extreme rain events.	35 residential homes with flooded basements resulting in damage to heating units, appliances and furnishings. Structural damage to one commercial building that had to be demolished. Flooding of commercial buildings resulting in damage to heating units, appliances and furnishings. Flooding of a high school football field resulting in damage to playing surface and support facilities. Flooding of municipal building resulting in damage to heating units, appliances and furnishings.	Flooding	Flooding-inadequate or lack of drainage system
NA	Wall Borough	Reported: no stormwater problems within municipality			NA
206	West Deer Township	Route 910 occasionally flooded	Route 910 occasionally flooded	Flooding	Flooding-inadequate or lack of drainage
207	West Deer Township	Saxonburg Boulevard occasionally flooded	Saxonburg Boulevard occasionally flooded	Flooding	Flooding-inadequate or lack of drainage
205	West Deer Township	Basement flooding	6 residences with water in basements	Flooding	Flooding-inadequate or lack of drainage system
NA	West View Borough	Reported: no stormwater problems within municipality			NA
NA	Whitaker Borough	Reported: no stormwater problems within municipality			NA
NA	Wilkinsburg Borough	Reported: no stormwater problems within municipality			NA
NA	Wilmerding Borough	Reported: no stormwater problems within municipality			NA
0 - location not provided	ACCD	Flooding on the property	Residential Property Damage, 1 property	Flooding	Flooding-inadequate or lack of drainage system
0 - location not provided	ACCD	Stormwater from neighboring elementary school parking areas and driveways discharge into residential back yards resulting in flooding	Residential Property Damage, 2-3 properties	Flooding, Accelerated Erosion	Flooding-inadequate or lack of drainage system
0 - location not provided	ACCD	Cement blocks, boulders and debris in creek create obstructions resulting in flooding at least once a year.	Residential Property Damage, 1 property	Flooding, Sedimentation	Sediment/Debris Accumulation
0 - location not provided	ACCD	New housing developments failing to maintain stormwater BMPs resulting in flooding, accelerated erosion and sedimentation	Residential Property Damage, many properties	Flooding, Accelerated Erosion, Sedimentation	Lack of maintenance – erosion
0 - location not provided	ACCD	Walking trail for housing development has resulted in drainage issues that flow onto complainant's property	Residential Property Damage, 1 property	Other (Drainage)	Flooding-inadequate or lack of drainage system
0 - location not provided	ACCD	Recent church construction resulting in flooding from runoff from church parking lot being discharged onto neighbor's property	Residential Property Damage, 1 property	Flooding	Flooding-inadequate or lack of drainage system
0 - location not provided	ACCD	Stormwater runoff has resulted in flooding of home and property.	Residential Property Damage, 1 property	Flooding	Flooding-inadequate or lack of drainage system

GENERALIZED PROBLEM AREA RECOMMENDATIONS

The following recommendations provide information and explanations on causes and potential typical solutions for each generalized cause of stormwater problem in Table 5.1:

STREAMBANK EROSION

Streambank erosion is the removal of soil material from the banks adjacent to a stream, causing steep slopes and the transport of sediment downstream. There are many causes of streambank erosion, including stream migration and increased intensity and frequency of flooding. This condition may occur naturally as a stream or river meanders and changes course or may be the result of manmade changes. These manmade changes can include modifications such as when a stream is straightened or widened, or when riparian vegetation has been removed. It may also be accelerated by upstream development in the stream's watershed, which may require it to be addressed on a watershed scale. Determining the cause of the erosion plays a key role in in selecting the solution and correcting the problem.

The riparian buffers required by the *Model Ordinance* help avoid bank erosion by allowing native vegetation to grow on and along the streambanks. Also, the trees and woody plants in the required buffer slow the overland flowrate of floodwaters, which reduces the amount of soil lost to erosion. This is an example of the non-structural Best Management Practices (BMPs) outlined in Section 9 of this PLAN.

An erosive condition can be improved at its source through streambank remediation, which can include modification of the steep streambank to a gentle slope and protecting the streambank with riprap and/or woody plantings in a manner similar to a natural riparian buffer. This is typically the most preferred solution given it will require little if any maintenance if done properly

In areas where a natural type of streambank remediation is not feasible hard armoring may be required. An example of this would be an area where there is no room to provide a shallow slope with woody vegetation These types of protection are typically engineered stone such as placed riprap or gabion basket walls. More extreme cases may require the use of materials such as block or concrete for the walls or streamlining but these are typically avoided due to their ecological impacts.

In cases where streambank erosion is caused by increased flooding intensity and frequency it may be necessary to alleviate stormwater flows coming to the site in question. This is typically the most complex, intrusive, and costly option as it will require detailed engineering studies and retrofitting large scale solutions such as detention basins throughout the upstream watershed. The implementation of this PLAN will help to alleviate stormwater flows over time as areas of new and redevelopment are designed with on-site measures for infiltration and to control volume, rate, and streambank erosion. These on site measures would typically qualify as structural BMPs which are discussed in Section 9 of this PLAN.

Streambank erosion is the cause of many of the selected problem areas as listed in Table 5.2 and included in the *Appendix B* conceptual solutions.

SEDIMENT / DEBRIS ACCUMULATION

Sediment and debris can build up in a stream for a variety of reasons, including a heavy upstream sediment load such as that from agriculture or forestry, accelerated stream bank erosion upstream of the site, or the illegal dumping of refuse within stream channels. Some debris such as tree branches is natural and cannot be avoided. An additional discussion on controlling agricultural sediment and related issues is included in Section 6 of this PLAN. When sediment-laden water is forced to slow abruptly at a stream obstruction, the lower velocity water cannot carry the sediment and debris and thus they have a chance to settle to the streambed. Over the course of a few storms, this accumulation of soil and debris further slows the flow of water and exacerbates the problem.

A typical solution to this problem is to implement a management program to clean and remove the debris out of the channel with special attention being paid to those areas upstream of bridge and culvert crossings. This work can be done by the bridge owner with minimal regulatory permits in Pennsylvania. If the problem recurs frequently, the bridge crossing may be undersized and replacement should be considered. The channel further upstream of the immediate problem site may also require routine sediment/debris removal if the problem persists. Dealing with the source of sediment/debris will typically provide the best solution as it will be a more permanent result which will benefit both the site where sediment is accumulating and where it is eroding. Sediment and debris accumulation is the cause of many of the selected problem areas as listed in Table 5.2 and included in the Appendix B conceptual solutions.

The overall health of the watershed plays a role in sediment and debris buildup. In healthy watersheds, upstream erosion is limited, the stream is stable and the resulting sediment load is low. A goal of this PLAN is to encourage development that mimics the natural stormwater cycle leading to healthy streams. Low Impact Development (LID) – Section 9 is a design approach leading to improved water quality.

LANDSLIDE – CONCENTRATED DRAINAGE ONTO SLOPE

Landslides are typically the result of multiple causes. Some of these causes include topography, weathering of sub-soils and bedrock, intense rainfall, vegetation change, slope loading, freeze thaw action, and surface runoff. The focus of this PLAN is on landslides which are in part caused by stormwater surface runoff. Concentrated runoff from upstream developments onto steep and inherently unstable slopes is the primary cause for this type of failure. Landslide with concentrated drainage onto the slope is a cause for Problem Area 134 included in Appendix B.

A geotechnical engineer should be consulted when dealing with landslides in order to determine the true nature of the landslide on a given site. In the instance were concentrated runoff is a contributing factor to the landslide, stormwater will need to be safely conveyed down the slope by means of a conduit or swale or by directing runoff away from the slope altogether. Once the runoff component of the landslide is address and other factors may be resolved and the slope may be repair with a number of conventional means such as retaining walls or soil anchors. Further discussion on slopes and their management is included in Section 4 of this report

FLOODING – INADEQUATE OR LACK OF DRAINAGE SYSTEM

Local flooding due to surface runoff during storms can largely be addressed by the construction of adequately-sized local drainage structures (swales, pipes, catch basins, etc.). Site development must consider where the runoff from the site will travel and whether there are sufficient facilities to convey the runoff, without damage to the downstream land, to a stable conveyance. Where a drainage system is not available in the vicinity, then on-site measures must be taken to control the drainage to prevent downslope damages.

Where this problem exists under current conditions, directing storm waters away from existing structures is the first step in remediating a site. This can be accomplished with measures such as grading and catch basins. Once that is accomplished the priority switches to conveying the runoff to the receiving body of water. This can be accomplished simply by grading and drainage swales or by more elaborate systems including inlets and storm sewers.

The best method to eliminate this type of issue in future construction is the adoption of ordinances which provide an adequate storm water drainage system in all new construction. It is in every municipality's best

interest to enact this type of ordinance as a measure to prevent this type of flooding from impacting both public and private properties. Flooding caused by inadequate or lack of drainage system is the cause of several of the selected problem areas as listed in Table 5.2 and included in the Appendix B conceptual solutions.

FLOODING – INADEQUATELY SIZED STREAM CULVERT/BRIDGE AND OTHER FLOODPLAIN OBSTRUCTIONS

Flooding due to stream and floodplain obstructions may occur naturally or as a result of manmade structures and may be in conjunction with other types of problems.

Flooding due to inadequately-sized structures, such as bridges and culverts, occurs frequently due to a number of reasons. This includes: 1) natural siltation and sedimentation of streams and drainage ways which decrease the available waterway opening; 2) lack of maintenance of existing structures which can lead to partial collapse; and 3) additional upstream development with inadequate stormwater management or controls that leads to increased flows beyond the original design capacity of the culvert or bridge. The regulations contained within the Model Ordinance address both the quantity and rate of flow from new and re-developments to address this issue of increased flows beyond the original design capacity of the downstream culverts and bridges.

Methods used to address flooding due to inadequately-sized structure, such as bridges and culverts, include: regular evaluation of structures for capacity and general inspection of structural condition; ensuring that stormwater created by new development does not exceed downstream pipe or structure capacity; regular maintenance of streams, ponds, and creeks through removal of debris, sediment, and other flow obstructions; and potentially replacement of the culvert or bridge.

Methods used to address flooding due to stream and floodplain obstructions may include: enforcing current ordinances regarding construction within the floodplain; adopting more stringent floodplain ordinances; regular maintenance of streams, ponds, and creeks through removal of obstructions; and by construction of flood control structures to address the increased incidence of flooding.

Flooding along streams caused by floodplain obstructions often requires the construction of more expensive regional facilities to protect property in the floodplain. Regional solutions include levees, stormwater impoundment facilities, or public acquisition of flood-prone properties. Flooding caused by inadequately sized stream culvert/bridge and other floodplain obstructions is the cause of several of the selected problem areas as listed in Table 5.2 and included in the Appendix B conceptual solutions.

FLOODING – DEVELOPMENT WITHIN FLOODPLAIN

Floodplains are low lying areas adjacent to waterbodies such as rivers and streams. These areas are formed naturally by layers of alluvium deposited by previous floods and are highly prone to future flooding. For structures that are located in floodplains substantial modification may be required in order to prevent future flood damage. One of the potential solutions is for a governmental body to acquire the property and ultimately remove the structure. The resulting vacant lot would then be used as greenway. Opening these areas up as greenways will allow for greater conveyance and storage of stormwater as well as providing a number of ecological benefits. Other options involve either elevating or flood proofing the structure. These modifications would typically be funded by the property owner however the County or municipality may be able to acquire grant funding for this purpose in the future from either FEMA or

PEMA. These options are discussed in further detail in the Allegheny County 2015 Hazard Mitigation Plan. Floodplain restoration is discussed further in the Restoration BMPs portion of Section 9 in this PLAN.

Flooding caused by development within the floodplain is the cause of many of the selected problem areas as listed in Table 5.2 and included in the Appendix B conceptual solutions. Based on the problem areas selected for study, many of the instances of flooding reported by the WPAC members relates to construction in low lying areas close to the stream and within the floodplain. While many of the conceptual solutions recommend dealing with the immediate problem by flood-proofing or demolition because it is cost effective, watershed-type solutions are preferable and are discussed in Section 7 – Stormwater Management.

BRIDGE SCOUR

Bridge scour may occur naturally or in conjunction with (or as a result of) other types of problems as well. Some of the reasons for bridge scour which may undermine an existing bridge foundation are: 1) increased flow in a defined stream channel caused by sediment or debris directing the flow to a portion of the channel; 2) inadequate maintenance of the bridge structure and foundation protection; 3) additional upstream development with inadequate stormwater management or controls that leads to increased flows beyond the design of the culvert or bridge; and 4) natural stream migration (meandering).

Methods used to address bridge scour include: more frequent maintenance of the bridge structure; removal of debris, sediment and obstructions from the stream; protection of the abutments with rock or concrete; and potentially replacement of the bridge with a foundation below the depth of expected scour.

ACID MINE DRAINAGE

Acid Mine Drainage (AMD) is prevalent in western Pennsylvania. AMD is the result of water entering into abandoned mines and then draining to the surface either in upland seeps or to streams. The effects of AMD include loss of biodiversity due to chemical pollutants; degradation of existing structures due to acidity of the drainage; and loss of recreational use. The presence of AMD is often indicated by yellow boy, a yellow-orange solid that precipitates from drainage when the pH is raised above 3. See Section 6 – Water Quality for further information on the extent and effects of AMD.

Resolutions of AMD problems are complex. Good stormwater management solutions could relate to minimizing water entering into the mine, if indeed the water entry points are known. However, it is beyond the scope of this PLAN to resolve contaminated water by treating the drainage exiting the mine with chemicals to neutralize the acidity or passing the drainage through a wetland constructed to deal with the acidity and mineral pollutants. Limestone is the most commonly used substance to neutralize the AMD in these constructed wetlands. Once a neutral or near-neutral pH has been achieved the metals precipitate due to oxidation or reaction with organic matter. This option is common due to its relatively low cost but is limited by the metal load and volume of the incoming waters.

Larger scale treatments would involve a dedicated water treatment facility which would employ techniques such as lime or calcium silicate neutralization or followed by a sedimentation and/or filtration process in order to remove the yellow boy and other reactive by-products. Solutions of this scale are typically not employed at a local level and would require state intervention.

PROBLEM AREA CONCEPTUAL SOLUTIONS

Table 5.2 lists twenty-one of the Problem Areas in Table 5.1 that were judged to be either significant, regional, or illustrative of stormwater related issues to be used for the purposes of providing Conceptual 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 conceptual solutions that could be implemented for a range of stormwater problems.

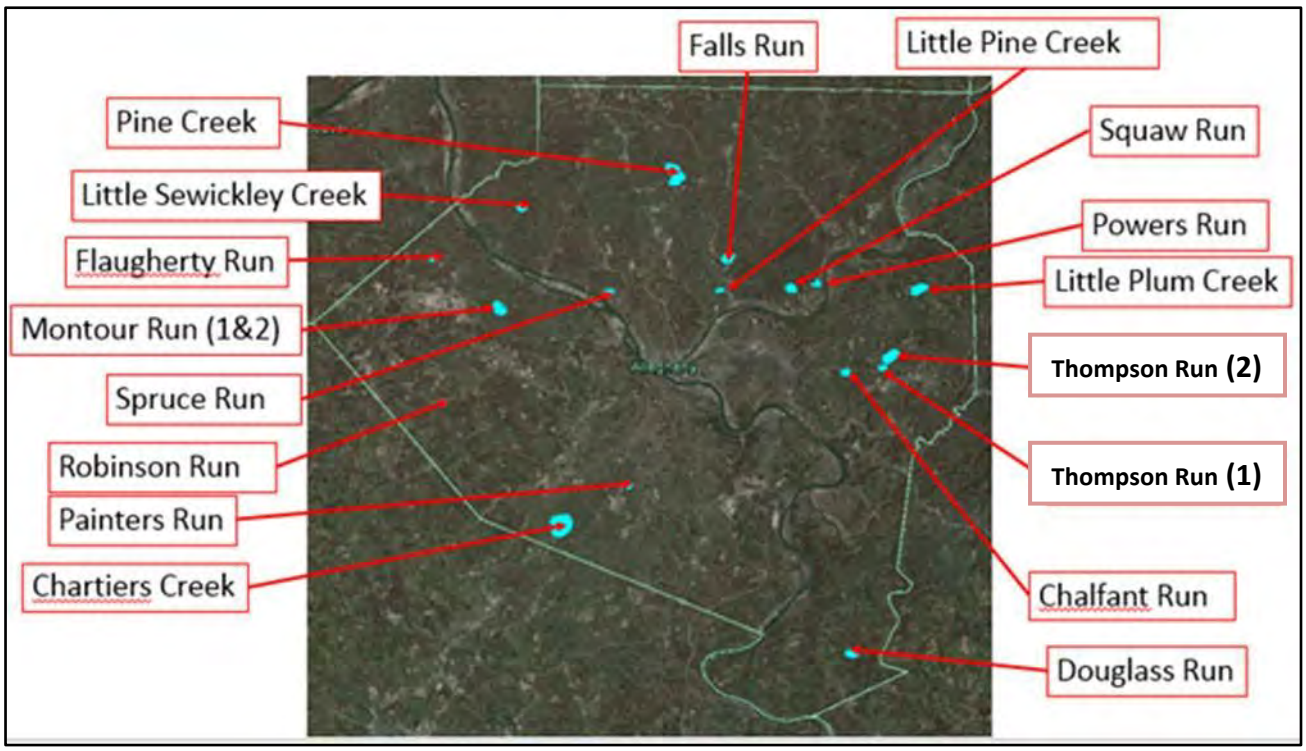
Table 5.2 - Problem Areas with Conceptual Solutions in Appendix B

Stormwater Problem Area Map Point	Municipality	Generalized Cause of Stormwater Problems
1	Baldwin Township	Flooding - Inadequate drainage system; Inadequate bridge/culvert/other obstructions; Sediment/debris accumulation
2	Ben Avon	Flooding-Inadequate culvert/bridge; Development w/I floodplain; Sediment/Debris accumulation; Streambank erosion
42	Coraopolis	Flooding-Inadequate culvert/bridge; Development w/I floodplain
50	Crescent Twp.	Sediment/debris accumulation; Streambank erosion
56	Edgeworth Borough	Streambank Erosion; Sediment/debris accumulation
83	Hampton Twp.	Flooding - development within floodplain; Streambank erosion
90	Jefferson Hills Borough	Flooding - development within floodplain; Streambank erosion; Acid mine drainage
96	Moon Township	Flooding - Development within the floodplain
97	Moon Township	Flooding - development within floodplain; Streambank erosion
100	Moon Township	Flooding - development within floodplain; Streambank erosion
101	Moon Township	Streambank erosion and flooding
115	Moon Township	Streambank erosion
128	Monroeville	Flooding-development In floodplain & inadequate bridge; Sediment accumulation
131	Monroeville	Flooding-inadequate or lack of drainage system & maintenance; sediment accumulation
133	Monroeville	Flooding-inadequate culvert/bridge (maintenance); Sediment accumulation; Stream erosion
134	Monroeville	Landslide-slope drainage; Flooding - inadequate drainage system; Sediment accumulation
145	North Fayette Township	Flooding - development within floodplain exceeds capacity of stream
174	Scott Township	Flooding - inadequate culvert/bridge/channel; Sediment accumulation
178	Shaler Township	Flooding - inadequate bridge; Streambank erosion, Sediment accumulation
200	South Park Township	Flooding - inadequate culvert (or maintenance); Sediment accumulation
203	Turtle Creek Borough	Flooding-roadway & development w/i floodplain; Streambank erosion;

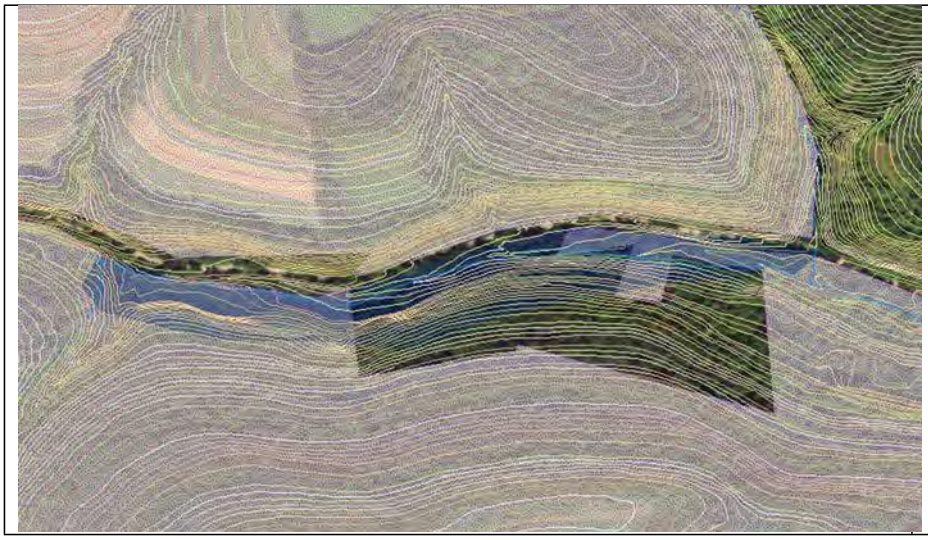
REGIONAL DETENTION BASIN ANALYSIS AND RECOMMENDATIONS

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, was not intended to be exhaustive, and was constrained 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 were considered in the following watersheds: Douglass Run, Robinson Run, Squaw Run, Pine Creek, Flaugherty Run, Little Sewickley Creek, Chartiers Creek, Chalfant Run, Thompson Run (2 Locations), Powers Run, Montour Run (2 Locations), Painters Run, Spruce Run, Little Pine Creek, Falls Run, and Little Plum Creek. The potential for stormwater impacting private land and roadways; and impacts to upstream infrastructure and rail facilities were eliminating factors. When the potential capacity of a detention area appeared to be sufficient to alleviate the downstream problems that area was evaluated. The results for each of the eighteen detention areas shown on the following Overview Map are presented on the following pages. The 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 and as funding becomes available.

OVERVIEW MAP



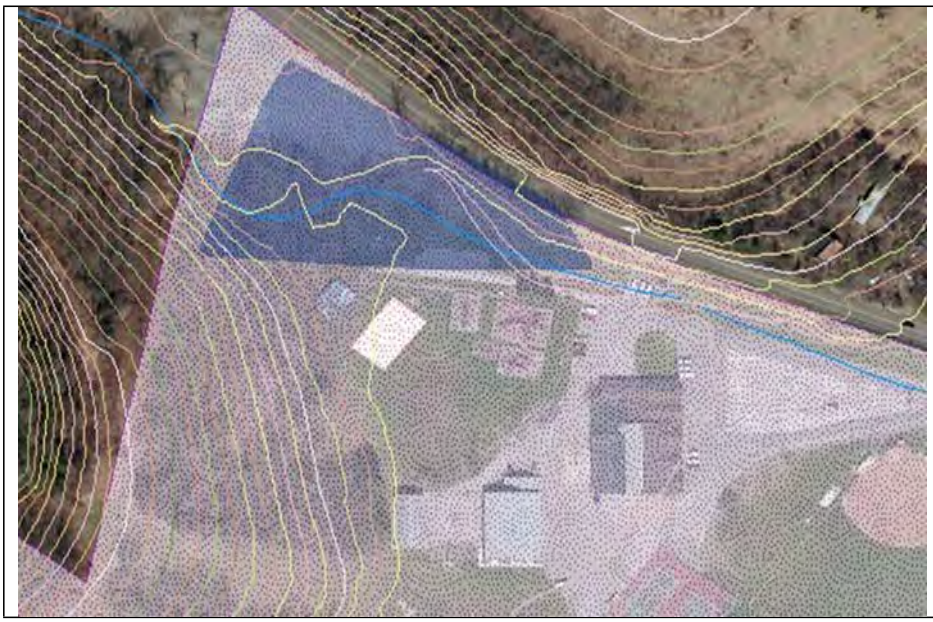
Locations in Allegheny County



Douglass Run

- *1 downstream problem area*
- *This site is not recommended due to potential flooding of private land and an adjacent roadway.*

Locations in Allegheny County



Robinson Run

- *3 downstream problem areas*
- *This site is not recommended due to potential flooding of private land and minimal storage potential.*



Squaw Run

- *3 downstream problem areas*
- *This site is recommended for further evaluation because the detention area appeared to be sufficient to alleviate the downstream problems.*

Locations in Allegheny County



Pine Creek

- *11 downstream problem areas*
- *This site is not recommended because raising the dam elevation would potentially impact existing infrastructure adjacent to the reservoir.*



Flaugherty Run

- *10 downstream problem areas*
- *This site is recommended for further evaluation because the detention area appeared to be sufficient to alleviate the downstream problems and was included in the Flaugherty Run HMS model.*

Locations in Allegheny County



Little Sewickley Creek

- *4 downstream problem areas*
- *This site is not recommended due to potential impacts to upstream infrastructure and roads.*



Chartiers Creek

- *6 downstream problem areas*
- *This site is not recommended because of potential impacts to the adjacent rail line and upstream private land.*

Locations in Allegheny County



Chalfant Run

- *7 downstream problem areas*
- *This site is recommended for further evaluation because the detention area appeared to be sufficient to alleviate the downstream problems.*



Thompson Run

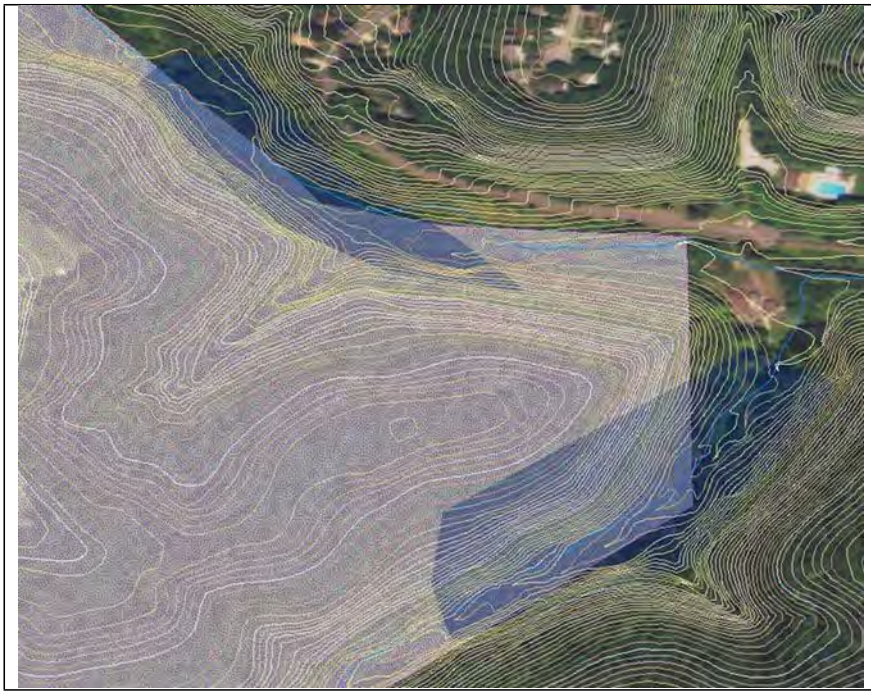
- *7 downstream problem areas*
- *Neither potential site location is recommended due to extensive impacts to private land.*

Locations in Allegheny County



Powers Run

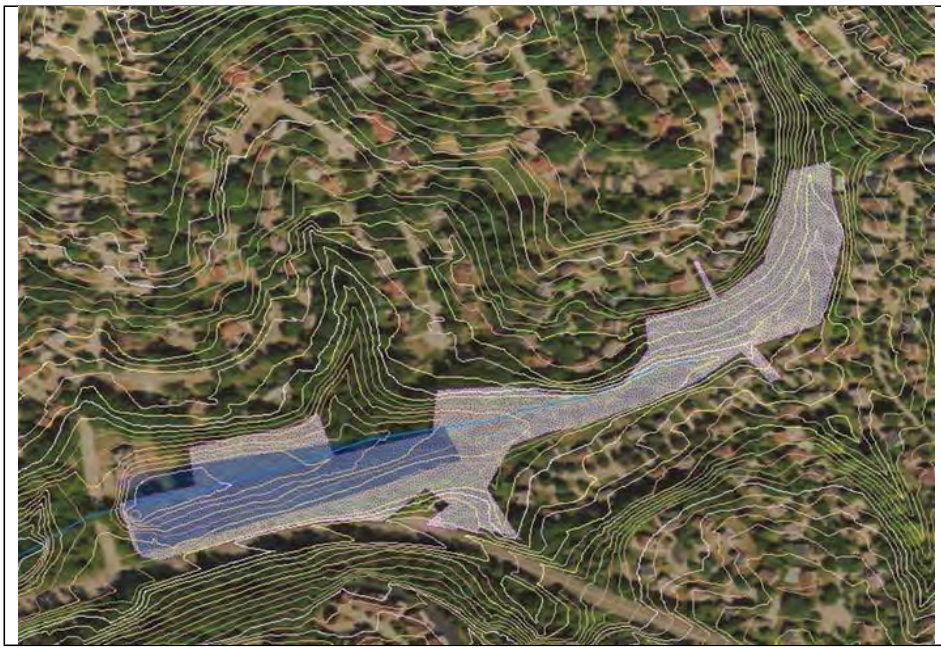
- *1 downstream problem area*
- *This site is not recommended because the adjacent public land will not provide adequate space for a significant amount of storage.*



Montour Run

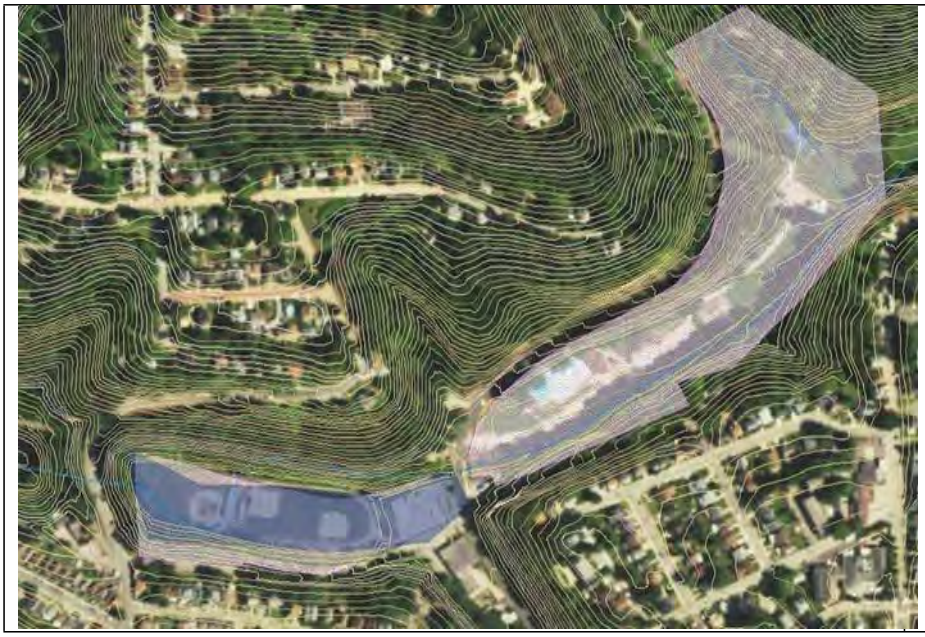
- *1 downstream problem area*
- *The northern location is not recommended due to the impacts to private land. The southern location is recommended for further evaluation in a location upstream of the indicated position because the detention area appeared to be sufficient to alleviate the downstream problems.*

Locations in Allegheny County



Painters Run

- *1 downstream problem area*
- *This site is not recommended because of the very small drainage area, limited public land available for storage, and potential impacts to private land.*



Spruce Run

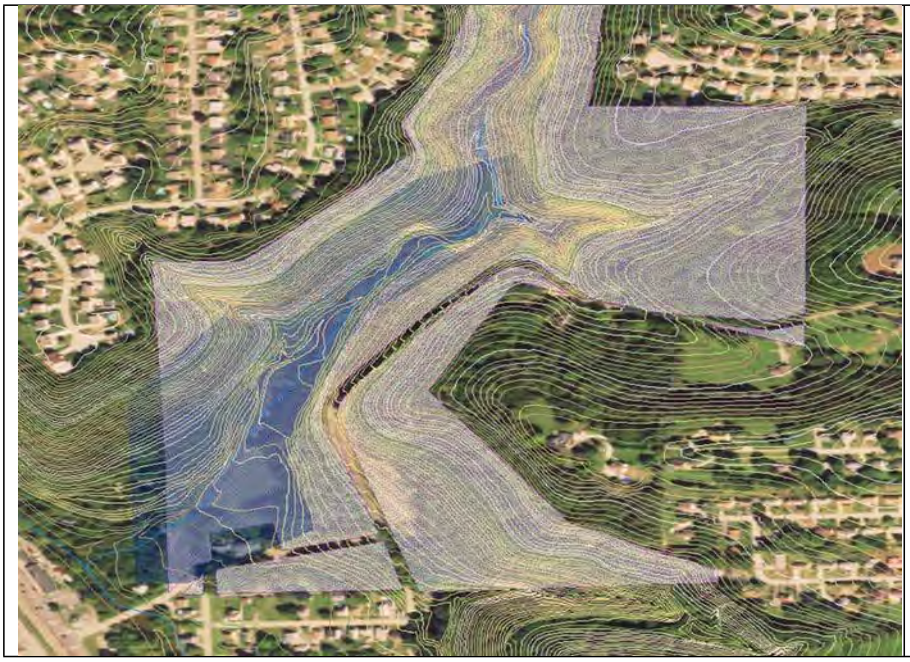
- *1 downstream problem area*
- *This site is not recommended due to impacts to upstream infrastructure and improved park facilities.*

Locations in Allegheny County



Little Pine Creek

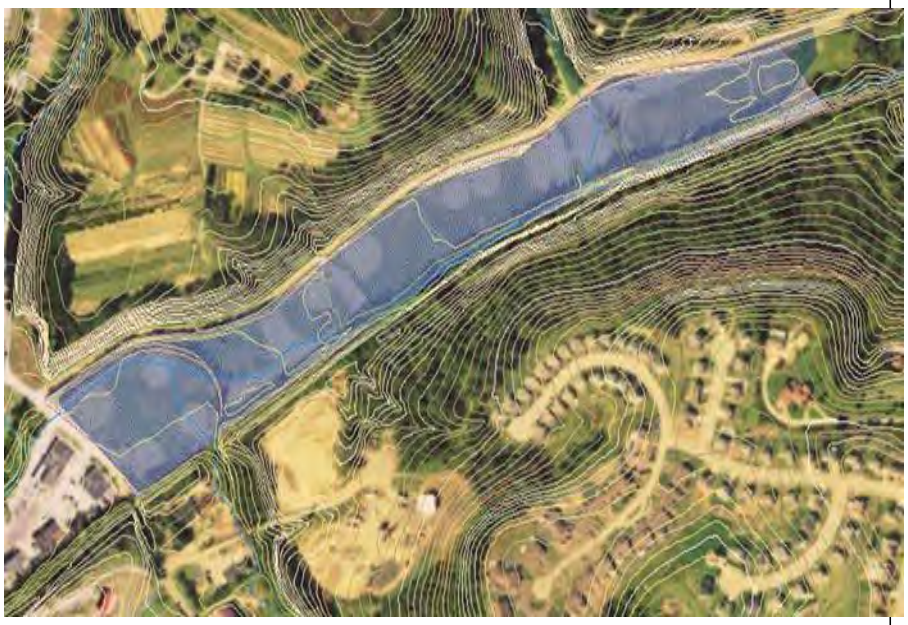
- *2 downstream problem areas; might also improve conditions at some problem areas along the main stem of Pine Creek.*
- *This site is not recommended due to the small area of public land available for storage and the resulting impacts to adjacent private lands.*



Falls Run

- *No downstream problem areas on Falls Run, but impoundment could improve conditions at 4 problem areas on the main stem of Pine Creek.*
- *This site is recommended for further evaluation because the detention area appeared to be sufficient to alleviate the downstream problems.*

Locations in Allegheny County



Little Plum Creek

- *2 downstream problem areas*
- *This site is not recommended because of potential impacts to adjacent infrastructure and improved park facilities.*

Section 5 – Problem Areas and Obstructions

OBSTRUCTIONS

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 were judged to be an obstruction. 657 obstructions were identified in this manner. Each obstruction was assigned a unique Obstruction Number (O-1 to O-657); "Number on Steam" consisting of the stream name abbreviation and a sequential number for that stream (beginning at the downstream end) (such as ABE-6 for the 6th obstruction on Abers Creek); the Stream Name; and a brief description/location of the obstruction. The obstructions with the preceding information are listed in the table of Appendix C-4, are shown on *Map 9 – Stormwater Problems and Obstructions,* and are included in the Project GIS.

CONCLUSIONS

It is noted that the problem areas mentioned in this section are more pronounced in the more populated/developed areas. Many of the problem areas highlight an overall characteristic of flooding in Allegheny County – that the terrain has led to structures being located along streams and within the floodplain. It is not known whether these structures were within the floodplain at the time they were constructed, or whether the extent of the floodplain has increased due to uncontrolled runoff from local and upstream areas, inadequate culverts or bridges, or obstructions that are blocking the natural flow of stormwater.

Some drainage problems that occur on a yearly basis have been reported by the WPAC members. While a certain amount of flooding is natural in streams during heavy rain, periodic maintenance can prevent some of the identified problems with flooding and erosion, especially in the smaller, frequently-occurring storms. Work in the field conducted as part of this study revealed stormwater management facilities that were not being maintained. A stormwater facility maintenance program should be developed and implemented as part of the strategy to correct deterioration (mostly due to uncontrolled vegetative growth) to alleviate future problem areas. The repair and upgrade of the existing drainage facilities will require capital expenditures. An ongoing issue is ownership of facilities built by developers and orphaned after construction.

Continued unregulated development within the County will worsen existing problems and create new ones. Remedial actions will be necessary to correct existing drainage problems. In the long term, a comprehensive approach is required to tackle these problems. This approach will have to incorporate regulations and development standards into local zoning, consider both on-site and off-site drainage, provide a consistent approach between communities, use natural elements for the transport and storage of stormwater, consider both quantity and quality of water, and treat the watershed as a whole.

Section 6 – 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. These include the Water Quality Act of 1965, Federal Water Pollution Control Act of 1972, Clean Water Act of 1977, and Water Quality Act of 1987. The goal of the Clean Water Act is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters". Section 305(b) of the Federal Clean Water Act requires each state to prepare a Watershed Assessment Report for submission to the United States Environmental Protection Agency (EPA). The reports include a description of the water quality of all waterbodies in the state and an analysis of the extent to which they are meeting their water quality standards. The report must also recommend any additional action necessary to achieve the water quality standards and for which waters that action is necessary.



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.

IMPAIRED STREAMS

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 uses, as defined in PaDEP's rules and regulations:

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

The established goals are numerical, or narrative, water quality criteria that express the in-stream levels of substances that must be achieved to support the uses. This assessment effort is used to support water quality reporting required by the Clean Water Act. PaDEP uses an integrated format for the Clean Water

Act Section 305(b) reporting and Section 303(d) listing in a biennial report called the "Pennsylvania Integrated Water Quality Monitoring and Assessment Report". The narrative report contains summaries of various water quality management programs including water quality standards, point source control and nonpoint source control. In addition to the narrative, the water quality status of Pennsylvania's waters is presented using a five-part characterization of use attainment status (PaDEP, 2008). The listing categories are:

Category 1: Waters attaining all designated uses.

Category 2: Waters where some, but not all, designated uses are met. Attainment status of the remaining designated uses is unknown because data are insufficient to categorize the water.

Category 3: Waters for which there are insufficient or no data and information to determine if designated uses are met.

Category 4: Waters impaired for one or more designated use but not requiring a TMDL. These waters are placed in one of the following three subcategories:

- Subcategory 4A: TMDL has been completed.
- Subcategory 4B: Expected to meet all designated uses within a reasonable timeframe.
- Subcategory 4C: Not impaired by a pollutant and not requiring a TMDL.

Category 5: Waters impaired for one or more designated uses by any pollutant. Category 5 includes waters shown to be impaired as the result of biological assessments used to evaluate aquatic life use. Category 5 constitutes the Section 303(d) list submitted to EPA for final approval

ALLEGHENY COUNTY IMPAIRMENTS

If a stream segment is not attaining any one of its designated uses, it is considered to be "impaired." 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. *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 *Table 6.1* does not reflect that most streams have multiple source-causes of impairment of a particular stream segment. *Table 6.2* lists the non-attaining streams in Allegheny County and the source-cause of the impairment. *Map 2 – Act 167 Designated Watersheds* shows the impaired streams. The major source-causes of impairment in the County are: abandoned mine drainage, agriculture, industrial or municipal point source (e.g. sanitary sewage–SSO), urbanization (habitat modification), unknown sources (pathogens, sewage (SSO & CSO), oils/grease, metals, pH, suspended solids, etc.).

Table 6.1 - Impaired Streams Miles by Watershed and Classification

Impaired Classification (stream miles)	Abandoned Mine Drainage	Agriculture	Atmospheric Deposition	Forestry	Hydro-modification	Industrial or Municipal Point Source	Urbanization	Source Unknown	Other	Total Impaired (stream miles)	Percent of County Impaired (%)
Act 167 Watersheds (Stream Miles)											
Allegheny River Subbasin											
Allegheny River	3.1					3.2	12.8			19.1	2.4%
Buffalo Creek										0.0	0.0%
Bull Creek		0.8								0.8	0.1%
Deer Creek	6.9	8.0					23.4		4.1	42.4	5.3%
Girtys Run							20.3			20.3	2.6%
Pine Creek								116.8		116.8	14.7%
Plum Creek	31.3									31.3	3.9%
Pucketa Creek							3.6		2.0	5.6	0.7%
Squaw Run							4.3			4.3	0.5%
Monongahela River Subbasin											
Monongahela River	50.5	13.9			10.5		9.8		2.2	86.9	11.0%
Peters Creek	71.0									71.0	9.0%
Turtle Creek	82.8									82.8	10.4%
Youghiogheny River	4.5						5.0			9.5	1.2%
Ohio River Subbasin											
Big Sewickley Creek										0.0	0.0%
Breakneck Creek							1.7			1.7	0.2%
Chartiers Creek								104.2		104.2	13.1%
Connoquenessing Creek		1.7					9.4			11.1	1.4%
Flaugherty Run							3.4			3.4	0.4%
Little Sewickley Creek							18.0			18.0	2.3%
Lowries Run							2.1			2.1	0.3%
Montour Run	48.0									48.0	6.1%
Ohio River	15.0					2.2	26.8			44.0	5.5%
Raccoon Creek	8.9									8.9	1.1%
Robinson Run								43.7		43.7	5.5%
Sawmill Run	2.2					14.7				16.9	2.1%
Total per Category	324.2	24.4	0.0	0.0	10.5	20.1	140.6	264.7	8.3	792.8	100.0%
% of County Impaired by Category	40.9%	3.1%	0.0%	0.0%	1.3%	2.5%	17.7%	33.4%	1.0%	100.0%	

Table 6.2a - Impaired Streams in the Allegheny River Subbasin

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Allegheny River	Unnamed Tributary		42123	2.79	2.79	Aquatic Life	WWF	Impaired	Urbanization	
Allegheny River	Shades Run		42221	1.08	1.08	Aquatic Life	WWF	Impaired	Urbanization	
Allegheny River	Shades Run	Unnamed Tributary	42222	0.4	0.4	Aquatic Life	WWF	Impaired	Urbanization	
Allegheny River	Sandy Creek		42239	2.68	2.68	Aquatic Life	WWF	Impaired	Municipal Point Source	
Allegheny River	Sandy Creek	Unnamed Tributary	63748	0.49	0.49	Aquatic Life	WWF	Impaired	Municipal Point Source	
Allegheny River	Sandy Creek	Unnamed Tributary	63749	1.52	1.52	Aquatic Life	WWF	Impaired	Urbanization	
Allegheny River	Sandy Creek	Unnamed Tributary	63750	0.84	0.84	Aquatic Life	WWF	Impaired	Urbanization	
Allegheny River	Sandy Creek	Unnamed Tributary	63751	0.43	0.43	Aquatic Life	WWF	Impaired	Urbanization	
Allegheny River	Sandy Creek	Unnamed Tributary	63752	0.89	0.89	Aquatic Life	WWF	Impaired	Urbanization	
Allegheny River	Sandy Creek	Unnamed Tributary	63753	0.55	0.55	Aquatic Life	WWF	Impaired	Urbanization	
Allegheny River	Sandy Creek	Unnamed Tributary	63754	0.47	0.47	Aquatic Life	WWF	Impaired	Urbanization	
Allegheny River	Sandy Creek	Unnamed Tributary	63755	0.34	0.34	Aquatic Life	WWF	Impaired	Urbanization	
Allegheny River	Sandy Creek	Unnamed Tributary	63756	0.49	0.49	Aquatic Life	WWF	Impaired	Urbanization	
Allegheny River	Sandy Creek	Unnamed Tributary	63757	0.29	0.29	Aquatic Life	WWF	Impaired	Urbanization	
Allegheny River	Quigley Creek		42240	0.77	0.77	Aquatic Life	WWF	Impaired	Urbanization	
Allegheny River	Quigley Creek	Unnamed Tributary	42241	1.02	1.02	Aquatic Life	WWF	Impaired	Urbanization	
Allegheny River	Quigley Creek	Unnamed Tributary	42242	0.72	0.72	Aquatic Life	WWF	Impaired	Urbanization	
Allegheny River	Quigley Creek	Unnamed Tributary	42243	0.19	0.19	Aquatic Life	WWF	Impaired	Urbanization	
Allegheny River	Indian Creek		42244	1.33	1.33	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	
Allegheny River	Powers Run		42245	1.74	1.74	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	
Buffalo Creek								Supporting		
Bull Creek	Little Bull Creek		42459	8.3	0.85	Aquatic Life	TSF	Impaired	Agriculture	
Deer Creek			42285??		11.65	Aquatic Life	CWF	Impaired	Urbanization	
Deer Creek	Little Deer Creek		42289		1.96	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Deer Creek	Little Deer Creek	Unnamed Tributary	42290	0.98	0.98	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Deer Creek	Little Deer Creek	Unnamed Tributary	42291	1.66	1.66	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Deer Creek	Little Deer Creek	Unnamed Tributary	42292	0.62	0.62	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Deer Creek	Little Deer Creek	Unnamed Tributary	42293	1.25	1.25	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Deer Creek	Little Deer Creek	Unnamed Tributary	42294	0.42	0.42	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Deer Creek	Blue Run		42312	2.37	2.37	Aquatic Life	CWF	Impaired	Urbanization	
Deer Creek	Blue Run	Unnamed Tributary	42313	0.53	0.53	Aquatic Life	CWF	Impaired	Urbanization	
Deer Creek	Unnamed Tributary		42314	0.94	0.94	Aquatic Life	CWF	Impaired	Urbanization	
Deer Creek	Cunningham Run		42315??	2.83	1.93	Aquatic Life	CWF	Impaired	Habitat Modification	
Deer Creek	Cunningham Run	Unnamed Tributary	42316	1.14	0.72	Aquatic Life	CWF	Impaired	Habitat Modification	

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Deer Creek	Cunningham Run	Unnamed Tributary	42317??	1.49	1.49	Aquatic Life	CWF	Impaired	Habitat Modification	
Deer Creek	Unnamed Tributary		42327	2.48	2.48	Aquatic Life	CWF	Impaired	Urbanization	
Deer Creek	Unnamed Tributary (42327)	Unnamed Tributary	42328	0.47	0.47	Aquatic Life	CWF	Impaired	Urbanization	
Deer Creek	Unnamed Tributary (42327)	Unnamed Tributary	42329	0.35	0.35	Aquatic Life	CWF	Impaired	Urbanization	
Deer Creek	Unnamed Tributary (42327)	Unnamed Tributary	42330	0.48	0.48	Aquatic Life	CWF	Impaired	Urbanization	
Deer Creek	Unnamed Tributary		42331	0.78	0.78	Aquatic Life	CWF	Impaired	Urbanization	
Deer Creek	Unnamed Tributary		??	0.15	0.15	Aquatic Life	CWF	Impaired	Urbanization	
Deer Creek	Dawson Run		42333	4.31	1.80	Aquatic Life	CWF	Impaired	Agriculture	
Deer Creek	Dawson Run	Unnamed Tributary	42334	0.5	0.5	Aquatic Life	CWF	Impaired	Agriculture	
Deer Creek	Dawson Run	Unnamed Tributary	42335	1.22	1.22	Aquatic Life	CWF	Impaired	Agriculture	
Deer Creek	Dawson Run	Unnamed Tributary	42336	1.13	1.13	Aquatic Life	CWF	Impaired	Agriculture	
Deer Creek	Dawson Run	Unnamed Tributary	42337	1.59	1.59	Aquatic Life	CWF	Impaired	Agriculture	
Deer Creek	Dawson Run	Unnamed Tributary	42338	0.47	0.47	Aquatic Life	CWF	Impaired	Agriculture	
Deer Creek	West Branch Deer Creek		42342	3.98	0.86	Aquatic Life	CWF	Impaired	Urbanization	
Deer Creek	West Branch Deer Creek	Unnamed Tributary	42343	0.7	0.7	Aquatic Life	CWF	Impaired	Urbanization	
Deer Creek	West Branch Deer Creek	Unnamed Tributary	42345	0.85	0.85	Aquatic Life	CWF	Impaired	Agriculture	
Deer Creek	West Branch Deer Creek	Unnamed Tributary	42347	0.46	0.46	Aquatic Life	CWF	Impaired	Agriculture	
Deer Creek	West Branch Deer Creek	Unnamed Tributary	42348	0.42	0.42	Aquatic Life	CWF	Impaired	Urbanization	
Deer Creek	West Branch Deer Creek	Unnamed Tributary	42349	0.69	0.69	Aquatic Life	CWF	Impaired	Urbanization	
Deer Creek	West Branch Deer Creek	Unnamed Tributary	42350	0.52	0.52	Aquatic Life	CWF	Impaired	Urbanization	
Girtys Run			42124	8.39	8.39	Aquatic Life	WWF	Impaired	Urbanization	
Girtys Run	Unnamed Tributary		42125	1.07	1.07	Aquatic Life	WWF	Impaired	Urbanization	
Girtys Run	Unnamed Tributary		42126	2.12	2.12	Aquatic Life	WWF	Impaired	Urbanization	
Girtys Run	Unnamed Tributary (42126)	Unnamed Tributary	42127	0.69	0.69	Aquatic Life	WWF	Impaired	Urbanization	
Girtys Run	Nelson Run		42128	1.56	1.56	Aquatic Life	WWF	Impaired	Urbanization	
Girtys Run	Nelson Run	Unnamed Tributary	42129	0.65	0.65	Aquatic Life	WWF	Impaired	Urbanization	
Girtys Run	Unnamed Tributary		42130	1.26	1.26	Aquatic Life	WWF	Impaired	Urbanization	
Girtys Run	Unnamed Tributary (42130)		42131	1.28	1.28	Aquatic Life	WWF	Impaired	Urbanization	
Girtys Run	McKnight Run		42132	0.42	0.42	Aquatic Life	WWF	Impaired	Urbanization	
Girtys Run	Unnamed Tributary		42133	1	1	Aquatic Life	WWF	Impaired	Urbanization	
Girtys Run	Unnamed Tributary		42135	1.9	1.9	Aquatic Life	WWF	Impaired	Urbanization	
Pine Creek			42136	23.38	23.38	Recreational/ Aquatic Life	TSF / CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Little Pine Creek (42137)		42137	7.51	7.51	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Pine Creek	Little Pine Creek (42137)	Unnamed Tributary	42138	1.07	1.07	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Little Pine Creek (42137)	Unnamed Tributary	42139	1.06	1.06	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Little Pine Creek (42137)	Unnamed Tributary	42140	1.22	1.22	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Little Pine Creek (42137)	Unnamed Tributary	42141	0.43	0.43	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Little Pine Creek (42137)	Unnamed Tributary	42142	0.77	0.77	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Little Pine Creek (42137)	Unnamed Tributary	42143	0.5	0.5	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Little Pine Creek (42144)		42144	5.33	5.33	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Little Pine Creek (42144)	Unnamed Tributary	42145	1.02	1.02	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Little Pine Creek (42144)	Unnamed Tributary	42146	0.99	0.99	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Little Pine Creek (42144)	Unnamed Tributary	42147	0.61	0.61	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Little Pine Creek (42144)	Unnamed Tributary	42148	1.4	1.4	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Little Pine Creek (42144)	Unnamed Tributary	42149	0.61	0.61	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Unnamed Tributary		42150	1.1	1.1	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Unnamed Tributary		42151	0.9	0.9	Aquatic Life	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Unnamed Tributary		42152	1.4	1.4	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Unnamed Tributary (42152)	Unnamed Tributary	42153	0.5	0.5	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Gourdhead Run		42154	2.93	2.93	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Gourdhead Run	McCaskin Run	42155	1.95	1.95	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Gourdhead Run	Unnamed Tributary	42156	1.16	1.16	Aquatic Life/ Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Gourdhead Run	Unnamed Tributary	42157	0.19	0.19	Aquatic Life	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Gourdhead Run	Unnamed Tributary	42158	0.68	0.68	Aquatic Life	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Gourdhead Run	Unnamed Tributary	42159	0.55	0.55	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Unnamed Tributary		42160	0.57	0.57	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Unnamed Tributary		42161	1.28	1.28	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Crouse Run		42162	4.21	4.21	Aquatic Life/ Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Crouse Run	Unnamed Tributary	42163	0.48	0.48	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Crouse Run	Unnamed Tributary	42164	0.81	0.81	Aquatic Life	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Crouse Run	Unnamed Tributary	42165	1.32	1.32	Recreational/ Aquatic Life	TSF	Impaired	Source Unknown - Pathogens	yes

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Pine Creek	Crouse Run	Unnamed Tributary	42166	0.89	0.89	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Unnamed Tributary		42167	2.07	2.07	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Montour Run		42176	5	5	Recreational/ Aquatic Life	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Montour Run	Unnamed Tributary	42177	1.06	1.06	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Montour Run	Unnamed Tributary	42178	0.51	0.51	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Montour Run	Unnamed Tributary	42179	0.52	0.52	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Montour Run	Unnamed Tributary	42180	0.41	0.41	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Montour Run	Unnamed Tributary	42181	0.91	0.91	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Montour Run	Unnamed Tributary	42182	1.04	1.04	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Montour Run	Unnamed Tributary	42185	0.31	0.31	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Montour Run	Unnamed Tributary	42186	0.32	0.32	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Montour Run	Unnamed Tributary	42187	0.33	0.33	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Unnamed Tributary		42188	0.82	0.82	Recreational	TSF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Unnamed Tributary		42189	2.69	2.69	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	North Fork Pine Creek		42190	6.24	6.24	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	North Fork Pine Creek	Unnamed Tributary	??	0.34	0.34	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	North Fork Pine Creek	Unnamed Tributary	42191	0.69	0.69	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	North Fork Pine Creek	Unnamed Tributary	42192	1.02	1.02	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	North Fork Pine Creek	Unnamed Tributary	42193	1.89	1.89	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	North Fork Pine Creek	Unnamed Tributary	42194	1.3	1.3	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	North Fork Pine Creek	Unnamed Tributary	42196	1.13	1.13	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	North Fork Pine Creek	Unnamed Tributary	42198	2.01	2.01	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	North Fork Pine Creek	Unnamed Tributary	42199	1.64	1.64	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	North Fork Pine Creek	Unnamed Tributary	42200	0.28	0.28	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Unnamed Tributary		42201	0.63	0.63	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Unnamed Tributary		42202	1.84	1.84	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Unnamed Tributary		42203	0.71	0.71	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Unnamed Tributary		42204	0.85	0.85	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Rinaman Run		42205??	2.63	2.63	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Rinaman Run	Unnamed Tributary	42206??	0.77	0.77	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Rinaman Run	Unnamed Tributary	42207	0.06	0.06	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Unnamed Tributary		42208	0.83	0.83	Aquatic Life/ Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Wexford Run		42209	2.8	2.8	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Wexford Run	Unnamed Tributary	42210	0.82	0.82	Aquatic Life	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Fish Run		42211??	2.47	2.47	Recreational / Aquatic Life	CWF	Impaired	Source Unknown - Pathogens	yes

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Pine Creek	Fish Run	Unnamed Tributary	42212	0.77	0.77	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Fish Run	Unnamed Tributary	42213??	1.19	1.19	Aquatic Life/ Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Unnamed Tributary		42214	0.03	0.03	Recreational	CWF	Impaired	Source Unknown - Pathogens	yes
Pine Creek	Unnamed Tributary		42215	1.04	1.04	Aquatic Life	CWF	Impaired	Source Unknown - Pathogens	yes
Plum Creek			42246	9.36	9.36	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Unnamed Tributary		42247	1.18	1.18	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Unnamed Tributary (42247)	Unnamed Tributary	42248	1.34	1.34	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Unnamed Tributary		42254	1.78	1.78	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Unnamed Tributary (42254)	Unnamed Tributary	42255	0.56	0.56	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Little Plum Creek		42256	5.15	5.15	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Little Plum Creek	Unnamed Tributary	42260	2.7	2.7	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Little Plum Creek	Unnamed Tributary	42261	0.27	0.27	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Little Plum Creek	Unnamed Tributary	42262	0.41	0.41	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Little Plum Creek	Unnamed Tributary	42264	0.84	0.84	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Little Plum Creek	Unnamed Tributary	42266	0.62	0.62	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Little Plum Creek	Unnamed Tributary	42267	0.42	0.42	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Little Plum Creek	Unnamed Tributary	42273	0.33	0.33	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Little Plum Creek	Unnamed Tributary	42274	0.97	0.81	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Little Plum Creek	Unnamed Tributary	42275	0.47	0.47	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Unnamed Tributary		42276	1.08	1.08	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Unnamed Tributary (42276)	Unnamed Tributary	42277	0.33	0.33	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Unnamed Tributary		42279	0.98	0.98	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Unnamed Tributary		42280	0.57	0.57	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Unnamed Tributary		42281	0.47	0.47	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Unnamed Tributary (42281)	Unnamed Tributary	42282	0.67	0.67	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Unnamed Tributary		42283	0.6	0.6	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Plum Creek	Unnamed Tributary		42284??	0.36	0.36	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Pucketa Creek			42376		3.62	Aquatic Life	TSF	Impaired	Urbanization	
Pucketa Creek	Unnamed Tributary		42406	2.04	2.04	Aquatic Life	TSF	Impaired	Wastewater	
Squaw Run			42223	5.99	1.76	Aquatic Life	HQ-WWF	Impaired	Urbanization	
Squaw Run	Unnamed Tributary		42224	1.12	1.12	Aquatic Life	HQ-WWF	Impaired	Urbanization	
Squaw Run	Unnamed Tributary (42224)	Unnamed Tributary	42225	0.45	0.45	Aquatic Life	HQ-WWF	Impaired	Urbanization	
Squaw Run	Unnamed Tributary		42226	0.97	0.97	Aquatic Life	HQ-WWF	Impaired	Urbanization	

Table 6.2b - Impaired Streams in the Ohio River Subbasin

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Big Sewickley Creek								Sustaining		
Breakneck Creek			35016		0.84	Aquatic Life	WWF	Impaired	Urbanization	
Breakneck Creek	Kaufman Run		35049		0.41	Aquatic Life	WWF	Impaired	Urbanization	
Breakneck Creek	Trib. 5 - Unnamed Tributary to Kaufman Run		35056	0.86	0.42	Aquatic Life	WWF	Impaired	Urbanization	
Chartiers Creek			36777		19.48	Fish Consumption / Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary		36779	0.88	0.88	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary (36779)	Unnamed Tributary	??	0.21	0.21	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary		36780	0.73	0.73	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary (36780)	Unnamed Tributary	??	0.28	0.28	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary (36780)	Unnamed Tributary	??	0.24	0.24	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary		36781	1.89	1.62	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary (36781)	Unnamed Tributary	36782	0.6	0.6	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary (36781)	Unnamed Tributary	??	0.49	0.49	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary		36783	0.38	0.08	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary "Whiskey Run"		36784	1.87	1.87	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary "Whiskey Run"	Unnamed Tributary	36785	0.15	0.15	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary "Whiskey Run"	Unnamed Tributary	??	0.27	0.27	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary "Campbells Run"		36786	5.21	5.21	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary "Campbells Run"	Unnamed Tributary	??	0.76	0.76	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary "Campbells Run"	Unnamed Tributary	36787	2.57	2.57	Aquatic Life	WWF	Impaired	Urbanization	yes
Chartiers Creek	Unnamed Tributary "Campbells Run"	Unnamed Tributary	36788	0.48	0.48	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Chartiers Creek	Unnamed Tributary "Campbells Run"	Unnamed Tributary	36789	0.68	0.68	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary "Campbells Run"	Unnamed Tributary	36790	0.52	0.52	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary "Campbells Run"		36791	0.75	0.75	Aquatic Life	WWF	Impaired	Urbanization	yes
Chartiers Creek	Unnamed Tributary		36792	2.12	2.12	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary (36792)	Unnamed Tributary	36793	0.19	0.19	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary (36792)	Unnamed Tributary	??	0.34	0.34	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary "Georges Run"		36795	1.83	1.08	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary "Georges Run"	Unnamed Tributary	36796	0.41	0.41	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Scrubgrass Run		36797	2.11	2.11	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Scrubgrass Run	Unnamed Tributary	36798	0.61	0.61	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Scrubgrass Run	Unnamed Tributary	36799	0.55	0.55	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary		36800	0.65	0.65	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary		36801	1.53	1.53	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Unnamed Tributary (36801)	Unnamed Tributary	36802	0.48	0.48	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Painters Run		36803	3.7	3.7	Aquatic Life	WWF	Impaired	Habitat Modification	yes
Chartiers Creek	Painters Run	Unnamed Tributary	36804	0.28	0.28	Aquatic Life	WWF	Impaired	Habitat Modification	yes
Chartiers Creek	Painters Run	Unnamed Tributary	36805	0.45	0.45	Aquatic Life	WWF	Impaired	Habitat Modification	yes
Chartiers Creek	Painters Run	Unnamed Tributary	36806	0.26	0.26	Aquatic Life	WWF	Impaired	Habitat Modification	yes
Chartiers Creek	Painters Run	Unnamed Tributary	36807	0.6	0.6	Aquatic Life	WWF	Impaired	Habitat Modification	yes
Chartiers Creek	Painters Run	Unnamed Tributary	36808	0.97	0.97	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Painters Run	Unnamed Tributary	36809	0.69	0.69	Aquatic Life	WWF	Impaired	Habitat Modification	yes
Chartiers Creek	Painters Run	Unnamed Tributary	36810	0.51	0.51	Aquatic Life	WWF	Impaired	Habitat Modification	yes
Chartiers Creek	McLaughlin Run		36811	5.05	5.05	Aquatic Life	WWF	Impaired	Hydro Modification	yes
Chartiers Creek	McLaughlin Run	Unnamed Tributary	36812	0.42	0.42	Aquatic Life	WWF	Impaired	Hydro Modification	yes
Chartiers Creek	McLaughlin Run	Unnamed Tributary	36813	0.3	0.3	Aquatic Life	WWF	Impaired	Hydro Modification	yes
Chartiers Creek	McLaughlin Run	Unnamed Tributary	36814	0.37	0.37	Aquatic Life	WWF	Impaired	Hydro Modification	yes
Chartiers Creek	McLaughlin Run	Unnamed Tributary	36815	1.17	1.17	Aquatic Life	WWF	Impaired	Habitat Modification	yes
Chartiers Creek	McLaughlin Run	Unnamed Tributary	36816	0.29	0.29	Aquatic Life	WWF	Impaired	Habitat Modification	yes

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Chartiers Creek	McLaughlin Run	Unnamed Tributary	36817	0.21	0.21	Aquatic Life	WWF	Impaired	Habitat Modification	yes
Chartiers Creek	McLaughlin Run	Unnamed Tributary	36818	1.4	1.4	Aquatic Life	WWF	Impaired	Hydro Modification	yes
Chartiers Creek	McLaughlin Run	Unnamed Tributary (36818)	36819	0.22	0.22	Aquatic Life	WWF	Impaired	Habitat Modification	yes
Chartiers Creek	McLaughlin Run	Graesers Run	36820	1.81	0.25	Aquatic Life	WWF	Impaired	Habitat Modification	yes
Chartiers Creek	McLaughlin Run	Unnamed Tributary to Graesers Run	36821	1.54	1.54	Aquatic Life	WWF	Impaired	Habitat Modification	yes
Chartiers Creek	McLaughlin Run	Unnamed Tributary	36822??	0.34	0.34	Aquatic Life	WWF	Impaired	Hydro Modification	yes
Chartiers Creek	Thoms Run		36823	3.19	3.19	Aquatic Life	TSF	Impaired	Habitat Modification	yes
Chartiers Creek	Thoms Run	Unnamed Tributary	36824	1.63	1.63	Aquatic Life	TSF	Impaired	Urbanization	yes
Chartiers Creek	Thoms Run	Unnamed Tributary	36825	1.33	1.33	Aquatic Life	TSF	Impaired	Habitat Modification	yes
Chartiers Creek	Thoms Run	Unnamed Tributary	36826	0.34	0.34	Aquatic Life	TSF	Impaired	Habitat Modification	yes
Chartiers Creek	Millers Run		36827		5.15	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Millers Run	Unnamed Tributary	36828	1.21	1.21	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Millers Run	Unnamed Tributary	36829	2.91	2.91	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Millers Run	Unnamed Tributary	36830	0.67	0.67	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Millers Run	Unnamed Tributary	36831	1.77	1.77	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Millers Run	Dolphin Run	36832	2.22	2.22	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Millers Run	Fishing Run	36833	2.81	2.81	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Millers Run	Unnamed Tributary to Fishing Run	36834	0.67	0.67	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Millers Run	Unnamed Tributary	36835	0.62	0.56	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Chartiers Creek	Coal Run		36858	4.51	3.29	Aquatic Life	WWF	Impaired	Urbanization	yes
Chartiers Creek	Coal Run	Unnamed Tributary	36859	1.19	1.19	Aquatic Life	WWF	Impaired	Urbanization	yes
Chartiers Creek	Coal Run	Unnamed Tributary	36860	1.08	1.08	Aquatic Life	WWF	Impaired	Agriculture	yes
Chartiers Creek	Coal Run	Unnamed Tributary	36861	0.82	0.82	Aquatic Life	WWF	Impaired	Agriculture	yes
Chartiers Creek	Unnamed Tributary		36871	2.16	0.29	Aquatic Life	WWF	Impaired	Agriculture	yes
Chartiers Creek	Unnamed Tributary (36871)	Unnamed Tributary	36872	1.52	1.52	Aquatic Life	WWF	Impaired	Agriculture	yes
Chartiers Creek	Unnamed Tributary "Brush Run"	Unnamed Tributary	36874	3.08	1.74	Aquatic Life	WWF	Impaired	Habitat Modification	yes
Chartiers Creek	Unnamed Tributary "Brush Run"	Unnamed Tributary	36875	0.63	0.39	Aquatic Life	WWF	Impaired	Habitat Modification	yes
Chartiers Creek	Unnamed Tributary "Brush Run"	Unnamed Tributary	36877	0.56	0.56	Aquatic Life	WWF	Impaired	Habitat Modification	yes
Chartiers Creek	Unnamed Tributary "Brush Run"	Unnamed Tributary	36878	1.39	1.39	Aquatic Life	WWF	Impaired	Habitat Modification	yes
Chartiers Creek	Unnamed Tributary "Brush Run"	Unnamed Tributary	36879	0.31	0.25	Aquatic Life	WWF	Impaired	Habitat Modification	yes

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Chartiers Creek	Unnamed Tributary "Brush Run"	Unnamed Tributary	36921	0.18	0.18	Aquatic Life	WWF	Impaired	Habitat Modification	yes
Chartiers Creek	Unnamed Tributary "Brush Run"	Unnamed Tributary	36931	1.66	0.07	Aquatic Life	WWF	Impaired	Source Unknown	yes
Connoquenessing Creek	Brush Creek		34787		4.82	Aquatic Life	WWF	Impaired	Urbanization	
Connoquenessing Creek	Brush Creek	Unnamed Tributary	34858	0.88	0.73	Aquatic Life	WWF	Impaired	Urbanization	
Connoquenessing Creek	Brush Creek	Unnamed Tributary	34860	1.42	1.42	Aquatic Life	WWF	Impaired	Urbanization	
Connoquenessing Creek	Brush Creek	Unnamed Tributary	34861	0.89	0.89	Aquatic Life	WWF	Impaired	Urbanization	
Connoquenessing Creek	Brush Creek	Unnamed Tributary*	34862	1.53	1.53	Aquatic Life	WWF	Impaired	Urbanization	
Connoquenessing Creek	Glade Run		63657		1.58	Aquatic Life	WWF	Impaired	Agriculture	
Connoquenessing Creek	Glade Run	Unnamed Tributary	63695	1.5	0.16	Aquatic Life	WWF	Impaired	Agriculture	
Flaugherty Run			36640	4.62	2.16	Aquatic Life	WWF	Impaired	Urbanization	
Flaugherty Run	Spring Run		36641	1.13	1.13	Aquatic Life	WWF	Impaired	Urbanization	
Flaugherty Run	Spring Run	Unnamed Tributary	36642	0.49	0.09	Aquatic Life	WWF	Impaired	Urbanization	
Little Sewickley Creek			36657	7.92	7.92	Aquatic Life	HQ-TSF	Impaired	Urbanization	
Little Sewickley Creek	Unnamed Tributary		36658	0.65	0.65	Aquatic Life	HQ-TSF	Impaired	Urbanization	
Little Sewickley Creek	Unnamed Tributary		36659	1.03	1.03	Aquatic Life	HQ-TSF	Impaired	Urbanization	
Little Sewickley Creek	Unnamed Tributary (36659)	Unnamed Tributary	36660	0.82	0.82	Aquatic Life	HQ-TSF	Impaired	Urbanization	
Little Sewickley Creek	Unnamed Tributary		36661	0.9	0.9	Aquatic Life	HQ-TSF	Impaired	Urbanization	
Little Sewickley Creek	Unnamed Tributary		36662	0.76	0.76	Aquatic Life	HQ-TSF	Impaired	Urbanization	
Little Sewickley Creek	Unnamed Tributary (36662)	Unnamed Tributary	36663	0.31	0.31	Aquatic Life	HQ-TSF	Impaired	Urbanization	
Little Sewickley Creek	Unnamed Tributary "Fern Hollow"		36664	2.19	2.19	Aquatic Life	HQ-TSF	Impaired	Urbanization	
Little Sewickley Creek	Unnamed Tributary "Fern Hollow"	Unnamed Tributary	36665	0.56	0.56	Aquatic Life	HQ-TSF	Impaired	Urbanization	
Little Sewickley Creek	Unnamed Tributary		36666	0.96	0.06	Aquatic Life	HQ-TSF	Impaired	Urbanization	
Little Sewickley Creek	Unnamed Tributary (36666)	Unnamed Tributary	36667	0.87	0.87	Aquatic Life	HQ-TSF	Impaired	Urbanization	
Little Sewickley Creek	Unnamed Tributary		36668	0.73	0.73	Aquatic Life	HQ-TSF	Impaired	Urbanization	
Little Sewickley Creek	Unnamed Tributary		36669	1.22	1.22	Aquatic Life	HQ-TSF	Impaired	Urbanization	
Lowries Run			36750	7.9	1.19	Aquatic Life	TSF	Impaired	Urbanization	
Lowries Run	Unnamed Tributary		63863	0.94	0.94	Aquatic Life	TSF	Impaired	Urbanization	

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Montour Run			36684	12.51	12.51	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	Unnamed Tributary		36691	0.94	0.94	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	Unnamed Tributary (36691)	Unnamed Tributary	36692	0.45	0.45	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	Unnamed Tributary		36694	1.64	0.49	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	Unnamed Tributary (36694)	Unnamed Tributary	36695	0.75	0.75	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	Unnamed Tributary (36694)	Unnamed Tributary	36696	0.5	0.5	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	Unnamed Tributary		36700	0.23	0.23	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	McClarens Run		36701	4.57	4.57	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	McClarens Run	Unnamed Tributary	36702	3.5	3.5	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	McClarens Run	Unnamed Tributary	36703	0.43	0.43	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	McClarens Run	Unnamed Tributary	36706	0.4	0.4	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	Unnamed Tributary		36707	1.4	1.4	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	Unnamed Tributary (36707)	Unnamed Tributary	36708	0.58	0.58	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	Unnamed Tributary		36709	1.3	1.3	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	Unnamed Tributary		36710	4.71	4.71	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	Unnamed Tributary (36710)	Unnamed Tributary	36711	3.67	3.67	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	Unnamed Tributary (36710)	Unnamed Tributary	36712	0.28	0.28	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	Unnamed Tributary (36710)	Unnamed Tributary	36713	1.97	1.97	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	Unnamed Tributary (36710)	Unnamed Tributary	36717	0.75	0.75	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	Unnamed Tributary (36710)	Unnamed Tributary	36719	0.46	0.46	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	Unnamed Tributary (36710)	Unnamed Tributary	36721	0.66	0.66	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	Unnamed Tributary		36722	0.58	0.58	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	South Fork Montour Run		36723	2.67	2.02	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	South Fork Montour Run	Unnamed Tributary	36724	0.75	0.75	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	South Fork Montour Run	Unnamed Tributary	36725	0.82	0.82	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	South Fork Montour Run	Unnamed Tributary	36726	0.72	0.72	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	South Fork Montour Run	Unnamed Tributary	36727	0.25	0.25	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Montour Run	North Fork Montour Run		36728	2.31	2.31	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Ohio River	Shouse Run		36638	1.68	1.68	Aquatic Life	WWF	Impaired	Municipal Point Source	
Ohio River	Shouse Run	Unnamed Tributary	36639	0.51	0.51	Aquatic Life	WWF	Impaired	Municipal Point Source	
Ohio River	Unnamed Tributary		36670	1.42	0.55	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Unnamed Tributary "Narrows Run"		36671	2.36	2.36	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Unnamed Tributary "Narrows Run"	Unnamed Tributary	36672	0.94	0.94	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Unnamed Tributary		36673	2	0.9	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Unnamed Tributary		36674??	1.93	1.21	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Unnamed Tributary		36679	1.64	1.64	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Unnamed Tributary (36679)	Unnamed Tributary	36680	0.23	0.23	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	McCabe Run		36681	1.75	1.75	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	McCabe Run	Unnamed Tributary	36682	0.9	0.9	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	McCabe Run	Unnamed Tributary	36683	0.16	0.16	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Moon Run		36730	6.46	6.46	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Ohio River	Moon Run	Unnamed Tributary	36731	1.49	1.29	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Ohio River	Moon Run	Unnamed Tributary	??	0.34	0.34	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Ohio River	Moon Run	Unnamed Tributary	36732	0.31	0.31	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Ohio River	Moon Run	Unnamed Tributary	36733	0.59	0.59	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Ohio River	Moon Run	Unnamed Tributary	36734	0.22	0.22	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Ohio River	Moon Run	Unnamed Tributary	36735	0.83	0.83	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Ohio River	Moon Run	Unnamed Tributary	??	0.32	0.32	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Ohio River	Moon Run	Unnamed Tributary	??	0.26	0.26	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Ohio River	Moon Run	Unnamed Tributary	36736	0.46	0.46	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Ohio River	Moon Run	Unnamed Tributary	36737	0.84	0.84	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Ohio River	Moon Run	Unnamed Tributary	36738	0.42	0.42	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Ohio River	Moon Run	Unnamed Tributary	??	0.38	0.38	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Ohio River	Unnamed Tributary "Kilbuck Run"		36739	5.27	2.77	Aquatic Life	CWF	Impaired	Urbanization	
Ohio River	Unnamed Tributary "Kilbuck Run"	Unnamed Tributary	36740	0.66	0.66	Aquatic Life	CWF	Impaired	Urbanization	
Ohio River	Unnamed Tributary "Kilbuck Run"	Unnamed Tributary	36741	0.27	0.27	Aquatic Life	CWF	Impaired	Urbanization	
Ohio River	Unnamed Tributary "Kilbuck Run"	Unnamed Tributary	36742	1.02	1.02	Aquatic Life	CWF	Impaired	Urbanization	
Ohio River	Unnamed Tributary "Kilbuck Run"	Unnamed Tributary	36743	0.32	0.32	Aquatic Life	CWF	Impaired	Urbanization	

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Ohio River	Unnamed Tributary		36748	1.46	1.46	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	
Ohio River	Unnamed Tributary (36748)	Unnamed Tributary	36749	0.84	0.84	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	
Ohio River	Unnamed Tributary (36748)	Unnamed Tributary	??	0.39	0.39	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Unnamed Tributary (36748)	Unnamed Tributary	??	0.3	0.3	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Unnamed Tributary		36768	0.69	0.69	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Unnamed Tributary		36770	0.76	0.76	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Spruce Run		36771	2.74	2.74	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Spruce Run	Unnamed Tributary	36772	0.51	0.51	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Spruce Run	Unnamed Tributary	36773	0.48	0.48	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Spruce Run	Unnamed Tributary	36774	1	1	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Unnamed Tributary		??	0.32	0.32	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Unnamed Tributary "Jacks Run"		36775	2.96	2.96	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Unnamed Tributary "Jacks Run"	Unnamed Tributary	??	0.34	0.34	Aquatic Life	WWF	Impaired	Urbanization	
Ohio River	Unnamed Tributary "Jacks Run"	Unnamed Tributary	36776	0.63	0.63	Aquatic Life	WWF	Impaired	Urbanization	
Raccoon Creek	Unnamed Tributary "Potato Garden Run"		33756	6.26	5.34	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Raccoon Creek	Unnamed Tributary "Potato Garden Run"	Unnamed Tributary	33764	1.5	1.5	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Raccoon Creek	Unnamed Tributary "Potato Garden Run"	Unnamed Tributary	33765	0.71	0.71	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Raccoon Creek	Unnamed Tributary "Potato Garden Run"	Unnamed Tributary	33766	1.36	1.36	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Robinson Run			36794	16.51	11.07	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Unnamed Tributary		63285	1.66	1.66	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Pinkertons Run		63290	2.79	2.79	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Pinkertons Run	Unnamed Tributary	63291	0.52	0.43	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Pinkertons Run	Lintons Run	63292	0.75	0.75	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Unnamed Tributary		63293	1.37	1.27	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Robinson Run	Unnamed Tributary "North Branch Robinson Run"		63294	7.82	5.54	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Unnamed Tributary "North Branch Robinson Run"	Unnamed Tributary	63295	2.24	2.24	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Unnamed Tributary "North Branch Robinson Run"	Unnamed Tributary	63296	1.46	1.46	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Unnamed Tributary "North Branch Robinson Run"	Unnamed Tributary	63297	1.86	1.86	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Unnamed Tributary "North Branch Robinson Run"	Unnamed Tributary	63298	0.66	0.66	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Unnamed Tributary "North Branch Robinson Run"	Unnamed Tributary	63299	1.79	1.79	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Unnamed Tributary "North Branch Robinson Run"	Halfcrown Run	63300	2.82	2.82	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Unnamed Tributary "North Branch Robinson Run"	Trib. 5 - Unnamed Tributary to Halfcrown Run	63301	0.72	0.72	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Unnamed Tributary "North Branch Robinson Run"	Unnamed Tributary	63302	2.04	2.04	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Unnamed Tributary		63864	1.79	1.79	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Fink Run		63303	1.75	1.75	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Unnamed Tributary		63304	1.58	1.58	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Unnamed Tributary (63304)	Unnamed Tributary	63305	0.38	0.38	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes
Robinson Run	Unnamed Tributary (63304)	Unnamed Tributary	63306	1.14	1.14	Aquatic Life	WWF	Impaired	Unknown - Metals, pH, Suspended Solids	yes

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Sawmill Run			37164	9.31	9.31	Aquatic Life	WWF	Impaired	Point Source	yes
Sawmill Run	Unnamed Tributary		37166	1.92	1.92	Aquatic Life	WWF	Impaired	Point Source	yes
Sawmill Run	Unnamed Tributary (37166)	Unnamed Tributary	37167	0.58	0.5	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Sawmill Run	Unnamed Tributary (37166)	Unnamed Tributary	63871??	0.51	0.51	Aquatic Life	WWF	Impaired	Point Source	yes
Sawmill Run	Unnamed Tributary		37168	0.87	0.87	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Sawmill Run	Unnamed Tributary		??	0.23	0.23	Aquatic Life	WWF	Impaired	Point Source	yes
Sawmill Run	Unnamed Tributary		37169	0.66	0.66	Aquatic Life	WWF	Impaired	Point Source	yes
Sawmill Run	Unnamed Tributary		37170	1.68	0.51	Aquatic Life	WWF	Impaired	Point Source	yes
Sawmill Run	Unnamed Tributary (37170)	Unnamed Tributary	37171	0.53	0.1	Aquatic Life	WWF	Impaired	Point Source	yes
Sawmill Run	Unnamed Tributary		??	0.53	0.53	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Sawmill Run	Unnamed Tributary		37172	0.71	0.3	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Sawmill Run	Unnamed Tributary		37173	0.59	0.59	Aquatic Life	WWF	Impaired	Point Source	yes
Sawmill Run	Unnamed Tributary		37174	0.91	0.91	Aquatic Life	WWF	Impaired	Point Source	yes

Table 6.2c - Impaired Streams in the Monongahela River Subbasin

Monongahela	Unnamed Tributary "Panther Hollow"		63872	1.77	1.77	Aquatic Life	WWF	Impaired	Hydro-modification	
Monongahela	Unnamed Tributary		37186	2.14	2.14	Aquatic Life	WWF	Impaired	Hydro-modification	
Monongahela	Unnamed Tributary (37186)	Unnamed Tributary	37187	0.89	0.89	Aquatic Life	WWF	Impaired	Hydro-modification	
Monongahela	Streets Run		37189	5.39	5.39	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Streets Run	Glass Run	37190	1.87	1.87	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Streets Run	Unnamed Tributary	37191	1.57	1.57	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Monongahela	Streets Run	Unnamed Tributary	37192	0.6	0.6	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Streets Run	Unnamed Tributary	37193	1.24	1.24	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Streets Run	Unnamed Tributary	64937	0.52	0.52	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Streets Run	Unnamed Tributary	37194	1.72	1.72	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Streets Run	Unnamed Tributary	37195	0.54	0.54	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Streets Run	Unnamed Tributary	37196	0.49	0.49	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Streets Run	Unnamed Tributary	37197	0.53	0.53	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Streets Run	Unnamed Tributary	37198	0.71	0.71	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	West Run		37199	2.76	2.76	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	
Monongahela	Nine Mile Run		37201	2.04	2.04	Aquatic Life	TSF	Impaired	CSO	
Monongahela	Homestead Run		37202	2.55	2.55	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	
Monongahela	Homestead Run	Unnamed Tributary	37203	0.51	0.51	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	
Monongahela	Unnamed Tributary		64948	1.73	1.73	Aquatic Life	WWF	Impaired	Hydro-modification	
Monongahela	Thompson Run		37449	4.31	4.31	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Thompson Run	Unnamed Tributary	37450	0.57	0.57	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Thompson Run	Unnamed Tributary	37452	0.68	0.68	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Thompson Run	Unnamed Tributary	37453	0.57	0.57	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Crooked Run		37454	2.79	2.79	Aquatic Life	WWF	Impaired	Hydro-modification	
Monongahela	Crooked Run	Unnamed Tributary	37455	1.21	1.21	Aquatic Life	WWF	Impaired	Hydro-modification	
Monongahela	Unnamed Tributary		39421	2.13	2.13	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Unnamed Tributary (39421)	Unnamed Tributary	39422	2.67	2.67	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Unnamed Tributary (39421)	Unnamed Tributary	39423	0.48	0.48	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Unnamed Tributary		39424	0.79	0.79	Aquatic Life	WWF	Impaired	Urbanization	
Monongahela	Wylie Run		39528	3.13	3.13	Aquatic Life	WWF	Impaired	Urbanization	
Monongahela	Wylie Run	Unnamed Tributary	39529	1.94	1.94	Aquatic Life	WWF	Impaired	Urbanization	
Monongahela	Wylie Run	Unnamed Tributary	39530	0.71	0.71	Aquatic Life	WWF	Impaired	Urbanization	
Monongahela	Wylie Run	Unnamed Tributary	39531	0.14	0.14	Aquatic Life	WWF	Impaired	Urbanization	
Monongahela	Wylie Run	Unnamed Tributary	39532	0.78	0.78	Aquatic Life	WWF	Impaired	Urbanization	
Monongahela	Wylie Run	Unnamed Tributary	39533	0.38	0.38	Aquatic Life	WWF	Impaired	Urbanization	
Monongahela	Wylie Run	Unnamed Tributary "Harrison Hollow"	39534	0.98	0.98	Aquatic Life	WWF	Impaired	Urbanization	
Monongahela	Wylie Run	Unnamed Tributary	39535	0.99	0.99	Aquatic Life	WWF	Impaired	Urbanization	
Monongahela	Fallen Timber Run		39537	4.46	4.46	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Fallen Timber Run	Unnamed Tributary	39538	0.33	0.33	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Fallen Timber Run	Unnamed Tributary	39539	1.27	1.27	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Monongahela	Fallen Timber Run	Unnamed Tributary	??	0.13	0.13	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Fallen Timber Run	Unnamed Tributary	39540	0.91	0.91	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Fallen Timber Run	Unnamed Tributary	39541	0.92	0.92	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Fallen Timber Run	Unnamed Tributary	39542	1.35	1.35	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Fallen Timber Run	Unnamed Tributary	39543	0.38	0.38	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Fallen Timber Run	Unnamed Tributary	39544	0.57	0.57	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Fallen Timber Run	Unnamed Tributary	39545	0.55	0.55	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Fallen Timber Run	Unnamed Tributary	39546	0.24	0.24	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Fallen Timber Run	Unnamed Tributary	39547	0.04	0.04	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Monongahela	Lobbs Run	Unnamed Tributary	39555	1.5	1.5	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	
Monongahela	Lobbs Run	Unnamed Tributary	39556	0.46	0.46	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	
Monongahela	Lobbs Run	Unnamed Tributary	39557	0.27	0.27	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	
Monongahela	Lobbs Run	Unnamed Tributary	39558	0.21	0.21	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	
Monongahela	Perry Mill Run		39552	3.72	3.72	Aquatic Life	WWF	Impaired	Agriculture	
Monongahela	Perry Mill Run	Unnamed Tributary	39566	0.19	0.19	Aquatic Life	WWF	Impaired	Agriculture	
Monongahela	Perry Mill Run	Unnamed Tributary	39567	1.05	1.05	Aquatic Life	WWF	Impaired	Agriculture	
Monongahela	Perry Mill Run	Unnamed Tributary	39568	0.96	0.96	Aquatic Life	WWF	Impaired	Agriculture	
Monongahela	Perry Mill Run	Unnamed Tributary	39569	0.36	0.36	Aquatic Life	WWF	Impaired	Agriculture	
Monongahela	Perry Mill Run	Unnamed Tributary	39570	0.99	0.99	Aquatic Life	WWF	Impaired	Agriculture	
Monongahela	Perry Mill Run	Unnamed Tributary	39571	0.51	0.51	Aquatic Life	WWF	Impaired	Agriculture	
Monongahela	Unnamed Tributary		39572	0.98	0.13	Aquatic Life	WWF	Impaired	Habitat Modification	
Monongahela	Unnamed Tributary		39767	1.54	1.54	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	
Monongahela	Sunfish Run		39768	2.69	0.34	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	
Monongahela	Sunfish Run	Unnamed Tributary	39769	0.54	0.54	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	
Monongahela	Beckets Run		39774	1.7	1.7	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	
Monongahela	Beckets Run	Unnamed Tributary to Kelly Hollow	39775	1.18	1.18	Aquatic Life	WWF	Impaired	Agriculture	
Monongahela	Beckets Run	Unnamed Tributary to Kelly Hollow	39776	0.71	0.71	Aquatic Life	WWF	Impaired	Agriculture	
Monongahela	Beckets Run	Unnamed Tributary	39777	1.72	1.72	Aquatic Life	WWF	Impaired	Agriculture	
Monongahela	Beckets Run	Unnamed Tributary	39778	0.97	0.97	Aquatic Life	WWF	Impaired	Agriculture	
Monongahela	Beckets Run	Unnamed Tributary (395777)	39779	0.58	0.58	Aquatic Life	WWF	Impaired	Agriculture	
Monongahela	Beckets Run	Unnamed Tributary (395777)	39780	0.97	0.97	Aquatic Life	WWF	Impaired	Agriculture	
Monongahela	Beckets Run	Unnamed Tributary	39781	0.77	0.38	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Peters Creek			39425		7.62	Aquatic Life / Recreational/ Potable Water Supply	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Unnamed Tributary		39426	0.55	0.55	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Unnamed Tributary		39427	0.45	0.45	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Unnamed Tributary		39428	1.01	1.01	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Unnamed Tributary		39429	0.86	0.86	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Unnamed Tributary (39429)	Unnamed Tributary	39430	0.45	0.45	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Unnamed Tributary (39429)	Unnamed Tributary	39431	0.55	0.55	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lewis Run		39432	3.66	3.66	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lewis Run	Unnamed Tributary	39433	1.21	1.21	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lewis Run	Unnamed Tributary	39434	1.35	1.35	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lewis Run	Unnamed Tributary	39435	0.41	0.41	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lewis Run	Unnamed Tributary	39436	0.47	0.47	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lewis Run	Unnamed Tributary	39437	0.82	0.82	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lewis Run	Unnamed Tributary	39438	1.57	1.57	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Unnamed Tributary		39439	0.49	0.49	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Unnamed Tributary		39440	0.32	0.32	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Unnamed Tributary		39441	0.69	0.69	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Beam Run		39442??	2.65	2.65	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Beam Run	Unnamed Tributary	39443	0.39	0.39	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Beam Run	Unnamed Tributary	39444	0.67	0.67	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Beam Run	Unnamed Tributary	39445	0.59	0.59	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Beam Run	Unnamed Tributary	39446	0.71	0.71	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Beam Run	Unnamed Tributary	39447	0.4	0.4	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Beam Run	Unnamed Tributary	39448??	0.31	0.31	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Unnamed Tributary		39449	1.18	1.18	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Unnamed Tributary		39450	0.73	0.73	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lick Run		39451	6.72	6.72	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lick Run	Unnamed Tributary	39452	0.28	0.28	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lick Run	Unnamed Tributary	39453	0.58	0.58	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lick Run	Unnamed Tributary	39454	0.55	0.55	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lick Run	Unnamed Tributary	39455	0.47	0.47	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lick Run	Unnamed Tributary	39456	0.44	0.44	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lick Run	Unnamed Tributary	39457	0.66	0.66	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Peters Creek	Lick Run	Unnamed Tributary	39458	1.04	1.04	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lick Run	Unnamed Tributary	39459	1.15	1.15	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lick Run	Unnamed Tributary	39460	0.32	0.32	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lick Run	Unnamed Tributary	39461	0.6	0.6	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Lick Run	Unnamed Tributary	39462	0.63	0.63	Aquatic Life / Recreational	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Unnamed Tributary		39463	0.67	0.56	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork		39464	7.28	7.28	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary	39465	0.66	0.66	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary	39466	0.34	0.34	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Catfish Run	39467	3.55	3.55	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary to Catfish Run	39468	0.4	0.4	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary to Catfish Run	39469	0.62	0.62	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary to Catfish Run	39470	0.49	0.49	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary to Catfish Run	39471	0.54	0.54	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary to Catfish Run	39472	0.9	0.9	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Sleepy Hollow Run	39473	2.35	2.35	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary to Sleepy Hollow Run	39474	0.1	0.1	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary	39475	0.49	0.49	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary	39476	0.56	0.56	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary	39477	0.6	0.27	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary	39478	1.01	1.01	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary	39479	0.88	0.62	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary	39480	2.08	2.08	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary	39481	0.74	0.74	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary	39482	0.91	0.91	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary	39483	0.61	0.61	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary	39484	0.74	0.74	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary	39485	0.56	0.56	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary	39486	0.3	0.3	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary	39487	0.29	0.29	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Piney Fork	Unnamed Tributary	39488	0.23	0.23	Recreational / Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Peters Creek	Unnamed Tributary		39491	1.19	0.17	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Peters Creek	Unnamed Tributary (39491)	Unnamed Tributary	39492	0.4	0.11	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek			37204		12.73	Aquatic Life	WWF / TSF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Unnamed Tributary		64495	1.46	1.46	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Unnamed Tributary		37205	3.29	3.29	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Unnamed Tributary (37205)	Unnamed Tributary	37206	1.09	1.09	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Unnamed Tributary		37207	1.31	1.31	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Unnamed Tributary (37207)	Unnamed Tributary	37208	0.2	0.2	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Sawmill Run	37209??	3.04	3.04	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Unnamed Tributary to Sawmill Run	37210??	0.79	0.79	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run		37211??	7.1	7.1	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Chalfant Run	37212??	3.89	3.89	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Unnamed Tributary to Chalfant Run	37213	1.27	1.27	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Duffs Run	37215	0.71	0.71	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Unnamed Tributary to Chalfant Run	37216??	1.42	1.42	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Unnamed Tributary	37220	1.56	1.56	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Unnamed Tributary	63939??	0.39	0.39	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Unnamed Tributary	37221	0.64	0.64	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Leak Run	37222	2.52	2.52	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Unnamed Tributary to Leak Run	37223	0.15	0.15	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Unnamed Tributary to Leak Run	37224??	0.33	0.33	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Unnamed Tributary	37225??	2.16	2.16	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Unnamed Tributary	37231	1.58	1.58	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Unnamed Tributary	37233	0.53	0.53	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Unnamed Tributary	37226??	1.56	1.56	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Unnamed Tributary	37228??	1.18	1.18	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Unnamed Tributary	37229??	0.8	0.8	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Thompson Run	Unnamed Tributary	37230??	0.31	0.31	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Unnamed Tributary		37234	1.57	1.57	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Unnamed Tributary		37235	1.06	1.06	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Unnamed Tributary		37236	1.75	1.75	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Turtle Creek	Unnamed Tributary		37237	1.49	1.49	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Unnamed Tributary (37237)	Unnamed Tributary	37238	0.82	0.82	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Unnamed Tributary		37239	0.85	0.76	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Unnamed Tributary		37240	1.02	0.57	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Unnamed Tributary		37241	3.04	3.04	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Unnamed Tributary (37241)	Unnamed Tributary	37242	0.84	0.84	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Unnamed Tributary (37241)	Unnamed Tributary	37243	0.9	0.9	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Unnamed Tributary		37244	1	1	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Unnamed Tributary (37244)	Unnamed Tributary	37245	2.76	2.76	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Brush Creek		37246		0.62	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Abers Creek		37372??	4.83	3.47	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Abers Creek	Thompson Run	37373	2.81	2.02	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Abers Creek	Unnamed Tributary to Thompson Run	37374	0.83	0.83	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Abers Creek	Unnamed Tributary to Thompson Run	37375	0.76	0.76	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Abers Creek	Unnamed Tributary	37378	0.53	0.53	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Abers Creek	Piersons Run	37379	2.81	2.81	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Abers Creek	Unnamed Tributary to Piersons Run	37380	0.7	0.7	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Abers Creek	Unnamed Tributary to Piersons Run	37381	0.55	0.55	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Abers Creek	Unnamed Tributary to Piersons Run	37382	0.64	0.64	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Abers Creek	Unnamed Tributary	37383	0.43	0.43	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Turtle Creek	Abers Creek	Unnamed Tributary	37384	0.82	0.82	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	yes
Youghiogheny River	Long Run		37460	6.65	3.31	Aquatic Life	TSF	Impaired	Urbanization	
Youghiogheny River	Long Run	Unnamed Tributary	37461	1.31	1.31	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	
Youghiogheny River	Long Run	Unnamed Tributary to McKee Road Run	37463	1.75	1.31	Aquatic Life	HQ-TSF	Impaired	Urbanization	
Youghiogheny River	Long Run	Unnamed Tributary to Stewartsville Road Run	37475	2.1	0.18	Aquatic Life	TSF	Impaired	Abandoned Mine Drainage	
Youghiogheny River	Unnamed Tributary "Boston Hollow"		37483	1.92	1.92	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	
Youghiogheny River	Gillespie Run		37525??	3.86	0.63	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	

Act 167 Watershed	Tributary 1	Tributary 2	WRDS #	Total Stream Miles	Stream Miles W/I County	STR_ASSESS	CH93_USE	Stream Assessment	Source-Cause of Impairment	TMDL?
Youghiogheny River	Pollock Run		37542		0.34	Aquatic Life	WWF	Impaired	Urbanization	
Youghiogheny River	Pollock Run	Unnamed Tributary	37543	1.7	0.45	Aquatic Life	WWF	Impaired	Abandoned Mine Drainage	

TMDLs

Once a waterbody is listed on the EPA-approved 303(d) list, it is required to be scheduled for development of a TMDL. TMDLs are expressed in terms of mass per time, toxicity, or other appropriate measures that relate to a water quality standard. They can be developed to address individual pollutants or groups of pollutants if it is appropriate for the source of impairment.

Calculating the TMDL for any given body of water involves the combination of factors that contribute to the problem of nutrient concentrated runoff. Bodies of water are tested for contaminants based on their intended use. Each body of water is tested similarly but designated with a different TMDL. Drinking water reservoirs are designated differently from areas for public swimming and water bodies intended for fishing are designated differently from water located in wildlife conservation areas. The size of the water body also is taken into consideration when TMDL calculating is undertaken. The larger the body of water, the greater the amounts of contaminants can be present and still maintain a Margin of Safety. The Margin of Safety (MOS) is numeric estimate included in the TMDL calculation, sometimes 10% of the TMDL, intended to allow a safety buffer between the calculated TMDL and the actual load that will allow the water body to meet its beneficial use (since the natural world is complex and several variables may alter future conditions). TMDL is the end product of all point and non-point source pollutants of a single contaminant. Pollutants that originate from a point source are given allowable levels of contaminants to be discharged; this is the Waste Load Allocation (WLA). Nonpoint source pollutants are also calculated into the TMDL equation with Load Allocation (LA). The calculation of a TMDL is as follows:

$$TMDL = WLA + LA + MOS$$

Where: TMDL = Total Maximum Daily Load

WLA = Waste Load Allocation; from point sources such as industrial discharges and wastewater treatment plants

LA = Load Allocation; from nonpoint sources such as stormwater, agricultural runoff and natural background levels

MOS = Margin of Safety

TMDLs are developed by the State and submitted to EPA for review and approval. Once a TMDL has been approved, it becomes a tool to implement pollution controls. It does not provide for any new implementation authority. The point source component of the TMDL must be implemented through existing federal programs with enforcement capabilities (e.g. NPDES). Implementation of the Load Allocations for nonpoint sources can happen through a voluntary approach or by means of existing state or local regulations. Table 6.3 lists the TMDLs in Allegheny County.

Table 6.3. TMDLs in Allegheny County

Waterbody	TMDL Category	Cause	Status
Chartiers Creek Watershed	Unknown	Metals, pH, Suspended Solids PCB / Chlordane / Abandoned Mine Drainage	EPA Approved 2003
Deer Creek	AMD	AMD - Metals, pH	EPA Approved 2007
Fallen Timber Run	Agriculture	AMD-Metals	EPA Approved 2009
Un-named Tributary to Monongahela River	AMD	AMD - Metals	EPA Approved 2003
Moon Run	AMD	AMD - Metals, pH, Suspended Solids	EPA Approved 2004
Montour Run	AMD	AMD - Metals, pH	EPA Approved 2005
Ohio River	Fish Consumption	Chlordane, PCB	EPA Approved 2001
Peters Creek	AMD	AMD - Metals	EPA Approved 2009
Pine Creek	Unknown	Pathogens	EPA Approved 2013
Plum Creek	AMD	AMD - Metals, pH	EPA Approved 2005
Raccoon Creek	AMD	AMD - Metals, pH, Siltation, Suspended Solids	EPA Approved 2005
Robinson Run	AMD	AMD - Metals, pH, Suspended Solids	EPA Approved 2003
Saw Mill Run	CSO - Point and non-point sources	Nutrients, DO/BOD, Organic Enrichment/ Low D.O, Siltation	EPA Approved 2008
Streets Run	Nonpoint Source	AMD - Metals	EPA Approved 2009
Thompson Run	AMD	AMD - Metals, pH	EPA Approved 2003
Turtle Creek	AMD	AMD - Metals, pH	EPA Approved 2009

CRITICAL SOURCES OF IMPAIRMENT

The primary causes of water quality impairment are sediment/siltation, nutrients, metals, and pathogens. Nonpoint source (NPS) pollution is a general term for water pollution generated by diffuse land use activities rather than from an identifiable or discrete facility. In Allegheny County, the leading nonpoint sources of impairment are:

- Abandoned Mine Drainage (AMD)
- Agriculture
- Urban Runoff/Storm Sewers
- Road Runoff
- Small Residential Runoff

Some of these sources are regulated by stormwater ordinances. Several of these categories are more appropriately addressed by other regulations. Although these activities cannot be regulated directly by

the provisions in the Model Ordinance of this PLAN, they play a major role in the water quality of surface waters. The following is a summary of the nonpoint sources and causes for impairment that affect Allegheny County waters:

ABANDONED MINE DRAINAGE (AMD)

Contaminated water seeping from abandoned coal mine areas (commonly known as abandoned mine drainage, or AMD) is the most prevalent and severe water pollution problem in Allegheny County. AMD, impairing approximately 324 miles of surface waters within the County, is the primary cause of impairment in Allegheny County. Impacting 41% of the impaired waters within the County, AMD is, by far, the principal impairment concern. There are many different potential contaminants found in and around abandoned mines.

Vast bituminous coal deposits underlie western and northcentral PA, including Allegheny County. Indeed, bituminous coal mining and coke making dominated much of western Pennsylvania's economy during the late nineteenth and early twentieth century. The Pennsylvania bituminous industry peaked in 1918 when the industry started to encounter rising competition from other states and shrinking markets due to competing fuel sources such as petroleum and natural gas. This began a long-term decline in the coal industry that continues today. Bituminous coal was primarily mined through surface mining techniques or "strip mining". Through this process, the overburden (soils and other bedrock layers) is removed and relocated to expose the coal for extraction. Although this method was usually cheaper, it caused severe environmental problems that went unregulated until state law required land restoration in 1963. This process drastically changed the County's landscape, negatively influencing the hydrologic process.

Years of coal mining conducted before the regulation of the industry and a sharp decline in production have left behind a multitude of abandoned mine sites that host a variety of environmental and safety issues. Abandoned mine sites have left dangerous highwalls, open pits, coal refuse spoil piles, old mine openings, and miles of streams polluted by AMD. Past coal mining practices have led to erosion, landslides, polluted water supplies, destruction of fish and wildlife habitat, and an overall reduction in natural beauty. Abandoned mines leak acidic, metal-contaminated waters into nearby waterways and the groundwater.

Many strip mines were not backfilled or re-vegetated, allowing water to infiltrate through acidic spoil, settle into impoundments, and contaminate groundwater supplies. Strip mine activities often removed the outcrop barrier, allowing groundwater to flow unimpeded to the surface over the old strip pit. The refuse produced from mining activities (consisting of high sulfur material) was usually just stockpiled, another source of pollution.

Acid run-off and sedimentation from abandoned mine sites contaminate thousands of miles of streams nationwide. This contaminated water eventually serves as potable water supply; therefore, an increase in water treatment costs is required. AMD also leads to increased road maintenance costs due to the corrosive effects of AMD on culverts. Streams and drainage systems are often clogged by sedimentation from AML sites, which, in turn, may cause flooding. The Surface Mining Conservation and Reclamation Act of 1971 and the Federal Surface Mining Control and Reclamation Act of 1977 have generated regulations intended to eliminate and control adverse conditions resulting from mining operations.

URBANIZATION

This is a broad category that includes the following three critical sources of impairment listed earlier in this section: Urban Runoff/Storm Sewers, Road Runoff, and Small Residential Runoff. These sources have been grouped together because they are all types of urbanization, or human development activities.

When development activities replace forests, fields, and meadows with impervious surfaces, the landscape's capacity for infiltration is greatly reduced and surface runoff increases. This topic has been the focus of this PLAN. Urbanization accounts for 141 impaired stream miles or 18% of the impaired waters within the County.

SEDIMENT/SILTATION

As stormwater flows over land, it collects silt and sediment and carries them to surface waters. Urbanization decreases the opportunity for natural filtration of runoff through vegetation and often concentrates flow in discharges that cause increased overland erosion. The increased rate of stormwater flow and increased sediment load delivered to the stream combine to raise the in-stream energy. This changes the physical structure of the receiving streams by causing increased streambank erosion as well as scour of the streambed and sedimentation when the water finally slows down. Increased sediment loading in a stream contributes to increased Total Suspended Solids (TSS) and turbidity, which can in turn lead to increased stream temperatures as darker particles absorb heat (EPA, 1997). As water temperature rises, Dissolved Oxygen (DO) levels decrease. These changes caused by sediment and siltation are all substantial contributors to aquatic life impairments.

HABITAT ALTERATIONS

Natural channels are composed of alternating sequences of pools, riffles, and runs. The diverse characteristics of each of these features provide unique habitats that allow various aquatic species to live, feed, and reproduce (EPA, 2007). The elevated stream power that occurs when additional runoff and sediment loading are experienced causes physical alterations to the stream channel. The increased energy carries large debris downstream, erodes streambeds and banks, creates scour at existing structures, and deposits excess sediment in the channel. These changes can drastically alter the structure of pools, riffles, and runs and eventually diminish the quality of the habitat to a point where the stream can no longer support aquatic life.

NUTRIENTS AND METALS

As runoff flows over impervious surfaces, it picks up various pollutants and transports them to waterbodies. Pollutants include: oil and grease from automobiles; fertilizers; herbicides and pesticides from lawns; fecal matter from pet waste, wild animal/birds and malfunctioning septic tanks; chlorides from winter road maintenance; and heavy metals from tires, paints, and metal surfaces. These pollutants degrade water quality and limit the beneficial uses of the surface waters. Beneficial uses that may be impacted include: drinking water supply; swimming; fishing; other recreation; and aquatic life support.

WATERSHED PLANNING

Addressing water quality impairments is achieved most effectively through an Integrated Watershed Plan and implementation. The water quality-based approach is a common method of addressing impairments. The "Integrated Waters List" identifies impaired streams and identifies source-causes of impairment. The next step towards improving the water quality in a given stream is to identify the critical areas within the impacted watershed. Critical areas are the geographic regions within a watershed that are known or shown to directly contribute pollutants to the stream. The primary purpose for identifying critical areas is to develop a strategy that efficiently and cost effectively addresses the sources of water quality impairment.

An inventory of each watershed that identifies the critical areas allows time, effort, and funds to be targeted towards those sites that most negatively impact water quality. This stage should be completed by a watershed planner with the technical knowledge necessary to accurately identify critical areas and

the ability to provide a technical assessment of the severity of each source. The planner will have to work with the local groups that are concerned with the health of their watershed. Together they can prioritize the inventoried sites within the critical area based on the degree to which the sites contribute to the impairment and the overall objectives of the community.

It is important to involve the stakeholders within the watershed at this point in the form of a steering committee. A local watershed group or the ACCD may be able to assist in identifying the stakeholders and coordinating everyone's efforts. The planner and steering committee will work together to develop a comprehensive watershed plan and an implementation strategy to address the sites within the critical areas. The goal is to address the most severe sources of pollutants in an efficient manner. The next step in developing a comprehensive watershed plan is to set definable water quality goals based on the detailed inventory.

Developing an implementation strategy and determining specific BMPs to treat specific sites is the last step. Existing water quality programs should be considered as the implementation strategy is developed. These programs can be coordinated with the implementation strategy in order to achieve a common goal. Federal and State funding programs come and go, and Foundation grant priorities change, so during planning, thought must be given to then-current potential funding sources and how they can be used to implement specific portions of the overall water quality improvement plan. As projects are implemented, the plan should be reviewed and revised within certain timelines (e.g., 5 years) to ensure that the water quality goals will be obtained.

AGRICULTURAL CONSERVATION PRACTICES

A variety of agricultural conservation practices are available to help achieve producer's goals while also protecting natural resources. These practices are used to reduce soil erosion and improve and protect water quality. These practices are intended to address specific resource concerns. Individual BMPs are most effective through a conservation system. A conservation system addresses all of the resource concerns on a particular farm through a combination of different management practices and BMPs that work together. Planning a conservation system ensures that the maximum benefits can be obtained from the individual components and that the overall management goals are accomplished. Pennsylvania requires farmers to obtain a written Agricultural Erosion and Sediment Control Plan or Conservation Plan for agricultural plowing or tilling activities or for animal heavy use areas greater than 5,000 square feet. Conservation planning services are offered by a variety of private consultants as well as state and federal agencies, including the local County Conservation District and USDA Natural Resource Conservation Service staff. The following BMPs have been identified to address the impairments identified in Allegheny County:

Agricultural Streambank Protection

Streambank protection provides direct water quality results by reducing the amount of sediment, animal waste and nutrients entering the stream. Protection is implemented by excluding livestock from the stream and establishing buffer zones of vegetation around the stream (see *Riparian Buffers*). The practice can be implemented with or without fencing; however, it is much more effective when fencing is installed. Fencing is highly recommended in areas accessible to livestock. This BMP may require installation of an alternate watering source for livestock and potentially an animal crossing. According to the *Chesapeake Bay Program Best Management Practices, Agricultural BMPS – Approved for CBP Watershed Model* (PaDEP, 2007) the pollutant removal efficiency of this practice, with fencing and off-stream watering applied, is 60% (Nitrogen), 60% (Phosphorus), and 75% (Sediment). Without fencing, the efficiency is reduced to 30%, 30%, and 38% for nitrogen, phosphorus, and sediment, respectively.

Agricultural Riparian Buffers

Riparian areas, or land situated along the bank of a water source, typically occur as natural buffers between uplands and adjacent waterbodies. They act as natural filters of non-point source pollutants before they reach surface waters. In agricultural areas many riparian buffers have been removed by agricultural activity to increase tillable acreage and provide animal access to water (see *Streambank Protection*). Re-establishing riparian buffers by planting forest buffer or grass buffers adjacent to waterbodies provides significant water quality benefits. In addition to the filtering benefits that grass buffers provide, forested buffers provide shade to the stream, helping to reduce negative thermal impacts. Additionally, wetlands and riparian areas also help decrease the need for costly stormwater and flood protection facilities. The efficiency of riparian buffers varies by hydrologic setting.

Riparian buffers are part of a larger group of practices referred to as Conservation Buffers. This general practice is any area or strip of land maintained in permanent vegetation to help reduce erosion and filter nonpoint source pollutants. This group also includes contour buffer strips, field borders, filter strips, vegetative barriers, and windbreaks (NRCS, 1999).

Barnyard Runoff Control

Animal concentration areas (ACA) are a principal source of sediment and nutrient pollution on agricultural operations. Barnyard runoff control is used to manage stormwater runoff from animal concentration areas to reduce the sediment and nutrients that reach surface waters. Runoff control can be achieved with a variety of methods, but the principles are the same for all of the methods. These principles are removing manure from the barnyard, keeping “clean” water away from the barnyard, collecting runoff from the barnyard, and filtering it with an appropriate BMP or storing it in a manure storage facility for field application. Clean water is diverted away from ACAs with roof runoff structures, diversions, and drainage structures. When barnyard runoff control is implemented without storage, the pollutant removal efficiency is 20% (Nitrogen), 20% (Phosphorus), and 40% (Sediment) (PaDEP, 2007). When the practice is implemented in conjunction with a manure storage, the nitrogen and phosphorus efficiencies are both reduced to 10% and the sediment efficiency remains the same.

Agricultural Nutrient Management

Nutrient and manure management is planning for, and implementation of, the application of organic and inorganic materials to provide sufficient nutrients for crop production in a manner that limits negative environmental impact of their use (NRCS, 1999). Manure management plans are required for all operations producing and using manure. An approved nutrient management plan is required for higher density, concentrated animal operations. A nutrient management plan accounts for all nutrient sources and details the location, timing, rate, and method of nutrient application to crop fields. Pennsylvania regulations define maximum application rates and setback distances from environmentally sensitive areas. Implementing a nutrient management plan provides benefit to the farmer by allocating the available nutrients to where they are needed the most for crop yield. It also limits excess nutrients that would otherwise be susceptible to transport from contributing to NPS pollution. Pollutant delivery reductions achieved by implemented nutrient management plans are greatly varied by individual agricultural operations. There is no efficiency directly associated with this practice. Several cost-share programs are available to assist costs associated with plan development and implementation.

Animal Waste Management Systems

Animal waste management systems are used for the proper handling, storage, and application of animal waste generated on livestock operations. Wastes are collected from animal confinement areas and transferred to an appropriate waste storage facility. The waste storage facility enables the producer to store manure during adverse weather conditions when manure nutrients are most likely to reach surface waters. Manure is then field applied when conditions are most conducive to plant nutrient uptake. Waste storage facilities have a nitrogen and phosphorus efficiency of 75%.

Cover Crops

Cover crops are planted in the fall after the primary crop has been harvested. The cover crop grows through the fall and provides ground cover for the field throughout the winter months and early spring when the soil is extremely susceptible to erosion. The cover crop also provides nitrogen removal benefits as it utilizes excess nitrogen in the soil. The cover crop can either be harvested as a commodity crop in the spring or it can be killed and left as ground cover prior to spring planting. Cover crops provide excellent soil erosion protection when the fields need it most. The efficiency of cover crops varies based on planting time and harvesting.

Conservation Tillage

Conservation tillage is a crop production system that results in minimal disturbance of the surface soil. Maintaining soil cover with crop residue is an important part of conservation tillage. Maintaining ground cover throughout the year has many benefits to crop production, but the most significant water quality benefit is reduction in soil erosion. No-till farming is one form of conservation tillage in which crops are planted directly into ground cover with no disturbance of the surface soil. Minimum tillage farming is another method that involves minor disturbance of the soil, but maintains much of the ground cover on the surface. There is no efficiency associated with this practice. Additionally, foregoing fall tillage while maintaining crop residue can also provide a beneficial reduction in soil loss. The effects of each tillage system can be calculated by the Revised Universal Soil Loss Equation (RUSLE), which will give an estimation of the annual soil loss estimate for each field.

Section 7 – Stormwater Control Facilities and Floodplains

DAMS

There are a number of major dams in Allegheny County. Emsworth Lock and Dam and Dashield Lock and Dam are on the Ohio River, Allegheny River Lock and Dam #2, CW Bill Young Lock and Dam (Allegheny #3), and Allegheny River Lock and Dam #4 are on the Allegheny River, with Braddock Lock and Dam, and Monongahela River Lock and Dam #3 on the Monongahela River. These dams are primarily for river navigation but can provide some flood control benefit.

There are 80 PaDEP-regulated dams and impoundments located throughout Allegheny County. Table 7.1 lists the dams and their locations. The regulated dams are also shown on *Map 13 – Regulated Dams and Local Stormwater Control Facilities.*

Dams with small storage volumes (less than 100 acre-feet) and dams that are completely filled during minor runoff events (0.3 inches of runoff) are considered generally "run-of-the-river dams" that would only affect the immediate area near the dam. Their impacts to the overall watershed hydrology would be negligible. Any impoundments that exceed the above parameters can be considered "flood control dams" for the purpose of this Plan. Within the three watersheds studied within this PLAN, only the Robinson Run watershed has PaDEP-regulated dams within its boundaries. The two such dams are the Bayer Corporation dam and the Lisowski dam which are included in Table 7.1. Appendix E contains photographs of the Bayer Corporation Dam.

STORMWATER CONTROL FACILITIES

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 in Allegheny County; however, only 11 municipalities responded to the information request. Within the 11 reporting municipalities, a total of 193 stormwater control facilities were identified. Table 7.2 lists these stormwater control facilities and their coordinate locations. The physical locations of these stormwater control facilities are shown on *Map 13*. Photographs of representative stormwater control facilities are provided in Appendix E.

Table 7.1 - PaDEP Permitted Dams in Allegheny County

	Dam Number	Dam Name	Latitude			Longitude		
			Degree	Minute	Second	Degree	Minute	Second
1	02-004	LOWER DAM	40	32	24	80	10	6
2	02-006	UPPER DAM	40	32	30	80	9	54
3	02-010	NARROWS RUN	40	31	36	80	12	22
4	02-023	MARSHALL LAKE	40	36	42	80	1	6
5	02-024	GLADE LAKE	40	31	42	79	53	12
6	02-025	KAPPEL	40	37	48	80	1	30
7	02-026	PINE CREEK (NORTH PARK LAKE)	40	35	45	79	59	49
8	02-029	BUTLERS LAKE	40	15	51	79	49	6
9	02-032	CAMPBELLS POND	40	32	27	79	53	26
10	02-038	TREES #1	40	39	40	80	1	37
11	02-040	SARANDRIA	40	39	2	80	2	19
12	02-045	SPRING VALLEY LAKE	40	37	30	79	59	12
13	02-047	MIDDLE WEST DEER	40	37	19	79	49	27
14	02-048	VILLAGE AT PINE	40	37	40	80	2	53
15	02-050	RENTON SLURRY POND NO 3	40	29	59	79	43	10
16	02-051	RENTON SLURRY POND NO 4	40	30	0	79	43	2
17	02-052	RUSSELTON SLURRY POND NO 3	40	35	57	79	50	24
18	02-053	HARMAR REFUSE BANK	40	32	40	79	50	47
19	02-055	HARMAR STORAGE POND NO 4	40	32	8	79	50	51
20	02-056	RENTON SLURRY POND NO 5	40	29	58	79	42	55
21	02-057	CARING 1	40	25	18	79	44	39
22	02-064	MIDFIELD SEDIMENTATION POND	40	28	53	80	14	42
23	02-065	NORTHMONT FARMS BASIN #1	40	36	0	80	5	25
24	02-066	NORTHMONT BASIN #2	40	35	57	80	5	17
25	02-067	STORMWATER DETENTION	40	19	38	79	56	16
26	02-068	HUNTINGTON WOODS RETENTION POND	40	36	35	80	5	1
27	02-070	BALD KNOB	40	27	16	80	18	57
28	02-071	THORN HILL PARK DETENTION BASIN	40	40	10	80	6	38
29	02-072	EMSWORTH LOCK & DAM	40	30	17	80	5	17
30	02-073	MONTOUR HEIGHTS COUNTRY CLUB	40	30	2	80	11	23
31	02-074	LaROCHE COLLEGE DETENTION BASIN #1	40	34	3	80	0	57
32	02-075	ORCHARD PARK MEADOWS RETENTION BAS	40	37	18	79	55	37
33	02-076	BELMONT RIDGE	40	26	1	79	46	33
34	02-077	WILDWOOD GOLF CLUB POND NO1	40	34	41	79	58	58
35	02-078	WILDWOOD GOLF CLUB POND NO 2	40	34	40	79	58	49
36	02-080	DETENTION BASIN	40	34	50	79	56	0
37	02-081	PNGC RESERVOIR NO 6	40	39	14	79	56	34
38	02-082	WITTMER ROAD DETENTION	40	34	3	80	2	41
39	02-086	ALLEGHENY RIVER LOCK & DAM 2	40	29	12	79	54	54
40	02-087	C. W. BILL YOUNG LOCK & DAM	40	32	18	79	48	54
41	02-088	ALLEGHENY RIVER LOCK & DAM 4	40	36	47	79	43	2
42	02-089	BRADDOCK LOCK & DAM	40	23	30	79	51	30
43	02-090	MONONGAHELA RIVER LOCK & DAM 3	40	15	54	79	53	54
44	02-091	DASHIELDS LOCK & DAM	40	32	54	80	12	30
45	02-092	SUTULA/STROUD	40	39	58	79	59	37
46	02-093	LAKE STEUBEN	40	27	24	80	7	37
47	02-098	SLADE	40	36	8	80	6	47
48	02-099	14-NORTH IMPOUNDMENT	40	32	50	79	52	14
49	02-100	POTTER PARK LAKE	40	35	23	80	3	43
50	02-101	SHALER DETENTION FACILITY	40	30	45	79	58	21
51	02-102	BRECKENRIDGE DETENTION	40	36	38	80	2	37
52	02-103	RIDGE DETENTION BASIN DAM	40	32	19	80	8	54
53	02-104	LAROCHE COLLEGE DETENTION BASIN #2	40	34	3	80	0	41
54	02-108	SHALOM FARM POND	40	39	35	80	2	17
55	02-109	HANGER SERVICE ROAD DET BASIN	40	29	48	80	13	41
56	02-111	DEER RUN GOLF COURSE NO 1	40	39	11	79	53	1
57	02-113	TAXIWAY "E" DETENTION BASIN	40	29	26	80	13	29
58	02-115	EWING INTERCHANGE	40	29	2	80	12	4
59	02-116	LAKE EMILIE	40	20	19	79	49	39
60	02-117	WALDEN WOODS	40	26	40	80	13	28
61	02-118	DUNCAN AVE WEST FLOOD CONTROL	40	34	6	80	1	38
62	02-119	BAYER CORPORATION	40	26	15	80	10	18
63	02-120	PINE HOLLOW DETENTION	40	28	29	80	5	28
64	02-122	LOWER WEST DEER LAKE	40	37	11	79	49	42
65	02-123	UPPER WEST DEER LAKE	40	37	13	79	49	17
66	02-124	NORTH PARK NATURE CENTER	40	37	12	80	1	47
67	02-125	HOLE NO 16 - LOWER	40	30	56	79	53	9
68	02-126	HOLE NO 16 - UPPER	40	30	57	79	53	8
69	02-127	ROCK AIRPORT	40	35	52	79	49	7
70	02-128	ARDMORE RUN DEBRIS BASIN	40	24	45	79	50	42
71	02-129	LAKE MACLEOD	40	40	7	80	0	12
72	02-130	LAKEVIEW FARMS #2	40	39	57	80	0	25
73	02-131	GLENWOOD STORMWATER RETENTION POND	40	26	34	79	45	1
74	02-133	TREES #2	40	39	36	80	1	32
75	02-137	LISOWSKI	40	24	34	80	8	27
76	02-138	CHESWICK ASH POND 303	40	32	40	79	47	37
77	02-139	CHESWICK ASH POND 203	40	32	37	79	47	37
78	02-140	ROUND HILL PARK	40	14	31	79	51	14
79	02-141	LAKEMONT FARMS NO 1	40	20	28	80	7	2
80	02-142	LAKEMONT FARMS NO 2	40	20	23	80	7	6

Table 7.2 – Stormwater Control Facilities Reported for Communities in Allegheny County

FACILITY ID	FACILITY TYPE	YEAR	ADDRESS / LOCATION
CRESCENT-01	Detention - Retention Basin	2001	Laurel Ridge Dr, Crescent Township, PA
CRESCENT-02	Detention - Retention Basin	2001	Laurel Ridge Dr & Purdy Rd, Crescent Township, PA
CRESCENT-03	Detention - Retention Basin	2001	Cloverdale Lane, Crescent Township, PA
CRESCENT-04	Detention - Retention Basin	2001	Cloverdale Lane, Crescent Township, PA
CRESCENT-05	Detention - Retention Basin	unknown	Crescent Blvd Extension, Crescent Township, PA
FINDLAY-01	Detention - Retention Basin	NA	810 Route 30, Imperial, PA
FINDLAY-02	Detention - Retention Basin	NA	810 Route 30, Imperial, PA
FINDLAY-03	Detention - Retention Basin	NA	810 Route 30, Imperial, PA
FINDLAY-04	Wet Pond	NA	810 Route 30, Imperial, PA
FINDLAY-05	Detention - Retention Basin	NA	McClaren Woods Dr, Findlay Twp., PA
FINDLAY-06	Detention - Retention Basin	NA	McClaren Woods Dr, Findlay Twp., PA
FINDLAY-07	Detention - Retention Basin	NA	McClaren Woods Dr, Findlay Twp., PA
FINDLAY-08	Detention - Retention Basin	NA	Industry Dr., Findlay Twp., PA
FINDLAY-09	Detention - Retention Basin	NA	Industry Dr., Findlay Twp., PA
FINDLAY-10	Detention - Retention Basin	NA	Industry Dr., Findlay Twp., PA
FINDLAY-11	Detention - Retention Basin	NA	Enterprise Dr., Findlay Twp., PA
FINDLAY-12	Detention - Retention Basin	NA	Sweeney Dr., Findlay Twp., PA
FINDLAY-13	Detention - Retention Basin	NA	Sweeney Dr., Findlay Twp., PA
FINDLAY-14	Detention - Retention Basin	NA	Sweeney Dr., Findlay Twp., PA
FINDLAY-15	Detention - Retention Basin	NA	Aspen Dr., Findlay Twp., PA
FINDLAY-16	Detention - Retention Basin	NA	Ponderosa Dr., Findlay Twp., PA
FINDLAY-16	Detention - Retention Basin	NA	Ponderosa Dr., Findlay Twp., PA
FINDLAY-18	Detention - Retention Basin	NA	Birch St., Findlay Twp., PA
FINDLAY-19	Detention - Retention Basin	NA	Birch St., Findlay Twp., PA
FINDLAY-20	Detention - Retention Basin	NA	Birch St., Findlay Twp., PA
FINDLAY-21	Detention - Retention Basin	NA	Rodgers Dr., Findlay Twp., PA
FINDLAY-22	Detention - Retention Basin	NA	Rodgers Dr., Findlay Twp., PA
FINDLAY-23	Detention - Retention Basin	NA	Westbrooke Ln, Findlay Twp., PA
FINDLAY-24	Detention - Retention Basin	NA	Valley Green Dr., Findlay Twp., PA
FINDLAY-25	Detention - Retention Basin	NA	Meadow Ln, Findlay Twp., PA
FINDLAY-26	Detention - Retention Basin	NA	Park Edge, Dr., Findlay Twp., PA
FINDLAY-27	Detention - Retention Basin	NA	Pappan Dr, Findlay Twp., PA
FINDLAY-27	Detention - Retention Basin	NA	Pappan Dr, Findlay Twp., PA
FINDLAY-29	Detention - Retention Basin	NA	Lenox Dr, Findlay Twp., PA
FINDLAY-30	Detention - Retention Basin	NA	Robert St., Findlay Twp., PA
FINDLAY-31	Detention - Retention Basin	NA	International Drive, Findlay Twp., PA
FINDLAY-32	Detention - Retention Basin	NA	International Drive, Findlay Twp., PA
FINDLAY-33	Detention - Retention Basin	NA	Solar Drive, Findlay Twp., PA
FINDLAY-34	Wet Pond	NA	Solar Drive, Findlay Twp., PA
FINDLAY-35	Wet Pond	NA	North Campus Drive, Findlay Twp., PA

FACILITY ID	FACILITY TYPE	YEAR	ADDRESS / LOCATION
FINDLAY-36	Detention - Retention Basin	NA	1000 Airport Blvd., Findlay Twp., PA
FINDLAY-36	Wet Pond	NA	North Campus Drive, Findlay Twp., PA
FINDLAY-36	Wet Pond	NA	North Campus Drive, Findlay Twp., PA
FINDLAY-38	Wet Pond	NA	Trotter Ln., Findlay Twp., PA
FINDLAY-39	Wet Pond	NA	Trotter Ln., Findlay Twp., PA
FINDLAY-40	Wet Pond	NA	Moody Road, Findlay Twp., PA
FINDLAY-41	Wet Pond	NA	Moody Road, Findlay Twp., PA
FINDLAY-42	Wet Pond	NA	Youthtowne Rd., Findlay Twp., PA
FINDLAY-43	Wet Pond	NA	Youthtowne Rd., Findlay Twp., PA
FINDLAY-44	Wet Pond	NA	Youthtowne Rd., Findlay Twp., PA
FINDLAY-45	Wet Pond	NA	Queen of Peace Blvd., Findlay Twp., PA
FINDLAY-46	Wet Pond	NA	Burgettstown Rd., Findlay Twp., PA
FINDLAY-47	Detention - Retention Basin	NA	Burgettstown Rd., Findlay Twp., PA
FINDLAY-48	Wet Pond	NA	Clinton Lake Rd., Findlay Twp., PA
FINDLAY-49	Detention - Retention Basin	NA	Birch St., Findlay Twp., PA
FINDLAY-50	Bioretention Basin-Rain Garden	NA	Birch St., Findlay Twp., PA
FINDLAY-51	Bioretention Basin-Rain Garden	NA	Birch St., Findlay Twp., PA
FINDLAY-52	Bioretention Basin-Rain Garden	NA	Birch St., Findlay Twp., PA
FINDLAY-53	Detention - Retention Basin	NA	1000 Airport Blvd., Findlay Twp., PA
FINDLAY-54	Detention - Retention Basin	NA	1000 Airport Blvd., Findlay Twp., PA
FINDLAY-55	Detention - Retention Basin	NA	1000 Airport Blvd., Findlay Twp., PA
FINDLAY-56	Detention - Retention Basin	NA	1000 Airport Blvd., Findlay Twp., PA
FINDLAY-57	Detention - Retention Basin	NA	1000 Airport Blvd., Findlay Twp., PA
FINDLAY-58	Detention - Retention Basin	NA	1000 Airport Blvd., Findlay Twp., PA
FINDLAY-59	Detention - Retention Basin	NA	1000 Airport Blvd., Findlay Twp., PA
FINDLAY-60	Detention - Retention Basin	NA	1000 Airport Blvd., Findlay Twp., PA
FINDLAY-61	Detention - Retention Basin	NA	1000 Airport Blvd., Findlay Twp., PA
FINDLAY-62	Detention - Retention Basin	NA	1000 Airport Blvd., Findlay Twp., PA
FINDLAY-64	Detention - Retention Basin	NA	1000 Airport Blvd., Findlay Twp., PA
FINDLAY-65	Detention - Retention Basin	NA	1000 Airport Blvd., Findlay Twp., PA
FINDLAY-66	Detention - Retention Basin	NA	1000 Airport Blvd., Findlay Twp., PA
FINDLAY-67	Detention - Retention Basin	NA	RIDC Park West Dr., Findlay Twp., PA
FINDLAY-68	Detention - Retention Basin	NA	Technology Dr, Findlay Twp., PA
FINDLAY-69	Detention - Retention Basin	NA	RIDC Park West Dr., Findlay Twp., PA
FINDLAY-70	Detention - Retention Basin	NA	Mercantile Dr., Findlay Twp., PA
FINDLAY-75	Detention - Retention Basin	NA	Meanor St., Findlay Twp., PA
FINDLAY-76	Detention - Retention Basin	NA	750 Aten Rd., Findlay Twp., PA
FINDLAY-77	Detention - Retention Basin	NA	Court St., Findlay Twp., PA
FINDLAY-78	Detention - Retention Basin	NA	Red Deer Ln., Findlay Twp., PA
FINDLAY-79	Detention - Retention Basin	NA	Industry Dr., Findlay Twp., PA
FINDLAY-80	Natural Pond or Wetland	NA	McCaslin Rd. & Clinton Rd., Findlay Twp., PA
FINDLAY-81	Natural Pond or Wetland	NA	McCaslin Rd. &Clinton Enlow Rd., Findlay Twp., PA

FACILITY ID	FACILITY TYPE	YEAR	ADDRESS / LOCATION
FINDLAY-82	Natural Pond or Wetland	NA	Potato Garden Run Rd., Findlay Twp., PA
FINDLAY-83	Natural Pond or Wetland	NA	I-376, Findlay Twp., PA
FINDLAY-84	Detention - Retention Basin	NA	I-576, Findlay Twp., PA
FOREST-01	Detention - Retention Tank	1986	Ashley Court & Ridge Ave, Forest Hills, PA
FOREST-02	Detention - Retention Tank	1993	Cara Lin Drive, Forest Hills, PA
FOREST-03	Detention - Retention Tank	2005	Park Ridge & K Avenue, Forest Hills, PA
FOREST-04	Detention - Retention Tank	1945	B Avenue, Forest Hills, PA
FOX-01	Detention - Retention Basin	1980	Rockwood Drive, Fox Chapel, PA
FOX-02	Detention - Retention Basin	1990	Windmere Drive, Fox Chapel, PA
FOX-03	Detention - Retention Basin	1988	Fair Oaks Drive, Fox Chapel, PA
FOX-04	Detention - Retention Basin	1988	Fair Oaks Drive, Fox Chapel, PA
FOX-05	Detention - Retention Basin	1988	Fair Oaks Drive, Fox Chapel, PA
FOX-06	Detention - Retention Basin	1989	Sweet Water Lane, Fox Chapel, PA
FOX-07	Detention - Retention Basin	1989	Sweet Water Lane, Fox Chapel, PA
FOX-08	Detention - Retention Basin	1989	Old Chapel Trail, Fox Chapel, PA
FOX-09	Detention - Retention Basin	1989	Settlers Ridge Road, Fox Chapel, PA
FOX-10	Detention - Retention Basin	1989	Settlers Ridge Road, Fox Chapel, PA
FOX-11	Detention - Retention Basin	1990	Trillium Lane at Old Mill Road, Fox Chapel, PA
FOX-11	Detention - Retention Basin	1990	Trillium Lane at Old Mill Road, Fox Chapel, PA
FOX-13	Detention - Retention Basin	1990	Trillium Lane, Fox Chapel, PA
FOX-14	Detention - Retention Basin	1990	Trillium Lane, Fox Chapel, PA
FOX-15	Detention - Retention Basin	1990	Trillium Lane, Fox Chapel, PA
FRAZER-01	Detention - Retention Basin	2004	Route 28, Pittsburgh Mills Circle, Frazer Twp., PA
FRAZER-01	Detention - Retention Basin	2004	Village Center Drive, Frazer Twp., PA
MTLEBO-01	Bioretention Basin - Rain Garden	2013	Cedar Boulevard, Mt. Lebanon, PA
MTLEBO-02	Bioretention Basin - Rain Garden	2012	900 Cedar Boulevard, Mt. Lebanon, PA
MTLEBO-03	Detention - Retention Basin	2006	50 Moffett Street, Mt. Lebanon, PA
MTLEBO-04	Detention - Retention Basin	2001	700 Bower Hill Road, Mt. Lebanon, PA
MTLEBO-05	Detention - Retention Basin	1995	700 Bower Hill Road, Mt. Lebanon, PA
MTLEBO-06	Detention - Retention Basin	2002	James Place, Mt. Lebanon, PA
MTLEBO-07	Detention - Retention Basin	2003	1910 Cochran Rd, Mt. Lebanon, PA
MTLEBO-08	Detention - Retention Basin	2014	1551 Washington Rd, Mt. Lebanon, PA
MTLEBO-09	Detention - Retention Basin	2003	1121 Bower Hill Rd, Mount Lebanon, PA
MTLEBO-10	Detention - Retention Basin	2004	410 Cooke lane, Mt. Lebanon, PA
NEVILLE-01	Detention - Retention Basin	2015	5701 Grand Ave., Neville Twp., PA
NEVILLE-02	Detention - Retention Basin	2015	5701 Grand Ave., Neville Twp., PA
NEVILLE-03	Bioretention Basin-Rain Garden	2013	4900 Grand Ave., Neville Twp., PA
NEVILLE-04	Roof-Top Storage	2014	4200 Neville Rd., Neville Twp., PA
NVERSAILLES-01	Detention - Retention Basin	2000	100 Walmart Dr, North Versailles, PA

FACILITY ID	FACILITY TYPE	YEAR	ADDRESS / LOCATION
NVERSAILLES-02	Detention - Retention Basin	1992	625 E. Pittsburgh/McKeesport Rd, N. Versailles, PA
NVERSAILLES-03	Detention - Retention Basin	2010	1716 Lincoln Highway, North Versailles, PA
NVERSAILLES-04	Detention - Retention Basin	2004	1102 Aldi Drive, North Versailles, PA
NVERSAILLES-05	Detention - Retention Basin	2008	120 Mosside Boulevard, North Versailles, PA
NVERSAILLES-06	Detention - Retention Basin	2005	1150 Jacks Run Road, North Versailles, PA
NVERSAILLES-07	Detention - Retention Basin	2007	Luehm Avenue, North Versailles, PA
NVERSAILLES-08	Detention - Retention Basin	2015	1200 denning, North Versailles, PA
NVERSAILLES-09	Detention - Retention Basin	2014	11700 Lincoln Highway, North Versailles, PA
NVERSAILLES-10	Detention - Retention Basin	2002	Jacks Run Road, North Versailles, PA
NVERSAILLES-11	Detention - Retention Basin	2005	Howell St & Horrman Rd, North Versailles, PA
OAKMONT-01	Bioretention Basin-Rain Garden	2014	Hulton Road, Oakmont, PA
OAKMONT-02	Infiltration Device – Rock Sump	2014	Delaware Ave, Oakmont, PA
OAKMONT-03	Bioretention Basin-Rain Garden	2015	Dark Hollow Road, Oakmont, PA
OAKMONT-04	Detention - Retention Basin	2015	Bioretention Basin - Rain Garden
OAKMONT-04	Detention - Retention Basin	2012	College Ave, Oakmont, PA
OHIO-01	Detention - Retention Basin	NA	Village Ct., Ohio Twp., PA
OHIO-02	Detention - Retention Basin	NA	Ascot Dr., Ohio Twp., PA
OHIO-03	Detention - Retention Basin	NA	Brighton Dr., Ohio Twp., PA
OHIO-04	Detention - Retention Basin	NA	Brighton Dr., Ohio Twp., PA
OHIO-05	Detention - Retention Basin	NA	Nicholson Rd., Ohio Twp., PA
OHIO-06	Detention - Retention Basin	NA	Fan Ct., Ohio Twp., PA
OHIO-07	Detention - Retention Basin	NA	Douglas Rd., Ohio Twp., PA
OHIO-08	Detention - Retention Basin	NA	Nicholson Rd., Ohio Twp., PA
OHIO-09	Detention - Retention Basin	NA	Red Mud Hollow Rd., Ohio Twp., PA
OHIO-10	Detention - Retention Basin	NA	Mt Nebo Rd., Ohio Twp., PA
OHIO-11	Detention - Retention Basin	NA	Mt Nebo Rd., Ohio Twp., PA
OHIO-12	Detention - Retention Basin	NA	Mt Nebo Rd., Ohio Twp., PA
OHIO-13	Detention - Retention Basin	NA	Mt Nebo Rd., Ohio Twp., PA
OHIO-14	Detention - Retention Basin	NA	Mt Nebo Rd., Ohio Twp., PA
OHIO-15	Detention - Retention Basin	NA	Mt Nebo Rd., Ohio Twp., PA
OHIO-16	Detention - Retention Basin	NA	Mt Nebo Rd., Ohio Twp., PA
OHIO-17	Detention - Retention Basin	NA	Mt Nebo Rd., Ohio Twp., PA
OHIO-18	Detention - Retention Basin	NA	Bear Run Dr., Ohio Twp., PA
OHIO-19	Detention - Retention Basin	NA	Bear Run Dr., Ohio Twp., PA
OHIO-20	Detention - Retention Basin	NA	Bear Run Dr., Ohio Twp., PA
OHIO-21	Detention - Retention Basin	NA	North Ridge, Ohio Twp., PA
OHIO-22	Detention - Retention Basin	NA	North Ridge, Ohio Twp., PA
OHIO-23	Detention - Retention Basin	NA	Roosevelt Rd., Ohio Twp., PA
OHIO-24	Detention - Retention Basin	NA	Roosevelt Rd., Ohio Twp., PA
OHIO-25	Detention - Retention Basin	NA	Roosevelt Rd., Ohio Twp., PA

FACILITY ID	FACILITY TYPE	YEAR	ADDRESS / LOCATION
OHIO-26	Detention - Retention Basin	NA	Buckingham Dr., Ohio Twp., PA
OHIO-27	Detention - Retention Basin	NA	I-279 Access Rd., Ohio Twp., PA
OHIO-28	Detention - Retention Basin	NA	I-279 Access Rd., Ohio Twp., PA
OHIO-29	Detention - Retention Basin	NA	Kensington Dr., Ohio Twp., PA
OHIO-30	Detention - Retention Basin	NA	Manchester Cir., Ohio Twp., PA
OHIO-31	Detention - Retention Basin	NA	Manchester Cir., Ohio Twp., PA
OHIO-32	Detention - Retention Basin	NA	Manchester Cir., Ohio Twp., PA
OHIO-33	Detention - Retention Basin	NA	Cobblestone Dr., Ohio Twp., PA
OHIO-34	Detention - Retention Basin	NA	Cobblestone Dr., Ohio Twp., PA
OHIO-35	Bioretention Basin-Rain Garden	NA	Josephs Ln., Ohio Twp., PA
OHIO-36	Bioretention Basin-Rain Garden	NA	Josephs Ln., Ohio Twp., PA
OHIO-37	Bioretention Basin-Rain Garden	NA	Josephs Ln., Ohio Twp., PA
OHIO-38	Detention - Retention Basin	NA	Heritage Dr., Ohio Twp., PA
OHIO-39	Detention - Retention Basin	NA	Robin Ct., Ohio Twp., PA
OHIO-40	Detention - Retention Basin	NA	Mt. Nebo Rd., Ohio Twp., PA
OHIO-41	Detention - Retention Basin	NA	Mt. Nebo Rd., Ohio Twp., PA
OHIO-42	Detention - Retention Basin	NA	Mt. Nebo Rd., Ohio Twp., PA
OHIO-43	Detention - Retention Basin	NA	Mt. Nebo Rd., Ohio Twp., PA
OHIO-44	Detention - Retention Basin	NA	Lynhurst Dr., Ohio Twp., PA
OHIO-45	Detention - Retention Basin	NA	Lynhurst Dr., Ohio Twp., PA
OHIO-46	Detention - Retention Basin	NA	Stoner Rd., Ohio Twp., PA
OHIO-47	Detention - Retention Basin	NA	Stoner Rd., Ohio Twp., PA
OHIO-48	Detention - Retention Basin	NA	Glen Ln., Ohio Twp., PA
OHIO-49	Detention - Retention Basin	NA	Toms Run Rd., Ohio Twp., PA
OHIO-50	Detention - Retention Basin	NA	Buckingham Dr., Ohio Twp., PA
OHIO-51	Detention - Retention Basin	NA	Buckingham Dr., Ohio Twp., PA
OHIO-52	Bioretention Basin-Rain Garden	NA	Josephs Ln., Ohio Twp., PA
OHIO-53	Bioretention Basin-Rain Garden	NA	Josephs Ln., Ohio Twp., PA
OHIO-54	Detention - Retention Basin	NA	Josephs Ln., Ohio Twp., PA
OHIO-55	Detention - Retention Basin	NA	Duff, Rd., Ohio Twp., PA
WILKINSBURG-01	Detention - Retention Tank	1980	Lighthouse Point Drive, Wilkinsburg, PA
WILKINSBURG-02	Bioretention Basin-Rain Garden	2011	Wallace Ave, Wilkinsburg, PA

LEVEES

As administrator of the National Flood Insurance Program (NFIP), the Federal Emergency Management Agency (FEMA) completed an inventory of all known levees across Pennsylvania in 2009, known as the Mid-Term Levee Inventory (MLI). The MLI contains levee data gathered first and foremost for structures designed to protect from the 1 percent-annual-chance (100-year recurrence interval) flood event. The area behind a maintained and certified levee that is designed to protect from a 1 percent-annual-chance flood is called a Levee Protected Area. The MLI also frequently includes levees that were not designed to protect against this base flood, but the MLI does not include every levee in every county – especially small levees and agricultural levees not engineered or able to be accredited to the 1 percent-annual-chance event. FEMA's inventory of levees was compiled using all effective Flood Insurance Rate Maps and Flood

Insurance Study reports in Pennsylvania, the USACE levee inventory, the PaDEP's Flood Control Project summaries, information from local governments, aerial photography, and additional information such as news articles and websites.

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 1% annual chance 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. *Map 13 – Regulated Dams and Local Stormwater Control Facilities* shows the locations of these levee and floodwall systems. More specific information about these levee systems can be found in the following Table 7.3.

Table 7.3 - Levee and Floodwall Information for Allegheny County

LEVEE SEGMENT NAME	PRIMARY MUNICIPALITY	OPERATOR	STATUS
Monongahela River Floodwall (Clairton)	City of Clairton	U.S. Steel Corporation	Does not provide 1%-annual-chance protection.
Monongahela River Floodwall System (Duquesne)	City of Duquesne	U.S. Steel Corporation	Does not provide 1%-annual-chance protection.
Little Pine Creek West Floodwall (Midstream)	Borough of Etna	Borough of Etna	Does not provide 1%-annual-chance protection.
Little Pine Creek West Floodwall (Downstream)	Borough of Etna	Borough of Etna	Does not provide 1%-annual-chance protection.
Pine Creek Levee (Left Bank)	Borough of Etna	Borough of Etna	Does not provide 1%-annual-chance protection.
Pine Creek Levee (Right Bank)	Borough of Etna	Borough of Etna	Does not provide 1%-annual-chance protection.
Pine Creek Levee (Downstream)	Township of Shaler	Township of Shaler	Does not provide 1%-annual-chance protection.
Pine Creek Levee System (Upstream)	Township of Shaler	Township of Shaler	Does not provide 1%-annual-chance protection.
Little Pine Creek West Floodwall (Upstream)	Borough of Etna	Borough of Etna	Small protected area shown on FIRM map.

FLOODPLAINS AND FEMA FLOOD HAZARD AREAS

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 *Map 14 – FEMA Flood Map.*

Allegheny County has a long history of flooding problems. Allegheny County has suffered damage from numerous major overbank floods and localized flash flooding from the Allegheny, Monongahela, and Ohio Rivers, along with a large number of their tributaries.

Allegheny County has been, and remains, one of the great industrial areas in the U.S., due in large part to the accessibility of major waterways for transportation of coal, steel, and other products. As such, substantial development has taken place along the major rivers and industrial facilities were situated in the 1-percent-annual-chance floodplain, which has led to many buildings being flooded over the years. In addition to an historic pattern of development occurring in the floodplain, Allegheny County has steep slopes that allow fast runoff from storms, which exacerbates flooding conditions. It is common for bridges and culverts to become blocked with debris and cause backup flooding during a large storm.

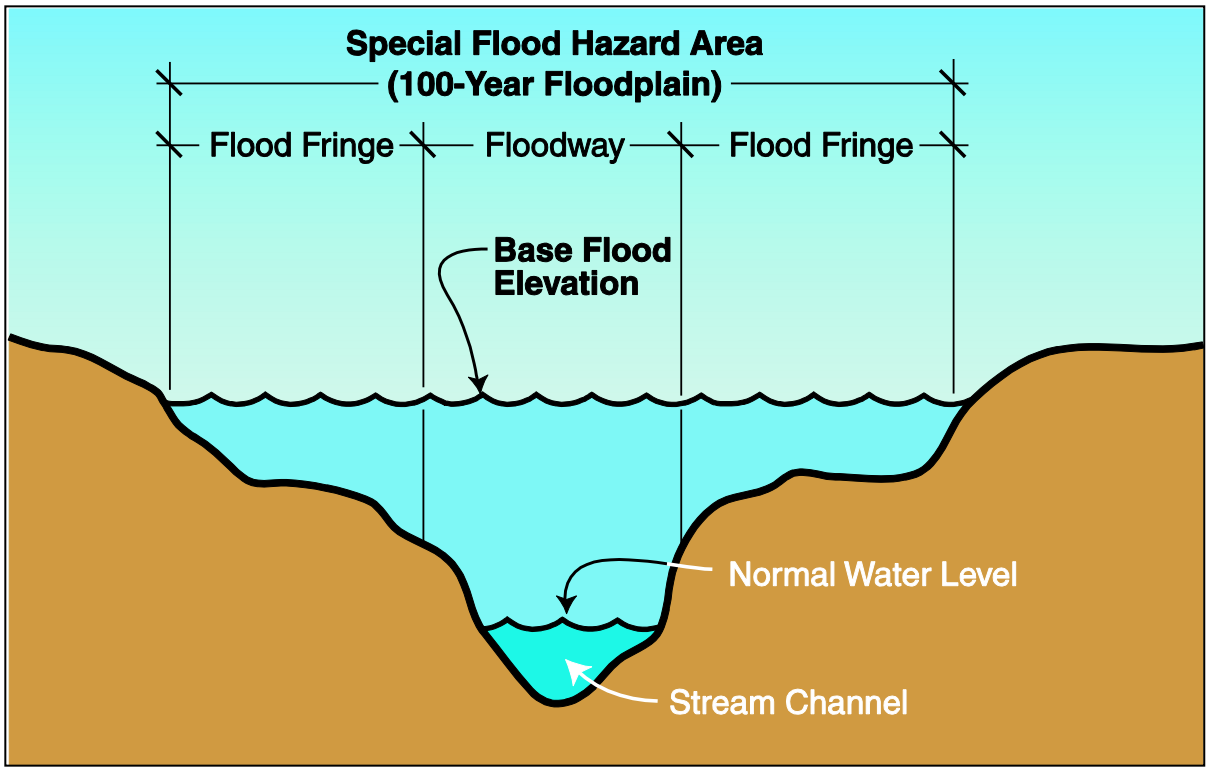
In addition to riverine flooding, there are many tributaries in the County that have experienced flash flooding and present flash flood hazards. The following streams and creeks and their associated tributaries present a recurring flood threat:

- Northwest Sector - Pine Creek, Girty's Run, Brush Creek, and Little Sewickley Creek
- Northeast Sector - Bull Creek, Deer Creek, Lowries Run and Rawlins Run
- East Sector - Plum Creek, Turtle Creek and Dirty Camp Run / Pitcairn
- Southeast Sector – Sawmill Run, Streets Run, Crooked Run, Long Run, and Peters Creek
- Southwest Sector - Chartiers Creek, Robinson Run, Moon Run, McLaughlin Run, Montour Run and Campbells Run

Detailed Studies

There are various levels of detail in floodplain mapping. Detailed studies (Zone AE) on the Flood Insurance Rate Map (FIRM) are conducted at locations where FEMA and communities have invested in engineering studies that define the base flood elevation and often distinguish sections of the floodplain between the floodway and flood fringe. See *Figure 7.1* below for a graphical representation of these terms. For a proposed development, most ordinances state that there shall be no increase in flood elevation anywhere within the floodway. Development within the flood fringe is usually permitted provided that the development will not cumulatively raise that water surface elevation by more than a designated height (set at a maximum of 1').

Figure 7.1. Floodplain Cross Section and Flood Fringe



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 Table 7.4 below.

Table 7.4 - Rivers and Streams in Allegheny County with Detailed Method Studies

River or Stream Name		
Abers Creek	Allegheny River	Bear Run
Becks Run	Big Sewickley Creek	Boston Hollow Run
Boyds Hollow Run	Brush Creek 1	Brush Creek 2
Bull Creek	Campbells Run	Chalfant Run
Chartiers Creek	Chartiers Creek - Diversion Channel	Crouse Run Tributary
Crooked Run	Crouse Run	Douglass Run
Deer Creek	Dirty Camp Run	East Thompson Run
Douglass Run Tributary No 1	Douglass Run Tributary No 2	Gillespie Run
Fallen Timber Run	Georges Run	Graesers Run
Girty's Run	Gourdhead Run	Hoffman Run
Happy Hollow Run	Harts Run	Humms Run
Jacks Run	Leak Run	Lewis Run
Lick Run	Little Bull Creek	Little Deer Run
Little Pine Creek East	Little Pine Creek West	Little Plum Creek
Lobbs Run	Long Run	Lowries Run
McCaslin Run	McClarens Run	McLaughlin Run

River or Stream Name	(continued from above)	
Millers Run	Monongahela River	Montour Run
Montour Run No 1	Moon Run	North Branch
Robinson Run	North Fork Montour Run	Ohio River
Ohio River Back Channel	Painters Run	Peters Creek
Pidgeon Hollow Run	Piersons Run	Pine Creek
Piney Fork	Pitt Street Tributary	Plum Creek
Pucketa Creek	Robinson Run	Rochester Run
Sandy Creek	Saw Mill Run	Saw Mill Run
Scrubgrass Run	South Fork Montour Run	Spring Garden Run
Squaw Run	Squaw Run Tributary No. 1	Squaw Run Tributary No 2
Squaw Run Tributary No 4	Streets Run	Thompson Run
Tributary A	Tributary to Bull Creek	Tributary 1 to Piney Fork
Turtle Creek	Unnamed Stream along Moss Side Boulevard	West Branch Deer Creek
Whiskey Run	Wittmer Run	Wildcat Run
Wylie Run	Youghiogheny River	

Approximate Studies and Non-delineated Floodplains

Approximate studies (Zone A on the FIRM) delineate the flood hazard area, but are prepared using approximate methods that result in the delineation of a floodplain without providing base flood elevations or a distinction between floodway and flood fringe. If no detailed study information is available, some ordinances allow the base flood elevation to be determined based on the location of the proposed development relative to the approximated floodplain; at times, a municipality may find it necessary to have the developer pay for a detailed study at the location in question.

A limitation of FIRMs and older Flood Insurance Rate Maps is the false sense of security provided to homeowners or developers who are technically not in the floodplain, but are still within an area that has a potential for flooding. Headwater streams or smaller tributaries located in undeveloped areas do not normally have FEMA delineated floodplains. This leaves these areas unregulated at the municipal level and somewhat susceptible to uncontrolled development. Flooding due to natural phenomena as well as increased stormwater runoff generated by land development is not restricted only to main channels and large tributaries. In fact, small streams and tributaries may be more susceptible to flooding from increased stormwater runoff due to their limited channel capacities.

PA's Chapter 105 regulations partially address the problem of non-delineated floodplains. Chapter 105 regulations prohibit encroachments and obstructions, including structures, in the regulated floodway without first obtaining a state Water Obstruction and Encroachment permit. The floodway is the portion of the floodplain adjoining the stream required to carry the 100-year flood event with no more than a one foot increase in the 100-year flood level due to encroachment in the floodplain outside of the floodway. Chapter 105 defines the floodway as the area identified by a detailed FEMA study or, where no FEMA study exists, as the area from the stream to 50-feet from the top of bank. These regulations provide a measure of protection for areas not identified as floodplain by FEMA studies.

FIRM Updates

Periodically, FEMA updates the effective FIRMs as new hydrologic and hydraulic data become available and to reflect changes within the community. As new information becomes available, FEMA updates the FIRMs to reflect the best available data and to address any new problem areas. Allegheny County's County-Wide FIRM was recently updated and revised (September 26, 2014), and would not likely be

revised again in the near future. New developments in Allegheny County may cause local floodplain/floodway revisions that would be updated by Letters of Map Revisions (LOMRs).

FLOOD VULNERABILITY AND ECONOMIC IMPACTS

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 Table 7.5 summarizes the findings from this study for Allegheny County.

Table 7.5 - Potential Impact Due to Flooding in Allegheny County (PEMA, 2009).

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 billon
500-Year Storm	12,872	$11.35 billion

Historic flood economic losses can be good predictors of future flood losses. Table 7.6 below 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.

Table 7.6 - NFIP Premium and Coverage and Claims Information (CIS, 2015)

MUNICIPALITY	TOTAL PREMIUM AND COVERAGE	TOTAL AMOUNT OF PAID CLAIMS
Aleppo Township	$1,130,555.00	$1,656.00
Aspinwall Borough	$1,937,569.00	$53,857.00
Avalon Borough	$7,765,599.00	$210,382.00
Baldwin Borough	$1,243,887.00	$4,984.00
Baldwin Township	$1,342,064.00	$129,627.00
Bell Acres Borough	$350,000.00	$8,191.00
Bellevue Borough	$105,000.00	$0.00
Ben Avon Borough	$1,023,706.00	$57,263.00
Ben Avon Heights Borough	$11,545,934.00	$381,237.00
Bethel Park, Municipality of	$2,443,721.00	$11,750.00
Blawnox Borough	$2,852,873.00	$14,369.00
Brackenridge Borough	$794,953.00	$41,963.00

Table 7.6 - NFIP Premium and Coverage and Claims Information (CIS, 2015)		
MUNICIPALITY	**TOTAL PREMIUM AND COVERAGE**	**TOTAL AMOUNT OF PAID CLAIMS**
Braddock Borough	$3,885,621.00	$28,025.00
Braddock Hills Borough	$280,000.00	$0.00
Bradford Woods Borough	$2,488,200.00	$16,673.00
Brentwood Borough	$10,462,228.00	$1,616,711.00
Bridgeville Borough	$30,096,609.00	$3,042,532.00
Carnegie Borough	$5,295,524.00	$180,707.00
Castle Shannon Borough	$280,000.00	$3,618.00
Chalfant Borough	$1,521,717.00	$51,646.00
Cheswick Borough	$3,649,357.00	$104,768.00
Churchill Borough	$95,109.00	$70,348.00
Clairton City	$10,800,525.00	$168,259.00
Collier Township	$11,525,986.00	$74,970.00
Coraopolis Borough	$958,173.00	$77,716.00
Crafton Borough	$1,389,143.00	$487.00
Crescent Township	$168,000.00	$2,902.00
Dormont Borough	$1,217,958.00	$68,543.00
Dravosburg Borough	$280,000.00	$0.00
Duquesne, City of	$7,654,304.00	$58,325.00
East Deer Township	$70,000.00	$0.00
East McKeesport Borough	$1,756,166.00	$143,139.00
East Pittsburgh Borough	$400,352.00	$0.00
Edgewood Borough	$2,032,729.00	$1,319.00
Edgeworth Borough	$3,021,292.00	$277,643.00
Elizabeth Borough	$15,921,785.00	$2,275,651.00
Elizabeth Township	$2,688,945.00	$262,817.00
Emsworth Borough	$26,074,117.00	$5,799,296.00
Etna Borough	$5,487,508.00	$641,762.00
Fawn Township	$4,323,849.00	$68,707.00
Findlay Township	$4,571,079.00	$63,616.00
Forest Hills Borough	$3,121,285.00	$159,664.00
Forward Township	$17,113,138.00	$25,084.00
Fox Chapel Borough	$5,424,869.00	$65,788.00
Franklin Park Borough	$191,000.00	$5,345.00
Frazer Township	$1,833,172.00	$26,077.00
Glassport Borough	$1,533,492.00	$127,530.00
Glen Osborne Borough	$4,947,191.00	$245,979.00
Glenfield Borough	$1,584,369.00	$43,364.00
Green Tree Borough	$12,038,394.00	$1,599,332.00
Hampton Township	$6,458,668.00	$1,193,256.00
Harmar Township	$2,390,140.00	$120,156.00
Harrison Township	$1,752,103.00	$3,749.00
Haysville Borough	$7,367,748.00	$701,823.00
Heidelberg Borough	$1,003,593.00	$0.00
Homestead Borough	$4,870,782.00	$130,552.00
Indiana Township	$339,900.00	$10,832.00
Ingram Borough	$9,749,411.00	$522,921.00
Jefferson Hills Borough	$2,036,139.00	$0.00
Kennedy Township	$2,395,800.00	$416,976.00
Kilbuck Township	$3,568,130.00	$112,522.00

Table 7.6 - NFIP Premium and Coverage and Claims Information (CIS, 2015)		
MUNICIPALITY	**TOTAL PREMIUM AND COVERAGE**	**TOTAL AMOUNT OF PAID CLAIMS**
Leet Township	$18,443,059.00	$29,949.00
Leetsdale Borough	$55,000.00	$0.00
Liberty Borough	$757,284.00	$0.00
Lincoln Borough	$7,860,429.00	$28,089.00
Marshall Township	$20,104,791.00	$668,055.00
McCandless, Town of	$3,176,442.00	$309,461.00
McDonald Borough	$25,338,453.00	$1,884,168.00
McKees Rocks Borough	$7,163,310.00	$458,475.00
McKeesport, City of	$15,451,884.00	$3,896,040.00
Millvale Borough	$18,260,582.00	$307,011.00
Monroeville, Municipality of	$6,202,357.00	$65,862.00
Moon Township	$0.00	$0.00
Mount Lebanon, Municipality of	$15,584,559.00	$41,014.00
Mount Oliver Borough	$0.00	$0.00
Munhall Borough	$1,193,253.00	$3,073.00
Neville Township	$24,758,875.00	$46,602.00
North Braddock Borough	$0.00	$0.00
North Fayette Township	$12,181,637.00	$1,221,606.00
North Versailles Township	$1,391,546.00	$64,900.00
Oakdale Borough	$7,996,032.00	$2,477,073.00
Oakmont Borough	$16,621,655.00	$61,004.00
O'Hara Township	$21,090,938.00	$156,843.00
Ohio Township	$2,478,285.00	$51,503.00
Penn Hills, Municipality of	$11,442,801.00	$223,911.00
Pennsbury Village Borough	$0.00	$0.00
Pine Township	$1,962,881.00	$19,894.00
Pitcairn Borough	$6,862,349.00	$567,908.00
Pittsburgh, City of	$190,228,943.00	$8,533,723.00
Pleasant Hills Borough	$1,295,423.00	$40,684.00
Plum Borough	$9,790,771.00	$789,077.00
Port Vue Borough	$2,315,354.00	$100,868.00
Rankin Borough	$28,000.00	$ 694.00
Reserve Township	$1,162,745.00	$28,133.00
Richland Township	$3,396,716.00	$52,801.00
Robinson Township	$13,208,225.00	$1,141,285.00
Ross Township	$30,561,419.00	$1,090,576.00
Rosslyn Farms Borough	$3,110,697.00	$2,894.00
Scott Township	$15,829,056.00	$276,783.00
Sewickley Borough	$6,758,711.00	$97,850.00
Sewickley Heights	$1,178,831.00	$25,599.00
Sewickley Hills Borough	$1,162,851.00	$0.00
Shaler Township	$32,827,583.00	$3,627,992.00
Sharpsburg Borough	$17,899,284.00	$1,507,064.00
South Fayette Township	$19,082,242.00	$2,903,103.00
South Park Township	$6,110,363.00	$982,524.00
South Versailles Township	$300,418.00	$14,710.00
Springdale Borough	$1,002,880.00	$4,726.00
Springdale Township	$105,000.00	$12,382.00
Stowe Township	$3,630,238.00	$20,745.00

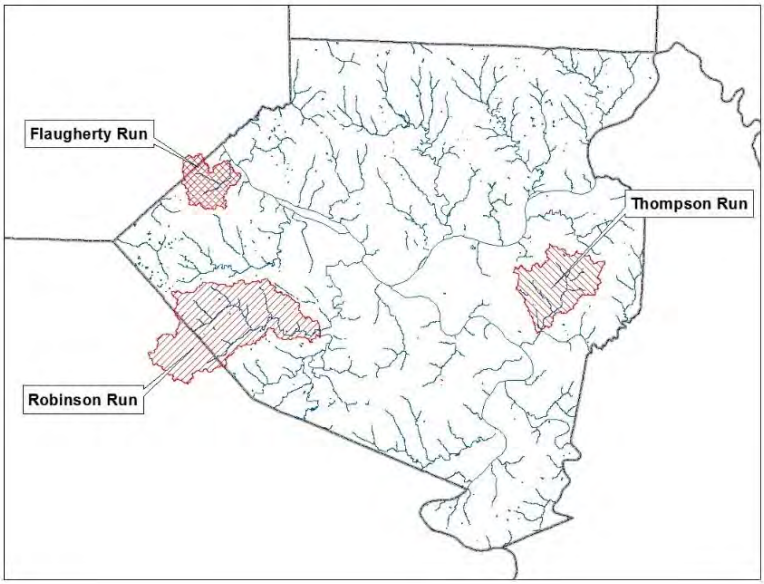
Table 7.6 - NFIP Premium and Coverage and Claims Information (CIS, 2015)		
MUNICIPALITY	**TOTAL PREMIUM AND COVERAGE**	**TOTAL AMOUNT OF PAID CLAIMS**
Swissvale Borough	$1,155,753.00	$0.00
Tarentum Borough	$4,186,072.00	$251,151.00
Thornburg Borough	$2,907,207.00	$7,271.00
Trafford Borough	$3,339,308.00	$175,343.00
Turtle Creek Borough	$5,679,083.00	$1,043,418.00
Upper St. Clair Township	$23,917,217.00	$377,299.00
Verona Borough	$7,965,687.00	$406,242.00
Versailles Borough	$399,346.00	$0.00
Wall Borough	$1,207,874.00	$0.00
West Deer Township	$5,916,340.00	$94,594.00
West Elizabeth Borough	$1,712,412.00	$874,727.00
West Homestead Borough	$455,000.00	$ 382
West Mifflin Borough	$2,039,410.00	$207,439.00
West View Borough	$1,513,421.00	$5,720.00
Whitaker Borough	$0.00	$0.00
White Oak Borough	$3,021,453.00	$47,424.00
Whitehall Borough	$2,388,485.00	$80,330.00
Wilkins Township	$5,048,440.00	$854,158.00
Wilkinsburg Borough	$576,302.00	$4,042.00
Wilmerding Borough	$3,863,150.00	$4,294.00
GRAND TOTAL	**$965,307,573.00**	**$59,795,334.00**

Many areas of stormwater-related flooding in Allegheny County communities, as identified above and in Section 5 (Problem Areas and Obstructions) are not in the SFHA, highlighting the need to look at comprehensive flood management in Allegheny County. This Stormwater Management 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 include acquisition, elevation, and relocation of residential structures in high flood hazard areas and flood proofing of non-residential structures.

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Section 8 – Technical Analysis and Watershed Modeling

TECHNICAL APPROACH



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. 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.

HYDROLOGIC MODEL PREPARATION

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

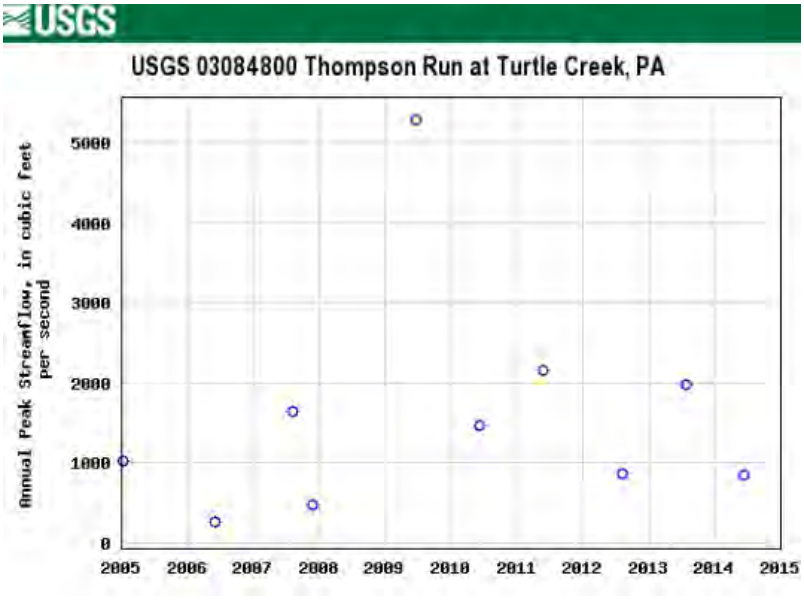
This watershed is located in the eastern region of Allegheny County and is part of the larger Turtle Creek Watershed. Thompson Run flows into Turtle Creek, which then flows to the Monongahela River. The Thompson Run Watershed drains an area of approximately 17.9 square miles, all of which is located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

HYDROLOGIC MODEL PARAMETERS

For HEC-HMS to calculate the runoff volume using the NRCS Curve Number (CN) Runoff method a number of model parameters were developed using the HEC-GeoHMS extension within ESRI ArcGIS. Watershed areas were subdivided to into areas approximately 0.5 square miles in size. A portion of these subdivisions were based on the problem areas discussed within this report. Lag Time was determined as a function of each subbasin's time of concentration using Flow Segment Parameters as outlined in TR55 and are also a function of watershed geometry. The Curve Numbers are determined as a function of soil type and land use. By overlaying these two layers, the hydrologic soil groups are paired with the land use so they can be correlated to the curve number values listed in Urban Hydrology for Small Watersheds TR-55 Table 2-2. These CNs are altered later on during the calibration process so that model results are within a reasonable range which is described in the Model Calibration Section of this report. Optional inputs such as initial abstraction were left as default within the HEC-HMS model.

MODEL CALIBRATION

The HEC-HMS models incorporate a number of user-defined variables to generate runoff hydrographs. Models must be made as accurate as possible by calibrating the model to known events or other reliable hydrologic information. Possible sources of information include stream gage data, high water marks (where detailed survey is available to facilitate hydraulic analysis), and other hydrologic methods. The most desirable source of calibration information is stream gage data as this provides an actual measure of the runoff response of the watershed during real rain events.



USGS Gage 03084800 Data Thompson Run at Turtle Creek, PA
Source: USGS, 2016

There is one USGS stream gage located within the Thompson Run Watershed and no stream gages are located within the Flaugherty Run or Robinson Run watersheds. The following table lists the statistics for the Thompson Run stream gage.

Table 8.1 - USGS Stream Gage Data in the Thompson Run Watershed

USGS Stream Gage No.	Site Name	Drainage Area mi^2	Number of Gage Years at Gage	Used in HEC-HMS Model
03084800	Thompson Run at Turtle Creek, PA	18.0	10	Used

The only gage within the watershed being analyzed for this study is USGS Gage 03085500 the Thompson Run gage. Flow estimates were derived at this gage using the *Bulletin 17B* methodology outlined in USGS (1982). This method produces estimates for storms of all of the frequencies desired in this study (between the 1- and 100-year storm events) for any gage that has more than ten years of data. The Bulletin 17B estimates are generally consistent with predictions from the USGS Regression Equations.

When no stream gage data is available, the next most desirable source of data for purposes of comparison is other hydrologic studies prepared by local, state, or federal agencies. FEMA Flood Insurance Studies (FIS) often provide discharge estimates at specific locations within FEMA floodplains. The estimates provided in FEMA FISs are valid sources for comparison, but should be carefully considered when used for calibration since they are sometimes dependent on outdated data, methodology or focus exclusively on the 100-year storm event for flood insurance purposes. Previous Act 167 analyses can also provide flows that have already been calibrated to known or computed flows in the watershed.

The third available source of information that may be used for calibration is regression equation estimates. The regression equations were developed on the basis of peak flow data collected at numerous stream gages throughout PA. The methodology for developing regression equation estimates within Pennsylvania is outlined in USGS Scientific Investigations Report (SIR) 2008-5102 (USGS, 2008) and USGS Water-Resources Investigations Report 2000-4189 (USGS, 2000). SIR 2008 is the most up-to-date method and takes into account watershed average elevation, forested area, urban area, carbonate (limestone) area, and minor surface water storage features such as small ponds and wetlands. Mean elevation, percent carbonate rock, percent forested, percent urban, and percent storage, the applicable parameters within Allegheny County, were calculated using the USGS StreamStats website (http://streamstats.usgs.gov/pastreamstats/index.asp).

Target flow rates were determined from one of these three sources. The HEC-HMS models were then calibrated to the target flow rates at the overall watershed level, at subwatersheds where significant hydrologic features were identified (e.g., confluences, dams, USGS Gages), at each individual subbasin, and for the range of storm events (1- through 100-year). This approach was used so that a flow value anywhere in the model would compare favorably to the best available data source. The parameters of calibration for the entire overall watershed were the curve number, initial abstractions, lag time, and reach routing coefficients. Detailed calibration results are provided in *Appendix A.*

The following figures (*Figures 8.1 – 8.3*) show the overall watershed calibration results at the outlet of Flaugherty Run, Robinson Run, and Thompson Run. As can be seen, the calibration results are in general agreement with the range of values for other hydrologic studies. Excluding the 1-year event, the

Thompson Run model was within eleven percent (11%) of the USGS gage values; at other calibrations points and throughout the Flaugherty Run and Robinson Run watersheds, the HEC-HMS model was within the standard error for the USGS Regression values. Detailed calibration results and model input are provided in *Appendix A.*

Figure 8.1 - Flaugherty Run Peak Flows

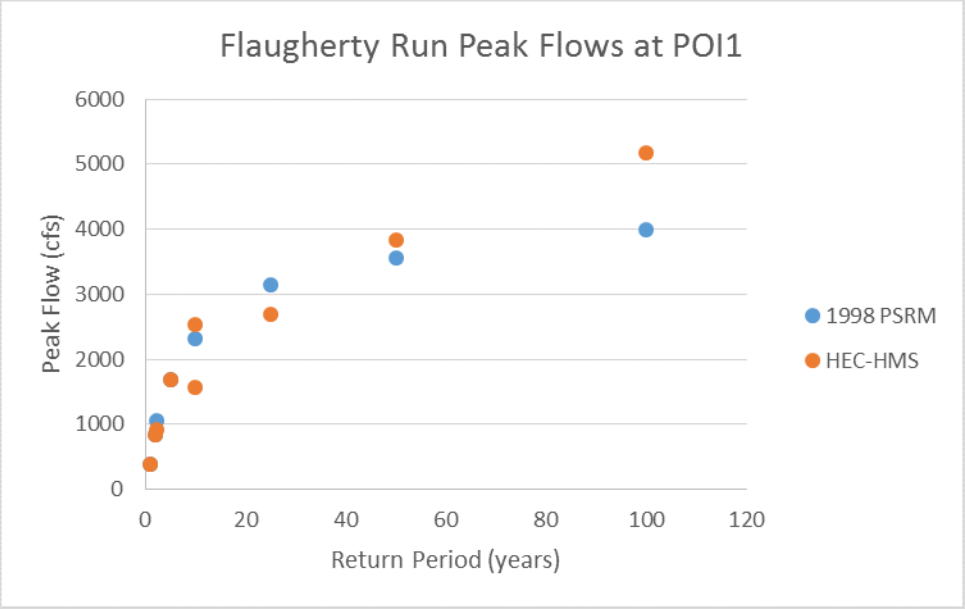


Figure 8.2 - Robinson Run Peak Flows

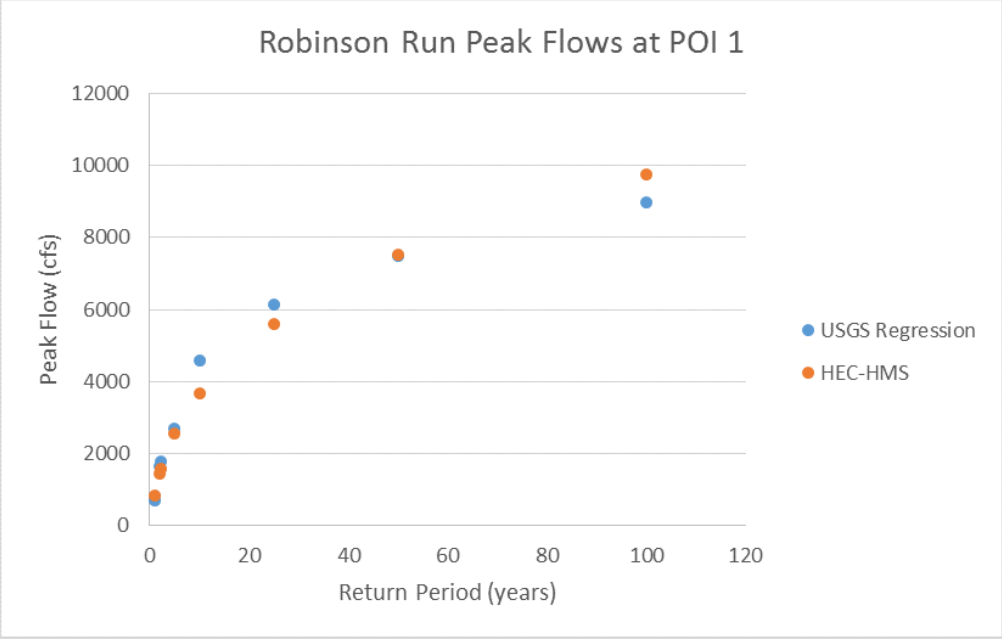
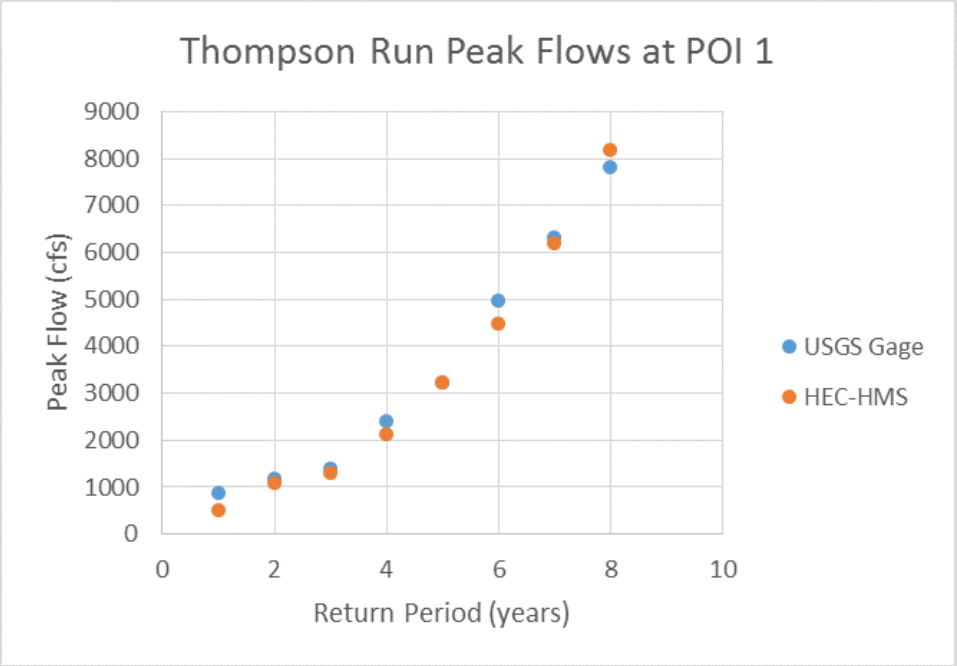


Figure 8.3 - Thompson Run Peak Flows



MODELING RESULTS

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.

The following simulations were performed with HEC-HMS (1, 2, 2.33, 5, 10, 25, 50 and 100-year, 24-hour storm events) for Flaugherty Run, Robinson Run, and Thompson Run:

Existing Conditions (Ex)
An existing conditions model was developed and analyzed using the calibration procedures described above.

Future Conditions with No Stormwater Controls (F-1)
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 Table 6.5. A full listing of the peak flow increase by each subbasin may be found in Appendix A.

Table 8.2 - Future Condition Flows with No Stormwater Management Controls

Storm Event (year)	Effects of Future Condition on Discharges		
	Maximum % Increase in Future Conditions	Average % Increase in Future Conditions[1]	Portion of subbasins with Increase (%)
2	464.5	21.3	27.9
10	263.0	15.1	27.5
25	217.2	13.7	27.5
50	198.4	13.5	27.5
100	180.7	12.7	27.5

Notes: [1] Area weighted averages

STORMWATER MANAGEMENT DISTRICTS

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.

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 Flaugherty 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. Prescribing a stricter than 100% release rate without justification on the non-modeled areas could adversely affect development within that watershed. A 100% release rate minimizes the size of stormwater facilities, while any project larger than one (1) acre will still be required to meet water quality standards set by the PADEP.

As stated above the calculation of release rates and the use of stricter release rates is based on factors that have some uncertainty (timing of projects and growth of community). Areas that were modeled were due to historic flooding and systematic stormwater issues plus growth potential. Urban areas with well-established streambanks typically do not benefit from stricter release rates on smaller developmental projects and could cause an undue burden on the developer. Therefore, prescribing a stricter than 100% release rate without justification on the non-modeled areas could adversely affect development within that watershed. A 100% release rate minimizes the size of stormwater facilities, while any project larger than one (1) acre will still be required to meet water quality standards set by the PADEP.

The standard for un-modeled watershed areas will be that post-construction peak discharge rates be less than or equal to pre-construction levels for 1-year, 2-year, 10-year, 25-year, 50-year, and 100-year storms events. This is in alignment with the state requirements and should not pose any issues in terms of permitting.

In general, this County-Wide Plan features a new, revised stormwater management strategy that is consistent with the PA BMP Manual. Although this strategy still employs detailed hydrologic modeling to determine release rate percentages to control larger storm events for selected watersheds, it does not require the need for detailed modeling in all watersheds contained within the County. The revised stormwater management concepts in the PA BMP Manual acknowledge the importance of addressing less frequent storms. The reduction in total runoff volume for the 2-year storm event required by the PA BMP Manual will effectively manage smaller storms and may provide some peak flow reductions for larger events, while twenty (20) percent of existing impervious area is to be considered meadow in good condition for existing conditions of redevelopment projects. This management strategy, coupled with the application of a 100% release rate for un-modeled areas is anticipated to provide overall, effective management throughout the County. 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 Appendix A - Stormwater Management Districts*.

RECOMMENDATIONS

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.

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 watershed. The stormwater management districts are provided in the *Model Ordinance Appendix A*. 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.

Section 9 – Stormwater Management

TECHNICAL STANDARDS FOR STORMWATER MANAGEMENT

The field of stormwater management has evolved rapidly in recent years as additional research has increased our understanding of how stormwater runoff is interrelated with the rest of our natural environment. Stormwater management practices will continue to evolve as additional knowledge becomes available. Effective resource management involves balancing the positive and negative effects of all potential actions. These actions are considered and the individual management techniques that provide the best known balance are chosen for implementation. The goal of this Plan is to manage stormwater as a valuable resource and to manage all aspects of this resource as effectively as possible. This Plan contains technical standards that seek to achieve this goal through four different methods. These standards are summarized as follows:

1. Peak Discharge Rate Standards – Peak discharge rate standards are implemented primarily to protect areas directly downstream of a given discharge by attenuating peak discharges from large storm events. These standards are also intended to attenuate peak flows throughout the watershed during large storm events. Peak discharge rate controls are applied at individual development sites. Controlling peak discharge rates from the sites entails collection, detention, and discharge of the runoff at a prescribed rate. This is an important standard for achieving stable watersheds.

2. Volume Control Standards – The standards in this PLAN that address increased stormwater volume are intended to benefit the overall hydrology of the watershed. The increased volume of runoff generated by development is the primary cause of stormwater related problems. Increased on-site runoff volume commonly results in a sustained discharge at the designed peak discharge rate as well as an increased volume and duration of flows experienced after the peak discharge rate. Permanently removing a portion of the increased volume from a developed site is key in mitigating these problems and maintaining groundwater recharge levels. Meeting this standard generally involves providing and utilizing infiltration capacity at the development site, although alternative methods may be used.

3. Channel Protection Standards – Channel protection standards are designed to reduce the erosion potential from stormwater discharges to the channels immediately downstream. Even though peak discharge rate controls are implemented for larger design storms, they do not provide controls for the smaller storms. These storms account for the vast majority of the annual precipitation volume. Past research has shown that channel formation in developed watersheds is largely controlled by these small storm events. The increased volume and rate of stormwater runoff during small storms forces stream channels to change in order to accommodate the increased flows. Channel protection standards will be achieved through reduction of the post development 2-year flow to the 1-year predevelopment peak flow.

4. Water Quality Standards – The water quality standards contained in this Plan are meant to provide a level of pollutant removal from runoff prior to discharge to receiving streams. Stormwater runoff can deliver a wide range of contaminants to the receiving stream, which leads to a variety of negative impacts. Water quality standards can be achieved through reducing the source of pollutants and utilizing natural and engineered systems that are capable of removing the pollutants, such as riparian buffers.

Beyond the standards discussed above, other measures may be taken to ensure that stormwater is properly managed. Some of these measures are discussed later in this section. These measures are included as recommendations because they are beyond the regulatory scope of this PLAN; however, municipalities should seriously consider these recommendations.

Stormwater management is an issue that is entwined with land use decisions and has social and economic implications. To maximize the effectiveness of a stormwater management program, a holistic approach is required. Stormwater management should be a consideration in any ordinance decisions that affect how land is used.

CRITERIA FOR 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.

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. The proposed release rates for this Plan fall into two categories:

1. Areas not covered by a Release Rate Map (watersheds not modeled):

   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.

2. Areas covered by a Release Rate Map (This PLAN or previous approved Act 167 Plans):

   For the 1-, 2-, 5-, 10-, 25-, 50-, and 100-year, 24-hour storm events, the post-development peak discharge rates shall 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.

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 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 (GI) 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.

The permanent removal of runoff volume is to be achieved through one of two available computational methods:

1. The *Design Storm Method* (CG-1 in the BMP Manual[4]) is applicable to any size of regulated activity. This method requires detailed modeling based on site conditions.

    A. Do not increase the post-development total runoff volume for all storms equal to or less than the 2-year 24-hour duration precipitation.

    B. At least the first one inch of runoff from new 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 documentation can be provided justifying 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.

    C. For modeling purposes:

        i. Existing (predevelopment) non-forested pervious areas must be considered meadow in good condition.

        ii. 20% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions.

2. The *Simplified Method* (CG-2 in the BMP Manual[4]) 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:

A. Stormwater facilities shall capture at least the first two inches of runoff from all new impervious surfaces.

B. 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 documentation can be provided justifying 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.

C. 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.

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 8%, 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.

CONTROLS FOR ROADWAY PROJECTS

This section on State transportation projects was prepared in close consultation with the Pennsylvania Department of Transportation (PennDOT) and PaDEP. For any State-owned or financed roadway project located in a watershed with an adopted Act 167 Plan, the requirements listed in that Plan shall apply. For any project to be located in any other location of Allegheny County, the requirements of this County-wide Act 167 Plan shall apply.

PennDOT is exempt from complying with municipal ordinances for its roadway projects. Under the Administrative Code, PennDOT has exclusive jurisdiction over all designated State transportation facilities (71 P.S. § 512(a)(10)). The Administrative Code further provides PennDOT with the authority "[t]o mark, build, rebuild, relocate, fix the width of, construct, repair, and maintain State designated highways and transportation facilities and rights of way" and "[t]o superintend, supervise and control the work of constructing, reconstructing, maintaining and repairing State designated highways, and other transportation facilities and rights of way" (71 P.S. §§ 512(a)(8) and (11)). PaDOT's exclusive jurisdiction over transportation facilities is supported by the enabling legislation of the municipalities which exempts

PennDOT projects (53 P.S. §§55103, 65103, 45102, and 46737). The Municipalities Planning Code (MPC, or PA Act 247 of 1968) contains a provision that specifically exempts the application of its provisions to PennDOT projects (53 P.S. §11202). The exemption also extends to ordinances enacted under the NPDES MS4 program. PennDOT has a statewide individual NPDES MS4 permit for its facilities located in regulated urbanized areas and has developed policies to address stormwater runoff associated with its projects to satisfy its obligations under the NPDES MS4 program.

The following language describes PaDOT's responsibilities with regard to implementation of PA Act 167 Plans in Allegheny County and in other parts of the state:

For purposes of this Act 167 Stormwater Management Plan (Act 167 Plan), the standards pertaining to stormwater management facilities for State roadways and associated facilities are provided in Sections 13.7 (Antidegradation and Post Construction Stormwater Management Policy) of PennDOT Publication No. 13M, Design Manual Part 2, as developed, updated, and amended in consultation with PaDEP. DM-2.13.7.B (Policy on Antidegradation and Post Construction Stormwater Management) was developed as a cooperative effort between PennDOT and PaDEP. DM-2.13.7.C (Project Categories) discusses the anticipated impact on the quality, volume, and rate of stormwater runoff. For purposes of this Act 167 Plan, road maintenance activities and bridge replacements on State roadways are regulated under 25 PA Code Chapter 102.

PaDOT's "Antidegradation and Post Construction Stormwater Management Policy" includes guidance that PennDOT considers for its design of projects, and categorizes its projects into four categories or "levels" (Levels 1, 2, 3 and 4). The increased level of projects corresponds to increased runoff and water quality impact generated by the type of project categorized in that level, and each level has one or more stormwater management "targets" assigned.

The linear and narrow nature of highway and roadway corridors creates significant challenges for physically incorporating stormwater management BMPs and facilities within the space constraints, and therefore the policy provides flexibility for whether or not implementation of the stormwater design target is achieved for any given project. State-owned highway and roadway projects typically are designed to balance the need for the transportation facilities to:

- Safely accommodate all roadway and highway users;
- Effectively manage stormwater runoff from roadways and highways to reduce the impacts of peak rate, volume and pollutants on receiving lands and streams; and
- Minimize project costs.

Stormwater systems that cannot be accommodated within the existing State-owned right-of-way for these projects may create the need for State condemnation of additional private properties to expand the right-of-way. Further, the design and construction of additional stormwater systems, and obtaining lands on which to construct them, increase the cost of the transportation project.

Level 1 projects are generally considered roadway "maintenance" projects and therefore Level 1 has no stormwater management "target" and minimal stormwater management consideration as the activities conducted would be working with existing roadways and not expanding the "footprint" of the roadway.

Level 2 projects generally include bridge replacements, turning lanes, and other projects that are considered to have either minimal impact on the rate, volume and water quality of stormwater runoff or

that involve relatively small area of disturbance and area of expansion of impervious cover, and that have very limited space for installing BMPs.

Level 3 generally includes projects that increase capacity of roadways (new roads or additional travel lanes) and are considered to have sufficient impact to the rate, volume and water quality of stormwater runoff to have a more significant stormwater management "target" assigned.

Level 4 provides the most protective stormwater "targets" and applies to any project that discharges to "sensitive areas", which includes High Quality (HQ) and Exceptional Value (EV) waters and wetlands; watersheds with impaired streams; combined sewer overflows; and threatened and endangered species and critical habitat.

Many roadways traverse across natural drainage systems and necessarily concentrate and redirect natural flows and water courses into constructed conveyance systems to pass the runoff under the roadway and protect the travel surface from dangerous runoff from adjacent lands during storm events. These hydrologic alterations of the natural watershed system create additional impacts to down gradient streams. As with other land uses, existing State roadways and highways may contribute to these stormwater runoff, erosion and water quality problems that are currently experienced in Allegheny County.

Given the network of PennDOT roadways within Allegheny County, their drainage systems to streams and watersheds, and the widespread distribution of water quality and watershed management needs throughout Allegheny County, it is important that future State transportation projects consider including provisions to:

- Minimize additional stormwater runoff impacts; and
- Reduce the impacts caused by existing transportation drainage facilities.

Listed below are stormwater management priorities related to State roadways that have been identified through development of County-wide Act 167 Plans. These are provided to assist PennDOT and PaDEP in evaluating and selecting opportunities, when or if they arise, for their inclusion in stormwater management designs for future transportation projects that are not considered road maintenance activities under 25 PA Code Chapter 102:

- *Improve awareness, coordination and communication with municipalities regarding proposed projects.* This priority could be addressed by submittal of stormwater management design plans to the municipality in which the project is to be located providing an opportunity for a 60-day period to comment on the plan and its consistency with this County-Wide Act 167 Plan prior to finalizing the plans.

- *Protect "sensitive areas" from additional stormwater-related impairments.* This priority could be addressed by achieving any or all of the following for Level 3 and 4 projects –

- Permanently remove the net increase in runoff from the 2-year, 24-hour storm from at least all net new impervious area (assuming that at least 20% of the existing impervious area over which new impervious area is being constructed has a ground cover of meadow for pre-construction volume calculations), and consistent with 25 PA Code Chapter 102;

- Apply Level 4 “targets” for all projects located in Allegheny County that discharge within a “sensitive area”; and

- Attempt to remove through infiltration or evapotranspiration at least one-half inch of runoff from the net new impervious area in non-karst areas.

- *Protect downgradient streams and properties from increased flooding and erosion from future projects.* This priority could be addressed by achieving the following peak rate controls for Level 2 (when applicable), 3 and 4 projects, as presented in this County-wide Act 167 Plan:

- For projects located in the watersheds with approved Act 167 watershed Plans, meet or exceed the peak rate control standards (and Predevelopment land cover assumptions).

- For projects located outside of watersheds with approved Act 167 watershed Plans, meet or exceed the post-construction peak flow rates of the predevelopment peak flow rates for the 1-, 2-, 5-, 10-, 25-, 50-, and 100-year, 24-hour storm event (at a minimum).

- *Reduce the occurrence of widespread problems caused by high velocities and erosion from discharges from existing PennDOT outfalls.* This priority could be addressed when a Level 1, 2, 3 outfall by also installing permanent energy dissipation device(s) sufficient to protect the receiving property or stream channel from erosion at the location where discharge leaves the PennDOT drainage feature. For example:

1. Maintain inlet and outlet ditches as far as necessary to achieve free flow of drainage to and from the outlet pipe, while avoiding excessive volume or velocity of water discharged onto private property; and
2. Provide outlet protection or a drop structure for the following locations where outlet velocities exceed the capacity of downstream areas to resist erosion: storm drains, sediment traps, sediment basins, stormwater management basins, temporary slope pipes, ditches or channels (temporary or permanent), etc.
3. *Improve ineffective or insufficient control of stormwater from existing transportation infrastructure.* Older stormwater and drainage systems may not provide the level of stormwater management now known to be required to reduce flooding, erosion and water quality impacts. This priority could be addressed by improving some of the existing conveyance and control infrastructure and making more functional use of available space within the existing right-of-way.

For example:

- When new projects are planned for construction in areas where existing stormwater conveyances or features exist, first evaluate the condition, function and effectiveness of the existing conveyance and/or BMPs and include improvements to address any shortcomings to those features as part of the overall proposed project.

- For limited access highways, cloverleaf areas often are already designed to collect and convey runoff. These could be improved to provide better and more efficient rate, volume, or water quality control. A riser could be added, soils amended, and/or appropriate plantings installed to provide improved stormwater treatment while reducing mowing costs.

- Existing vegetated areas within the right-of-way could be better utilized, such as implementing check dams, biologs, or similar measures along with appropriate plantings to slow down runoff rates, and allow for some volume reduction by either infiltration or evapotranspiration.

- Improvements to or within other existing swales, channels and outfalls could include implementing plunge pools or level spreaders at outfalls to reduce the erosive velocities of discharges; and existing swales and conveyances could be improved with amended soils, check dams, etc.

Pennsylvania Turnpike Commission Projects

For any project to be constructed by the Pennsylvania Turnpike Commission (PTC) within watersheds with approved Act 167 watershed Plans the requirements for PTC projects as discussed in those Plans shall apply. For any project to be located in any other location of Allegheny County, the requirements of this County-wide Act 167 Plan shall apply. Unlike PennDOT, the Pennsylvania Turnpike Commission must comply with the requirements of municipal ordinances. Therefore, projects undertaken by the PTC must be designed to meet the requirements of adopted municipal Act 167 stormwater ordinances within the municipalities in which their future projects are located. As with State-owned roadways and highways, given the PTC roadway within Allegheny County, the existing impacts of this roadway system and its drainage systems to receiving streams and watersheds, and the widespread distribution of water quality and watershed management needs throughout Allegheny County it is important that future PTC projects, whenever possible and to the extent practicable, include provisions to:

- Minimize additional stormwater runoff impacts; and
- Reduce the impacts caused by existing transportation drainage facilities.

In addition, the stormwater management priorities listed above for State transportation projects also relate to PTC projects, in particular:

- *Reduce the occurrence of widespread problems caused by high velocities and erosion from discharges from existing PTC outfalls.*
- *Improve ineffective or insufficient control of stormwater from existing transportation infrastructure.* The other three stormwater management priorities will be addressed by PTC projects through compliance with the municipality's adopted Act 167 ordinance requirements.

BEST MANAGEMENT PRACTICES (BMPS)

There are a number of Best Managements Practices (BMPs) listed in the Pennsylvania Storm Water BMP Manual that are effective in reducing stormwater runoff related flooding. These BMPs fall into one of two categories, structural and non-structural. Non-structural BMPs are considered to be a primary means of stormwater management and typical consist of design practices and recommendations aimed at minimizing the interruption of the natural hydrologic cycle such as minimizing impervious areas. When non-structural practices are unable to meet the regulatory stormwater criteria, it becomes necessary to employ structural practices. Generally, structural BMPs are selected to address specific stormwater issues, namely peak discharge and volume.

Non-Structural BMPS

Non-Structural BMPS typically fall into one of six categories according to the Pennsylvania BMP Manual:

- Protect Sensitive and Special Value Features
- Cluster and Concentrate
- Minimize Disturbance and Minimize Maintenance
- Reduce Impervious Cover
- Disconnect/Distribute/Decentralize
- Source Control

A brief description each of these categories follows. For a more detailed look into each type of feature and their pro and cons, refer to the Pennsylvania BMP Manual.

Protect Sensitive and Special Value Features

This type of BMP seeks to avoid affecting and encroaching upon sensitive areas with important stormwater functional values such as floodplains, wetlands, and riparian areas. This avoidance occurs on a site-by-site basis and on an area wide basis. Development in areas where sensitive/special value resources exist should be avoided so that their valuable natural functions are not lost, thereby substantially increasing stormwater impacts. Resources may be weighted according to their functional values specific to their municipality and in the context of the total watershed.

Cluster and Concentrate

The cluster and concentrate approach seeks to maximize undisturbed open space by holding density constant and reducing lot size and disturbed area. An example of this would be to situate the homes in a proposed development in such a way as to reduce the area of roadway required to access them and avoid disturbing natural features such as riparian areas, e.g. conservation subdivisions or cluster development.

Minimize Disturbance and Minimize Maintenance

This from of BMP in development essentially maintains the building program while reducing site grading, removal of existing vegetation and total soil disturbance. This eliminates the requirement for re-establishment of a new high maintenance landscape, such as lawns, for the site. Additionally, this can also be accomplished by modifying the proposed road system and other relevant infrastructure as well as the building location and elevations to better fit the existing topography.

Reduce Impervious Cover

An example of reducing impervious cover is minimizing street areas by reducing street widths and lengths in the design process.

Disconnect/Distribute/Decentralize

Traditionally, the rapid conveyance of rooftop runoff away from building structures has been encouraged to minimize issues such as surface ponding and potential ice formation. This creates a situation where both volume and peak discharge are increased while infiltration is reduced. This type of BMP seeks to minimize stormwater volume leaving the property in question by disconnecting roof leaders and directing

rooftop runoff to vegetated areas intended to slow down and infiltrate the flows. Allegheny County has partially accomplished this by mandating the disconnection of gutter systems from sanitary sewer lines.

Source Control

Source control strives to improve the quality of stormwater discharge by reducing the water pollutant load. An example of this would be to use of one of several modes of sweeping equipment (e.g., mechanical, regenerative air, or vacuum filter sweepers) on a programmed basis to remove larger debris material and smaller particulate pollutants, preventing this material from clogging the stormwater management system and washing into receiving waterways/waterbodies.

Structural BMPS

Structural BMPS fall into one of five categories according to the Pennsylvania BMP Manual:

- Volume/Peak Rate Reduction by Infiltration BMPs
- Volume/Peak Rate Reduction BMPs
- Runoff Quality/Peak Rate BMPs
- Restoration BMPs
- Other BMPs

A brief description each of these categories follows. For a more detailed look into each type of feature and their pro and cons, refer to the Pennsylvania BMP Manual.

Volume/Peak Rate Reduction by Infiltration BMPs

There are a number of structural BMPs with goals of rate reduction and infiltration of stormwater; one of which is previous pavement. Pervious pavement consists of a permeable surface course underlain by a uniformly-graded stone bed which provides temporary storage for peak rate control and promotes infiltration. The surface course may consist of porous asphalt, porous concrete, or various porous structural pavers laid on un-compacted soil.

A second option in this category is an infiltration basin. Infiltration basins are shallow impoundments that store and infiltrate runoff over a level, un-compacted permeable soil bed.

Subsurface Infiltration Beds work on the same principal by providing temporary storage and infiltration of stormwater runoff by placing storage media beneath the proposed surface grade. Properly selected vegetation will help to increase the amount of evapotranspiration taking place.

An Infiltration Trench consists of a perforated or porous pipe in a stone filled trench with a level bottom. An Infiltration Trench may be used as part of a larger storm sewer system, such as a relatively flat section of storm sewer, or it may serve as a portion of a stormwater system for a small area, such as a portion of a roof.

Rain Gardens, also referred to as bioretention, is an excavated shallow surface depression planted with specially selected native vegetation to treat and capture runoff.

Volume/Peak Rate Reduction BMPs

Examples of Volume/Peak Rate Reduction BMPs include capture a reuse systems and vegetated roof cover. Capture and Reuse encompasses a wide variety of water storage techniques designed to withhold precipitation, for a period of time, and reuse the water. Heavy rainfall may require slow release over time. A water budget must be developed to ensure that the water will be used to allow for more runoff capture

Vegetated roof cover is a veneer of vegetation that is grown on and completely covers an otherwise conventional flat or pitched roof, endowing the roof with hydrologic characteristics that more closely match surface vegetation than the roof. The overall thickness of the veneer may range from 2 to 6 inches and may contain multiple layers, consisting of waterproofing, synthetic insulation, non-soil engineered growth media, fabrics, and synthetic components. Vegetated roof covers can be optimized to achieve water quantity and water quality benefits. Through the appropriate selection of materials, even thin vegetated covers can provide significant rainfall retention and detention functions

Runoff Quality/Peak Rate BMPs

A broad spectrum of BMPs have been designed to remove non-point source pollutants from runoff as a part of the runoff conveyance system. These structural BMPs vary in size and function, but all utilize some form of settling and filtration to remove particulate pollutants from stormwater runoff, a difficult task given the concentrations and flow rates experienced. Regular maintenance is critical for this type of BMP. Many water quality filters, catch basin inserts and hydrodynamic devices are commercially available. They are generally configured to remove particulate contaminants, including coarse sediment, oil and grease, litter, and debris. Example of these include constructed wetlands, wet pond/retention basins and dry extended detention basins

Constructed Wetlands are shallow marsh systems planted with emergent vegetation that are designed to treat stormwater runoff.

Wet pond/Retention Basins are stormwater basins that include a substantial permanent pool for water quality treatment and additional capacity above the permanent pool for temporary runoff storage.

A dry extended detention basin is an earthen structure constructed either by impoundment of a natural depression or excavation of existing soil, that provides temporary storage of runoff and functions hydraulically to attenuate stormwater runoff peaks. The dry detention basin, as constructed in countless locations since the mid-1970's and representing the primary BMP measure until now, has served to control the peak rate of runoff, although some water quality benefit accrued by settlement of the larger particulate fraction of suspended solids. This extended version is intended to enhance this mechanism in order to maximize water quality benefits.

Restoration BMPs

Restoration BMPs are intended to reestablish areas to more natural condition which is ultimately more beneficial for stormwater hydraulics and hydrology. Examples of these include riparian buffers, landscape restoration, soil amendment/restoration and floodplain restoration

A riparian buffer is a permanent area of trees and shrubs located adjacent to streams, lakes, ponds, and wetlands. Riparian forests are the most beneficial type of buffer in that they provide ecological and water

quality benefits. Restoration of this type of habitat is in response to past activities that may have eliminated any vegetation.

Landscape Restoration is the general term used for actively sustainable landscaping practices that are implemented outside of riparian (or other specially protected) buffer areas. Landscape Restoration includes the restoration of forest (i.e. reforestation) and/or meadow and the conversion of turf to meadow. In a truly sustainable site design process, this BMP should be considered only after the areas of development that require landscaping and/or revegetation are minimized. The remaining areas that do require landscaping and/or revegetation should be driven by the selection and use of vegetation, such as native species, that does not require significant maintenance.

Soil amendment and restoration is the process of improving disturbed soils and low organic soils by restoring soil porosity and/or adding a soil amendment, such as compost, for the purpose of reestablishing the soil's long-term capacity for infiltration and pollution removal.

Floodplain restoration tries to mimic the interaction of groundwater, stream base flow, and root systems under pre-development conditions. The interaction among the stream's base flow, groundwater, permeable floodplain soils, and riparian root zones provides multiple benefits, including the filtering of sediments and nutrients through retention of frequent high flows onto the floodplain, removal of nitrates from groundwater, reduction of peak flow rates, groundwater recharge/infiltration, and increase of storage and reduction of flood elevations during higher flows. Floodplain restoration as a BMP should be considered where there is minimal interaction among the key components. Other benefits of this BMP include thermal cooling of the stream base-flow, improved benthic community species diversity and habitat, re-establishment and significant increases of wetland areas and native plant species on the floodplain, reduction of invasive plant species, and increased aquatic habitat and riparian areas.

Other BMPs

Other BMPS can include measures such as Level Spreaders that reduce the erosive energy of concentrated flows by distributing runoff as sheet flow to stabilized vegetative surfaces. Level Spreaders, of which there are many types, may also promote infiltration and improved water quality. The category can also include areas such as parking lots and rooftops that are primarily intended for other uses but that can be designed to temporarily detain stormwater for peak rate mitigation.

LOW-IMPACT DEVELOPMENT AND GREEN INFRASTRUCTURE

Low-Impact Development (LID) is an approach to land development that uses various land planning and design practices and technologies to simultaneously conserve and protect natural resource systems and reduce infrastructure costs (HUD, 2003). As the term applies to stormwater management, LID is an approach to managing stormwater in a manner that mimics the natural hydrologic regime by managing rainfall at the source using uniformly distributed, decentralized, micro-scale controls (Low Impact Development Center, 2007). LID, which includes Green Infrastructure (GI), is an important tool for land development because urbanization has altered the natural landscape and affected the hydrologic cycle. Where the natural hydrologic cycle maintains a balance of water circulation through evaporation, precipitation, infiltration/groundwater recharge, and absorption and transpiration by plants, urbanization has resulted in an altered hydrologic cycle through construction of impervious surfaces such as buildings, roads and parking lots. The amount of groundwater recharge has been reduced while the volume and rate of runoff has been increased (City of Philadelphia, 2014). These concepts are the origin of many of the strategies identified to achieve the goals presented in this Plan. GI employs multiple processes to design

a hydrologically functional site which mimics the existing conditions of the site (City of Lancaster, 2011) including: infiltration, evaporation/transpiration, and rainwater capture and re-use.

As a comprehensive technology-based approach to managing stormwater, LID has developed significantly since its inception in terms of policy implementation and technical knowledge. The goals and principles of LID, as described in *Low-Impact Development Design Strategies* (Prince Georges County, 2000) are defined as follows:

- Provide an improved technology for environmental protection of receiving waters.
- Provide economic incentives that encourage environmentally sensitive development.
- Develop the full potential of environmentally sensitive site planning and design.
- Encourage public education and participation in environmental protection.
- Help build communities based on environmental stewardship.
- Reduce construction and maintenance costs of the stormwater infrastructure.
- Introduce new concepts, technologies, and objectives for stormwater management such as micromanagement and multifunctional landscape features (bioretention areas, swales, and conservation areas); mimic or replicate hydrologic functions; and maintain the ecological/biological integrity of receiving streams.
- Encourage flexibility in regulations that allows innovative engineering and site planning to promote smart growth principles.
- Encourage debate on the economic, environmental, and technical viability and applicability of current stormwater practices and alternative approaches.

The overall design concepts and specific design measures for BMPs are derived from the following conceptual framework (Prince Georges County, 2000):

1. The site design should be built around and integrate a site's pre-development hydrology;
2. The design focus should be on the smaller magnitude, higher frequency storm events and should employ a variety of relatively small Best Management Practices (BMPs);
3. These smaller BMPs should be distributed throughout a site so that stormwater is mitigated at its source;
4. An emphasis should be given to non-structural BMPs; and
5. Landscape features and infrastructure should be multifunctional so that any feature (e.g., roof) incorporates detention, retention, filtration, or runoff use.

The LID process, including GI such as infiltration basins, pervious pavement, tree trenches, rain gardens, etc., is meant to provide an alternative approach to traditional stormwater management. *Table 9.1* highlights the difference between the two approaches. These concepts, as they apply to stormwater, are the basis for the stormwater management approach presented in this Plan.

Table 9.1. Comparison of LID Versus Traditional Stormwater Management Approach

LID Approach		Traditional Approach	
Approach	**Examples**	**Approach**	**Examples**
1. Integration of Pre-Development Hydrology	A development built around a drainage way outside of the functional floodplain. Preserving natural drainage features and storage areas.	Elimination of all water features from project site	Redirection and conveyance of drainage; alteration of floodplain to meet site design
2. Emphasis on smaller magnitude, higher frequency storm events	Several small BMPs (e.g. rain gardens, infiltration basins)	Large stormwater ponds and facilities that focuses on 10 and 100-year events	A single stormwater pond
3. Stormwater to be mitigated at source	BMPs located near buildings, within parking lot islands (e.g. tree trenches, stormwater bump-outs and planters)	Stormwater to be conveyed to low point in site	A single stormwater pond
4. Use simple, non-structural BMPs	Narrower drive ways, conservation easements, impervious disconnection	Use of pipe and stormwater ponds	A single stormwater pond
5. Use of multifunctional landscape and infrastructure	Green roofs, rain gardens in parking lot islands	Stormwater and site feature kept as separate as possible	No consideration given

When implemented at the site level, LID has been found to have a beneficial impact on water quality and in reducing peak flows for more frequent storm events (Bedan and Clausen, 2009; Hood et. al., 2007). There are numerous case studies and pilot projects that emphasize similar findings about the benefits of site level development and of specific LID BMPs (EPA, 2000; PaDEP, 2006; Low Impact Development Center, 2009).

When implemented at the watershed level, as proposed in this Plan, there are quantifiable benefits in terms of reduced peak discharges coming from future developments. The approach of considering water quality and existing condition hydrology will help address documented stream impairments (as described in *Section 6*). Additionally, adopting a LID approach that includes GI will help alleviate the economic impact of the additional regulations proposed in the Model Ordinance (as discussed in *Section 8*).

LID SITE DESIGN

The basic principles and concepts of LID as they relate to stormwater management, as well as some of the benefits of implementing LID stormwater management practices, were described in the previous

section. In addition, there are many non-stormwater LID site design and Green Infrastructure (GI) practices that also can have a very positive impact on a stormwater management program.

Development can alter the natural landscape with human infrastructure like buildings, roads, sidewalks, parking lots, and other impervious surfaces. As previously discussed, all of these "improvements" alter the natural hydrology of a site and generate increased runoff. LID site design concepts include reducing impervious surface area, minimizing the amount of natural area disturbed during development, decentralizing stormwater management facilities, and generally attempting to minimize the effects of development on natural resources. Stormwater management can be improved by encouraging use of additional LID site design practices, as described below.

LIMIT IMPERVIOUS COVER

Increased impervious area within a watershed is a direct contributor to increased storm flows and decreased water quality. Research in recent years has consistently shown a strong relationship between the percentage of impervious cover in a watershed and the health of the receiving stream (EPA, 2010). Various studies have indicated that as overall watershed imperviousness approaches ten percent, biological indicators of stream quality begin to show degradation. Limiting impervious cover is one method of reducing the impact of development on the hydrologic cycle.

Recommendations to Limit Impervious Cover

Some alternative development approaches within the LID approach include cluster development, reduction in street widths, reduction in parking space requirements (number and/or sizes), and creating a maximum impervious percentage on individual lots. Some specific elements within the LID framework include the following:

- **Preserve Natural Drainage Features.** Protecting natural drainage features, particularly vegetated drainage swales and channels, is desirable because of their ability to infiltrate and attenuate flows and to filter pollutants. However, this objective is often not accomplished in land development. In fact, commonly held drainage philosophy encourages just the opposite pattern - streets and adjacent storm sewers typically are located in the natural headwater valleys and swales, thereby replacing natural drainage functions with a completely impervious system. As a result, runoff and pollutants generated from impervious surfaces flow directly into storm sewers with no opportunity for attenuation, infiltration, or filtration. Developments designed to fit site topography also minimizes the amount of grading on site.

- **Road Widths** – These are usually specified based on the anticipated road use category (e.g., major, minor, or collector). Most ordinances assume a standard 12-foot wide travel lane and add width for shoulders, parking lanes, bicycle lanes, and other considerations. Reducing the travel lane width to eleven (11) feet for minor roads (e.g., roads within a subdivision development) could reduce the impervious cover of those roadways by up to eight percent.

- **On-Street Parking** – Parking lanes are often specified to be eight or ten feet wide. Standardizing the maximum width of these lanes to eight feet would reduce runoff. Also, limiting parking to one side of a street, particularly in subdivisions, could result in a significant reduction in total runoff. Another option would be to require that the parking lanes be constructed of pervious pavement, grid blocks or another pervious surface.

- **Sidewalks** – In instances where ordinances require sidewalks, consideration should be given to only requiring them on one side of the street in order to reduce impervious cover. Also,

sidewalks should be separated from the roadway surface by a "green strip" (e.g., grass or shrubs) to allow runoff from the impervious surface an opportunity to infiltrate before entering the roadway drainage system. In fact, the sidewalks could, in some instances, be laid out so that they do not parallel the roadway, providing even greater opportunity for infiltration.

- **Curb and Gutter Systems with Storm Sewers –** In heavy residential areas, many ordinances require the developer to install curb and gutters along roadways as well as to use inlets and storm sewers to remove and transport the runoff from the roads. Ordinances should be modified to allow roadside swales, providing additional infiltration opportunity and some water quality benefit through filtration. This option would have the added benefits of significantly reducing development costs and minimizing future maintenance requirements.

- **Parking Requirements and Parking Stall Dimensions** – Consideration should be given to reducing the number of parking spaces that must be provided on-street or in parking lots for residential, commercial, educational, and industrial developments. Furthermore, stall sizes in parking lots should be set to 8.5-feet wide by 18-feet long. In addition, consideration could be given to requiring that larger parking lots establish special areas for compact cars with stall sizes reduced to 8-feet wide by 15-feet long. Finally, the ordinances should include requirements for a minimum amount of "green space" in parking lots which should allow runoff from the impervious surfaces to flow over them so that infiltration and water quality filtration would be enhanced.

- **Lot Sizes and Total Impervious Cover** – Most ordinances establish minimum lot sizes for various types of development and the number of "units" permitted on each lot. There are times the ordinances do not limit the amount of impervious cover that can be built on a specific lot, particularly in residential developments. Limits should be established and those limits should be used in determining the "post-development" runoff condition when designing the proposed storm water management systems. In addition, requirements should be established for the minimum amount of "green space" that should be provided in commercial, educational, and industrial developments. These "green spaces" should be designed so that runoff from the impervious surfaces can flow over them to the maximum extent practical.

- **Lot Setbacks** – There are at least two schools of thought regarding lot setbacks as they relate to stormwater management: 1) Minimizing lot setbacks reduces driveway lengths and, thereby, reduce total impervious cover, and 2) Maximizing lot setbacks will allow runoff from impervious surfaces (e.g., roof tops) greater opportunity to infiltrate prior to reaching roadway drainage systems. Either method can be beneficial as long as the method works in coordination with other Ordinance requirements.

- **Use of Permeable Paving Materials** – These materials include permeable interlocking concrete paving blocks or porous bituminous concrete. These materials should be considered as alternatives to conventional impermeable paving surfaces. Permeable paving is ideal for low traffic areas such as driveways, alleys, overflow parking, etc.

LIMIT DISTURBANCE OR COMPACTION OF TOPSOIL

Topsoil is an absorbent top layer that provides significant stormwater management functions through the initial abstraction process. During rainfall events, no runoff occurs until the topsoil becomes saturated and the initial holding capacity of the soil is exceeded. The void spaces in undisturbed topsoil can provide significant water storage. The ability for initial abstraction can alter drastically from one

soil type to another or because of varied site conditions. Soil compaction plays a significant role in the ability of a given soil type to hold water. As topsoil is disturbed or compacted, the holding capacity of the soil is drastically reduced, thus limiting its effectiveness in reducing runoff. Previous studies (Gregory et al., 2006) have shown that compacted pervious area effectively approaches the infiltration behavior of an impervious surface.

Recommendations for Topsoil Management

- **Adopt topsoil management ordinance language.** The area of disturbance during the construction phase of a project should be limited to the minimum area necessary to complete the project. This provides the dual benefit of limiting erosion during construction and improving PCSM.
- **Adopt ordinance provisions that limit soil compaction where possible.** Areas that are not disturbed should be protected from compaction by construction activities to the maximum extent practicable. These areas should be designated on site plans, demarcated and protected by in-field measures. This is especially important for areas intended for infiltration-based stormwater management facilities.

IMPEDIMENTS TO LID IMPLEMENTATION

The LID concept has been around for a long time, but has been slow to catch on in mainstream implementation. In an effort to assess the impediments to LID in the Chesapeake Bay portion of Virginia, Lassiter (2007) identified and ranked several impediments to LID implementation. The two most important impediments identified were: 1) lack of education about the LID concept, and 2) existing development rules that conflict with LID principles.

While many existing municipal regulations were developed to provide adequate infrastructure to meet the needs of growing communities, these standards often encourage the use of unnecessary impervious surfaces, such as extra-wide streets in small residential areas, parking spaces for "worst-case scenarios" that get used only a few times a year, and dead-end sidewalks. Municipalities are encouraged to review their ordinances for regulations that conflict with LID and revise them to encourage the use of LID site design. There are many direct economic, environmental, aesthetic, and social benefits for a municipality adopting LID-friendly ordinances.

Recommendations to Remove Impediments to LID Implementation

- **Provide education activities and training workshops to various stakeholder groups.** Municipal and county officials should be encouraged to obtain additional education on LID practices. Other stakeholders, such as developers, builders, and homeowners, should also have educational resources available to increase awareness and encourage implementation of LID practices. Education is the key to successful implementation of LID practices.
- **Promote guidance documents.** There are a variety of publications and internet sites that discuss LID and GI and offer design solutions: Low Impact Development Center (2009), PaDEP (2006), City of Lancaster (2011), and Prince George's County (1999). These resources, along with this Plan, should be made available through municipal offices, websites, or training sessions.
- **Update Zoning and Subdivision and Land Development Ordinances to include standards, requirements, and procedures for Low Impact Development.** The *Stormwater Ordinance Review* (U of Pittsburgh Environmental Law Clinic for 3 Rivers Wet Weather, Inc., 2013) studied barriers and facilitators to green infrastructure and LID in Allegheny County. The report is available at http://www.3riverswetweather.org/municipalities/municipal-tools (Stormwater Ordinance Review Report). They found that the ordinances of many municipalities did not encourage LID and

GI implementation but rather contain barriers to LID and GI and therefore work against good stormwater management. The report provides detailed recommendations on how to modify ordinances to encourage LID and GI.

Following adoption of the Model Stormwater Management Ordinance, municipalities should review their existing land use ordinances and update them as required to implement the LID recommendations of the PLAN. Some zoning techniques that can provide flexibility for LID include overlay zoning, cluster development, conservation zoning and more flexible setback, parking and other requirements. The subdivision and land development ordinance and/or public improvements code should also be reviewed and updated as required to ensure that appropriate requirements, standards, and specifications for public and private improvements are included.

- **Provide Incentives for LID Implementation.** Municipalities should also consider providing incentives to encourage LID such as density bonuses.

- **Keep an inventory of LID efforts to help provide County-specific experience recommendations and a list of successful BMP installation.** While considerable documentation exists on specific BMPs (e.g. National Research Council, 2008; PaDEP, 2006), very little data on the effectiveness of certain BMPs exists for projects in Western Pennsylvania. One of the local agencies embracing the inventorying of local projects with design details, implementation experiences, and documented results would greatly assist developers and design professionals in distinguishing between what does and does not work in Allegheny County.

IMPLEMENTATION OF STORMWATER MANAGEMENT CONTROLS

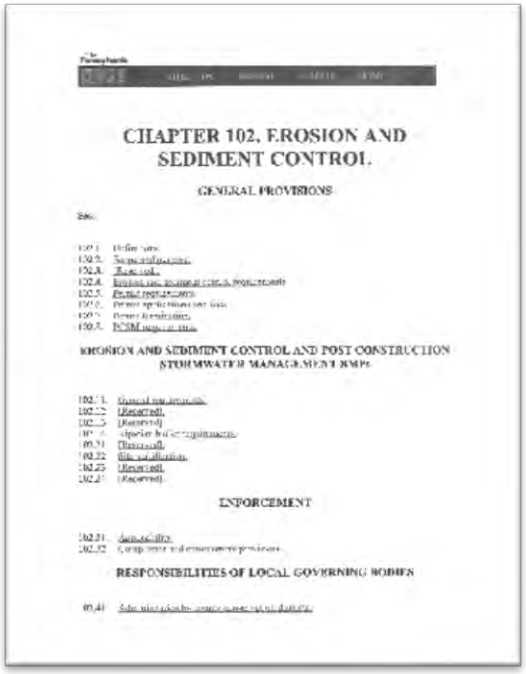
From a regulatory perspective, the standards and criteria developed in this PLAN will be implemented through municipal adoption of the Model Stormwater Management Ordinance (Model Ordinance) developed as part of the Plan. The Model Ordinance contains provisions to realize the standards and criteria outlined in this section. Providing uniform stormwater management standards throughout the County is one of the stated goals of this PLAN. This goal will be achieved through adoption of the Model Ordinance by all of the municipalities in Allegheny County.

From the practical development viewpoint, the stormwater management controls will be put into practice 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.

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Section 10 –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.



CHAPTER 102. EROSION AND SEDIMENT CONTROL

GENERAL PROVISIONS

EROSION AND SEDIMENT CONTROL AND POST CONSTRUCTION STORMWATER MANAGEMENT BMPs

ENFORCEMENT

RESPONSIBILITIES OF LOCAL GOVERNING BODIES

FEDERAL REGULATIONS

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. An overview of these regulations is provided below in *Table 10.1*.

Table 10.1 - Existing Federal Regulations

Clean Water Act	Section 303	Requires states to establish Total Maximum Daily Loads for point sources of pollution that are allowable to maintain water quality and protect stream flora and fauna. Other water quality standards (e.g., thermal) are also regulated.
Clean Water Act	Section 404	Regulates permitting of discharge of dredged or fill material into the waters of the United States. Includes regulation of discharge of material into lakes, navigable streams and rivers, and wetlands.
Clean Water Act	Section 401/402	Authorizes the Commonwealth to grant, deny, or condition Water Quality Certification for any licensed activity that may result in a discharge into navigable waters. Established the National Pollutant Discharge Elimination System (NPDES) that regulates any earth disturbance activity of 5 acres (or more) or 1 acre (or more) with a point source discharge.
Rivers and Harbors Act of 1899	Section 10	Regulates activities that obstruct or alter any navigable waters of the United States.
Federal Emergency Management Act		Requires that any proposed structure within the floodplain boundaries of a stream cannot cause a significant increase in the 100-year flood height of the stream.

STATE REGULATIONS

Pennsylvania has developed stormwater regulations that meet the federal standards and provide a statewide system for stormwater regulation. State regulations are more specific than federal regulations. Statewide standards include design criteria for state issued permits. State regulations cover a variety of stormwater related topics. A brief review of the existing state regulations is provided below in *Table 10.2*.

Table 10.2 - Existing State Regulations

Chapter 92a	National Pollutant Discharge Elimination System Permitting, Monitoring and Compliance	Regulates permitting of point source discharges of pollution under NPDES. Storm runoff discharges at a point source draining five (5) or more acres of land or one (1) or more acres with a point source discharge are regulated under this provision. Municipal separate storm sewer systems (MS4) are regulated under this chapter.
Chapter 93	Water Quality Standards	Establishes the Water Use Protection classification (i.e., water quality standards) for all streams in the state. Stipulates anti-degradation criteria for all streams.
Chapter 96	Water Quality Implementation Standards	Establishes the process for achieving and maintaining water quality standards applicable to point source discharges of pollutants. Authorizes PaDEP to establish Total Maximum Daily Loads (TMDLs) and Water Quality Based Effluent Limitations (WQBELs) for all point source discharges to waters of the Commonwealth.
Chapter 102	Erosion and Sediment Control	Requires persons proposing or conducting earth disturbance activities to develop, implement and maintain Best Management Practices to minimize the potential for accelerated erosion and sedimentation. Current PaDEP policy requires preparation and implementation of a post-construction stormwater management (PCSM) plan for development areas of five (5) acres or more or for areas of one (1) acre or more with a point source discharge.
Chapter 105	Dam Safety and Waterway Management	Regulates the construction, operation, and maintenance of dams on streams in the Commonwealth. Also regulates water obstructions and encroachments (e.g., road crossings, walls, etc.) that are located in, along, across or projecting into a watercourse, floodway, wetland, or body of water.
Chapter 106	Floodplain Management	Manages the construction, operation, and maintenance of structures located within the floodplain of a stream if owned by the State, a political subdivision, or a public utility.

NATIONAL POLLUTANT DISCHARGE ELIMINATION (NPDES) – CHAPTER 92a

Point source discharges for the Commonwealth are addressed in *The Pennsylvania Code, Title 25 Chapter 92a*. These regulations relate to permitting of point source discharges of pollution under NPDES, including municipal separate storm sewer systems (MS4s).

A municipal separate storm sewer (MS4) is any conveyance or system of conveyances (including but not limited to streets, ditches, and pipes) that is: 1) owned by a municipality; 2) designed or used for collecting

or conveying only stormwater; 3) not a combined sewer (i.e., not intended for both sewage and stormwater); and, 4) not part of a publicly owned treatment works (POTW).

Municipalities in Pennsylvania that meet certain standards must obtain NPDES permit coverage for discharges of stormwater from their municipal separate storm sewer systems (MS4s). MS4s are categorized as Large, Medium, or Small based on criteria in the federal regulations at 40 CFR 122.26. Large and Medium MS4s must apply for NPDES permit coverage. Large MS4s are defined as those systems serving a population of more than 250,000, while Medium MS4s are defined as those serving a population of more than 100,000 but less than 250,000. Based on this criteria, there is one Large MS4 in Allegheny County, namely, the City of Pittsburgh, and there are no Medium MS4s in Allegheny County. Other than the City of Pittsburgh, the remaining MS4s in Allegheny County are considered Small MS4s.

Small MS4s must apply for NPDES permit coverage or a waiver if they are located in an urbanized area as determined by the latest Decennial Census by the U.S. Census Bureau, or if they are designated as requiring a permit by PaDEP. Waivers may be granted in lieu of permit coverage if the criteria in 40 CFR 122.32(d) or (e) are met. Waiver criteria in 40 CFR 122.32(d) apply to MS4s serving a population of less than 1,000, and it must be demonstrated that the MS4 is not contributing significant pollutant loadings to an interconnected MS4 or to receiving surface water bodies. Waiver criteria in 40 CFR 122.32(e) apply to MS4s serving a population of less than 10,000, and it must be demonstrated that the MS4 is not currently contributing pollutant loadings to an interconnected MS4 or to receiving surface water bodies, and also that potential future discharges do not have significant water quality impacts.

Large and Medium MS4s must apply for individual NPDES permits in Pennsylvania, as no NPDES General Permit exists for these MS4s. Small MS4s required to obtain permit coverage may, if eligible, apply for coverage under the NPDES General Permit for Stormwater Discharges from Small MS4s (PAG-13). Small MS4s that are ineligible for PAG-13 General Permit coverage may apply for an Individual Permit. (http://www.dep.pa.gov/Business/Water/PointNonPointMgmt/StormwaterMgmt/Stormwater)

Permit coverage is generally for a 5-year term with a requirement to submit a renewal application or NOI at least 180 days prior to the expiration date of coverage. PaDEP's regional offices inspect MS4s to determine whether the MS4 is meeting its permit obligations. PaDEP also reviews periodic reports submitted by MS4s.

The following table summarizes the current MS4 status for Allegheny County municipalities, as reported on PaDEP's website:
(http://www.depreportingservices.state.pa.us/ReportServer/Pages/ReportViewer.aspx?/WMS/WMS_Permitted_Facilities_MS4)

Table 10.3 - Allegheny County Municipalities MS4 Status

NAME	POPULATION (2010 census)	MS4 PERMIT or WAIVER		NAME	POPULATION (2010 census)	MS4 PERMIT or WAIVER
Cities (4)				***Home-rule Municipalities (4)***		
Clairton	6,796	General Permit		Bethel Park	32,313	General Permit
Duquesne	5,565	General Permit		Monroeville	28,386	General Permit
McKeesport	19,731	General Permit		Mount Lebanon	33,137	General Permit
Pittsburgh	305,704	Individual Permit		Penn Hills	42,329	General Permit

NAME	POPULATION (2010 census)	MS4 PERMIT or WAIVER		NAME	POPULATION (2010 census)	MS4 PERMIT or WAIVER
Townships (40)				***Townships (cont.)***		
Aleppo	1,916	General Permit		Neville	1,084	General Permit
Baldwin	1,992	General Permit		North Fayette	13,934	General Permit
Collier	7,080	General Permit		North Versailles	10,229	Individual Permit
Crescent	2,640	General Permit		O'Hara	8,407	Individual Permit
East Deer	1,500	General Permit		Ohio	4,757	General Permit
Elizabeth	13,271	General Permit		Pine	11,497	General Permit
Fawn	2,376	General Waiver		Reserve	3,333	General Permit
Findlay	5,060	General Permit		Richland	11,100	General Permit
Forward	3,376	General Permit		Robinson	13,354	General Permit
Frazer	1,157	NA(1)		Ross	31,105	General Permit
Hampton	18,363	General Permit		Scott	17,024	General Permit
Harmar	2,921	General Permit		Shaler	28,757	General Permit
Harrison	10,461	General Permit		South Fayette	14,416	General Permit
Indiana	7,253	Individual Permit		South Park	13,416	General Permit
Kennedy	7,672	General Permit		South Versailles	351	General Waiver
Kilbuck	697	General Waiver		Springdale	1,636	General Permit
Leet	1,634	Individual Permit		Stowe	6,362	General Permit
Marshall	6,915	General Permit		Upper St. Clair	19,229	General Permit
McCandless	28,457	General Permit		West Deer	11,771	General Permit
Moon	24,185	General Permit		Wilkins	6,357	General Permit
Boroughs (82)				***Boroughs (cont.)***		
Aspinwall	2,801	General Waiver		Jefferson Hills	10,619	General Permit
Avalon	4,705	General Permit		Leetsdale	1,218	Individual Permit
Baldwin	19,767	General Permit		Liberty	2,551	General Permit
Bell Acres	1,388	Individual Waiver		Lincoln	1,072	General Permit
Bellevue	8,370	General Permit		McDonald	383	NA(1)
Ben Avon	1,781	General Permit		McKees Rocks	6,104	General Permit
Ben Avon Heights	371	General Waiver		Millvale	3,744	General Permit
Blawnox	1,432	General Permit		Mount Oliver	3,403	General Permit
Brackenridge	3,260	General Permit		Munhall	11,406	General Permit
Braddock	2,159	NA(1)		North Braddock	4,857	NA(1)
Braddock Hills	1,880	General Permit		Oakdale	1,459	General Permit
Bradford Woods	1,171	General Permit		Oakmont	6,303	General Permit
Brentwood	9,643	General Permit		Pennsbury Village	661	General Waiver

NAME	POPULATION (2010 census)	MS4 PERMIT or WAIVER		NAME	POPULATION (2010 census)	MS4 PERMIT or WAIVER
Bridgeville	5,148	General Permit		Pitcairn	3,294	General Waiver
Carnegie	7,972	General Permit		Pleasant Hills	8,268	General Permit
Castle Shannon	8,316	General Permit		Plum	27,126	General Permit
Chalfant	800	NA(1)		Port Vue	3,798	General Permit
Cheswick	1,746	General Permit		Rankin	2,122	General Waiver
Churchill	3,011	General Permit		Rosslyn Farms	427	General Waiver
Coraopolis	5,677	General Permit		Sewickley	3,827	General Permit
Crafton	5,951	General Waiver		Sewickley Heights	810	Individual Waiver
Dormont	8,593	General Permit		Sewickley Hills	639	Individual Waiver
Dravosburg	1,792	General Permit		Sharpsburg	3,446	NA(1)
East McKeesport	2,126	General Permit		Springdale	3,405	General Permit
East Pittsburgh	1,822	NA(1)		Swissvale	8,983	General Permit
Edgewood	3,118	General Permit		Tarentum	4,530	General Permit
Edgeworth	1,680	Individual Permit		Thornburg	455	General Waiver
Elizabeth	1,493	General Permit		Trafford	61	NA(1)
Emsworth	2,449	General Permit		Turtle Creek	5,349	General Waiver
Etna	3,451	General Permit		Verona	2,474	General Permit
Forest Hills	6,518	General Permit		Versailles	1,515	General Permit
Fox Chapel	5,388	Individual Permit		Wall	580	NA(1)
Franklin Park	13,470	General Permit		West Elizabeth	518	General Waiver
Glassport	4,483	General Waiver		West Homestead	1,929	General Permit
Glenfield	205	General Permit		West Mifflin	20,313	General Permit
Glen Osborne	547	General Waiver		West View	6,771	General Permit
Green Tree	4,432	General Permit		Whitaker	1,271	General Permit
Haysville	70	General Waiver		Whitehall	13,944	General Permit
Heidelberg	1,244	General Permit		White Oak	7,862	Individual Permit
Homestead	3,165	General Permit		Wilkinsburg	15,930	General Permit
Ingram	3,330	General Permit		Wilmerding	2,190	NA(1)

(1) No record of MS4 permit or waiver on PaDEP website.

STATE WATER QUALITY STANDARDS – CHAPTER 93

Water Quality Standards for the Commonwealth are addressed in *The Pennsylvania Code, Title 25, Chapter 93*. Within Chapter 93, all surface waters are classified according to their water quality criteria and protected water uses. The following is an abbreviated explanation of these standards and their respective implications to this Act 167 Plan.

General Provisions (§93.1 - §93.4)

The general provisions of Chapter 93 provide definitions, citation of legislative authority (scope), and the definition of protected and statewide water uses. PaDEP's implementation of Chapter 93 is authorized by the Clean Streams Law, originally passed in 1937 to "preserve and improve the purity of the waters of the Commonwealth for the protection of public health, animal and aquatic life, and for industrial consumption, and recreation," and subsequently amended. *Table 10.3* is a summary of the protected water uses under Chapter 93 that are applicable to Allegheny County.

Table 10.4 - Chapter 93 Designations in Allegheny County

Protected Use	Relative Level of Protection	Description
Aquatic Life		
Warm Water Fishes (WWF)	Lowest	Maintenance and propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat.
Trout Socking (TSF)		Maintenance of stocked trout from February 15 to July 31 and maintenance and propagation of fish species and additional flora and fauna which are indigenous to a warm water habitat.
Cold Water Fishes (CWF)		Maintenance or propagation, or both, of fish species including the family Salmonidae and additional flora and fauna which are indigenous to a cold water habitat.
Special Protection		
High Quality Waters (HQ)		A surface water that meets at least one of chemical or biological criteria defined in §93.4b
Exceptional Value Waters (EV)	Highest	A surface water that meets at least one of chemical or biological criteria defined in §93.4b and additional criteria defined in §93.4b.(b)

Designated Water Uses and Water Quality Criteria (§93.9)

Designated water uses for rivers and streams in Pennsylvania are specified in 25 PA Code 93.9. The regulations present designated water uses by major watershed areas within the state. The Allegheny River Basin, the Monongahela River Basin, and the Ohio River Basin are presented on Drainage Lists U, V. and W, respectively, in Chapter 93. *Table 10.4* is a summary of the protected water uses under Chapter 93 for rivers, streams, and creeks within Allegheny County.

Table 10.5 - Allegheny County Designated Water Uses
Drainage List U – Allegheny River Basin in Pennsylvania

Allegheny River (main stem)	WWF
Unnamed Tributaries to Allegheny River	WWF
Bull Creek	TSF
Bailey Run	WWF
Crawford Run	WWF
Pucketa Creek	TSF
Riddle Run	WWF
Tawney Run	WWF
Blacks Run	WWF
Falling Springs Run	WWF
Deer Creek (source to Little Deer Creek)	CWF
Little Deer Creek	TSF
Deer Creek (Little Deer Creek to mouth)	WWF
Plum Creek	WWF
Powers Run	WWF
Indian Creek	WWF
Quigley Creek	WWF
Sandy Creek	WWF
Squaw Run	HQ-WWF
Shades Run	WWF
Guyasuta Run (source to PA Rt. 28)	HQ-WWF
Guyasuta Run (PA Rt. 28 to mouth)	WWF
Pine Creek (source to North Park Lake Dam)	CWF
Pine Creek (North Park Lake Dam to mouth)	TSF
Girtys Run	WWF

Drainage List V – Monongahela River Basin in Pennsylvania

Monongahela River (main stem)	WWF
Unnamed Tributaries to Monongahela River	WWF
Beckets Run	WWF
Sunfish Creek	WWF
Huston Run	WWF
Bunola Run	WWF
Kelly Run	WWF
Perry Mill Run	WWF
Lobbs Run	WWF
Smiths Run	WWF
Fallen Timber Run	WWF
Wylie Run	WWF
Peters Creek	TSF
Youghiogheny River (Connells Run to mouth)	WWF
Pollock Run	WWF
Gillespie Run	WWF
Crawford Run	WWF
Long Run (source to Jacks Run)	HQ-TSF
Jacks Run	HQ-TSF
Long Run (Jacks Run to mouth)	TSF
Crooked Run	WWF
Thompson Run	WWF
Turtle Creek (source to Brush Creek)	TSF
Turtle Creek (Brush Creek to mouth)	WWF
Abers Creek	TSF
Simpson Run	TSF
Brush Creek	TSF

Homestead Run	WWF
Nine Mile Run	TSF
West Run	WWF
Streets Run	WWF

Drainage List W – Ohio River Basin in Pennsylvania

Ohio River (main Stem)	WWF
Unnamed Tributaries to Ohio River	WWF
Sawmill Run	WWF
Chartiers Creek	WWF
Unnamed Tributaries to Chartiers Creek	WWF
Coal Run	WWF
Millers Run	WWF
Thoms Run	TSF
McLaughlin Run	WWF
Painters Run	WWF
Scrubgrass Run	WWF
Georges Run	WWF
Robinson Run	WWF
Campbells Run	WWF
Whiskey Run	WWF
Jacks Run	WWF
Spruce Run	WWF
Lowries Run	TSF
Toms Run	WWF
Kilbuck Run	CWF
Moon Run	WWF
Montour Run	TSF
McCabe Run	WWF
Thorn Run	WWF
Narrows Run	WWF
Little Sewickley Creek	HQ-TSF
Flaugherty Run	WWF
Shouse Run	WWF
Big Sewickley Creek	TSF

Anti-degradation Requirements (§93.4a - §93.4d)

According to the anti-degradation requirements of §93.4a, "Existing in-stream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." Certain waterbodies which exhibit exceptional water quality and other environmental features, as established in §93.4b and summarized in *Table 4.3*, are referred to as "Special Protection Waters." Activities that could adversely affect surface water are more stringently regulated in those watersheds than waters of lower protected use classifications. For WWF, TSF, or CWF waterbodies, many of the anti-degradation requirements can be addressed using guidance provided in this PLAN and the PaDEP BMP Manual; for HQ or EV watersheds, the current regulations follow PaDEP's anti-degradation policy.

For new or additional, point source discharges with a peak flow increase to an HQ or EV water, the developer is required to use a non-discharge alternative that is cost-effective and environmentally sound compared with the costs of the proposed discharge. If a non-discharge alternative is not cost-effective and environmentally sound, the developer must use the best available combination of treatment, pollution prevention, and wastewater reuse technologies and assure that any discharge is non-degrading. In the case where allowing lower water quality discharge is necessary to accommodate

important economic or social development in an area, PaDEP may approve a degrading discharge after satisfying intergovernmental coordination and public participation requirements.

Water Quality Criteria (§93.6 - §93.8c)

In general, the water discharged form either a point source or a nonpoint source discharge may contain substances in a concentration that would obstruct or be harmful to a protected water use. The specific limits for toxic substances, metals, and other chemicals are listed in this section.

Designated Water Uses and Water Quality Criteria (§93.9)

The designated use and water quality criteria for each stream reach or watershed is specified. On the following page, *Table 10.4* shows the Chapter 93 designated uses for Allegheny County streams and rivers as defined by §93.9. The majority of watersheds within Allegheny County have watersheds designated as warm water fisheries.

Water Quality Impairments and Recommendations

Additional to the Chapter 93 regulations, PaDEP has an ongoing program to assess the qualities of water in Pennsylvania and identify stream and other bodies of water that are not attaining the required water quality standards. These "impaired" streams, their respective designations, and the subsequent recommendations are discussed in *Section 6*.

MUNICIPAL REGULATIONS

In Pennsylvania, stormwater management regulations generally exist at the municipal level. 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.

ALLEGHENY COUNTY MUNICIPAL ORDINANCES

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.

Table 10.6 below provides a summary of existing regulations for the municipalities in Allegheny County including Zoning, SALDO, Stormwater, and Floodplain Ordinances. *Table 10.7* shown on the following pages 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.

The information in Tables 10.6 and 10.7 is based on the ordinances on file with the County. The information is assumed to be current as of October 2015, based on information available to the County and Consultant. Please contact the municipality for more information.

Table 10.6 - Allegheny County Municipal Ordinance Matrix

Municipality	Zoning	Subdivision & Land Development	Stormwater	Floodplain
Aleppo Township	Yes, 2012	Yes, 1996	Sec. 5	Ch. 200
Aspinwall Borough	Yes, 1983	Yes, 2004	Ch. 22-608	Ch. 8
Avalon Borough	Yes, 2009	County Ord., 2012	Article V Sec. 780-515 (county)	Ord. 1162
Baldwin Borough	Yes, 1985	Yes, 1975	Ch. 142 Art. 10 - 19	Ch. 92 Art. 3
Baldwin Township	Yes, 2007	Yes, 2006	Ch. 17	No
Bell Acres Borough	Yes, 2003	Yes, 1992	Ch. 149 Sec. 33	(zoning) Art. 4 165-67
Bellevue Borough	Yes, 2009	County Ord., 2012	Article V Sec. 780-515 (county)	No
Ben Avon Borough	Yes, 2009	County Ord., 2012	Ch. 23	Ch. 8
Ben Avon Heights Borough	Yes, 1994	County Ord., 2012	Article V Sec. 780-515 (county)	No
Bethel Park, Municipality of	Yes, 1966	Yes, 1986	Ch. 60 Art. 6	Ch. 72
Blawnox Borough	Yes, 2000	County Ord., 2012	Article V Sec. 780-515 (county)	No
Brackenridge Borough	Yes, 1996	County Ord., 2012	Article V Sec. 780-515 (county)	Ch. 8
Braddock Borough	Yes, 1958	County Ord., 2012	Article V Sec. 780-515 (county)	No
Braddock Hills Borough	Yes, 1991	Yes, 1969	Ch. 26	Ch. 8
Bradford Woods Borough	Yes, 2003	Yes, 2003	Ch. 190	Ch. 124
Brentwood Borough	Yes, 1999	Yes. 2003	Ch. 177	Ord. 2014-1229
Bridgeville Borough	Yes, 2008	Yes, 1970	Ord. 679 Sec. 604	Ch. 8
Carnegie Borough	Yes, 1983	Yes, 1962/2012	Sec. 27-407	Ch. 8
Castle Shannon Borough	Yes, 2013	Yes, 2001	Ord. 819 Art. 9 Sec. 908 (SALDO)	Ch. 8
Chalfant Borough	Yes, 2011	County Ord., 2012	Ch. 23	Ch. 8
Cheswick Borough	Yes, 1985	Yes 1955/1972	Ch. 141-9.H	Ord. 652 Art. 5
Churchill Borough	Yes, 1997	Yes, 1997	Ch. 260	Ch. 196
Clairton City	Yes, 2014	Yes, 1991	?	?
Collier Township	Yes, 2002	Yes, 2004	Ch. 23	Ch. 8
Coraopolis Borough	Yes, 1985	County Ord., 2012	Article V Sec. 780-515 (county)	?

Municipality	Zoning	Subdivision & Land Development	Stormwater	Floodplain
Crafton Borough	Yes, 2004	Yes, 2014	Ch. 197-42	Ch. 120 Art. 3
Crescent Township	Yes, 1971	Yes, 1973	Ch. 445	Ch. 230
Dormont Borough	Yes, 1995	Yes, 1992	Ch. 179	No
Dravosburg Borough	Yes, 1976	County Ord., 2012	Article V Sec. 780-515 (county)	No
Duquesne, City of	Yes, 1992	Yes, 1991	Sec. 407	No
East Deer Township	Yes, 1987	Yes, 1957	No	No
East McKeesport Borough	Yes, 1999	Yes, 1986	Ch. 26	Ch. 8
East Pittsburgh Borough	Yes,	Yes,	Ch. 26	Ch. 8
Edgewood Borough	Yes, 2015	Yes, 2015	Ch. 175 / Ord. 1051	No
Edgeworth Borough	Yes, 2007	Yes,	Ch. 107	Ch. 113 Art. 7
Elizabeth Borough	Yes, 2013	Yes,	No	Ord. 2013-002 Sec. 404
Elizabeth Township	Yes, 2006	Yes, 1971/87	Ch. 26	Ch. 8
Emsworth Borough	Yes, 1998	Yes, 2005	Ch. 203	Ch. 135
Etna Borough	Yes, 1983	County Ord., 2012	Ord. 1320	Ord. 1353
Fawn Township	Yes, 1995	Yes, 1965/90	No	Ord. 83
Findlay Township	Yes, 2014	Yes, 2014	Ord. 398 Art 6 Sec. 103.614	Ord. 398 Art 6 Sec. 103.606
Forest Hills Borough	Yes, 2007	Yes, 2006	Ch. 23	Ch. 8
Forward Township	Yes, 1983	Yes, 1983	No	No
Fox Chapel Borough	Yes, 2009	Yes, 2009	Ord. 661	No
Franklin Park Borough	Yes, 2013	Yes, 2013	Ch. 178	Ch. 123
Frazer Township	Yes, 2008	Yes, 2008	Ch. 26	Ch. 8
Glassport Borough	Yes, 2006	County Ord., 2012	Article V Sec. 780-515 (county)	Ch. 8
Glen Osborne Borough	Yes, 1988	Yes, 1991	Ord. 323 Sec. 811	Ord. 405
Glenfield Borough	Yes, 1978	County Ord., 2012	Article V Sec. 780-515 (county)	No
Green Tree Borough	Yes, 2013	Yes, 1980	Ch. 289	Ch. 170
Hampton Township	Yes, 2003	Yes, 2000	Ch. 266	Ch. 155-25
Harmar Township	Yes, 1999	Yes, 1969	Ord. 281	No
Harrison Township	Yes, 2009	Yes, 1995	Ch. 17	Ch. 8
Haysville Borough	No	County Ord., 2012	Article V Sec. 780-515 (county)	No
Heidelberg Borough	Yes, 2013 (Chapter 112)	County Ord., 2012	Ord. 579; Ch. 94	Ch. 54
Homestead Borough	Yes, 1988	Yes, 1992	Ch. 222	No

Municipality	Zoning	Subdivision & Land Development	Stormwater	Floodplain
Indiana Township	Yes, 2011	Yes, 1973	Ord. 230	Ord. 376
Ingram Borough	Yes, 2002	Yes, 1982	No	Ch. 97
Jefferson Hills Borough	Yes, 2000	Yes, 1998	Ch. 26	Ch. 8
Kennedy Township	Yes, 1976	Yes, 2001	Ord. 413	Ord. 405
Kilbuck Township	Yes, 2000	Yes, 2000	Ch. 182-33	Ch. 108
Leet Township	Yes, 2000	Yes, 1996	Ord. 2012-03	Ord. 2014-02
Leetsdale Borough	Yes, 1972	Yes, 1987	Ch. 265-27	Ch. 161
Liberty Borough	Yes, 1957	Yes,	Ch. 22 Part 3	Ch. 27 Part 14 (zoning)
Lincoln Borough	Yes, 1974	Yes, 1975	Ch. 22 Part 13	Ch. 22 Part 12
Marshall Township	Ch. 208, 2008	Ord. No. 394, 2008	Ch. 165	Article 1400
McCandless Township	Part Thirteen, Title Three	Part Thirteen, Title Five	§1375, §1371.04 §1311.07	§1342
McDonald Borough	Ord. No. 685, 2002	Allegheny County SALDO applies; Ord. 09-12-OR, 2012	no	§ 404-A
McKees Rocks Borough	Borough of McKees Rocks Zoning Ordinance, 1974	yes?	?	Article 6
McKeesport, City of	Ord. No. 96-2, 1996	Ord. No. 95-7, 1995	§407-47-61, 1995	§413-91
Millvale Borough	Ord. No. 1567, 1983	Allegheny County SALDO applies; Ord. 09-12-OR, 2012	§780-502.F(3)	§780-502.C(3), § 404-A
Monroeville, City of	Ch. 359, 1984	Ord. No. 2525, 2011	Ch. 319	Ord. No. 2618, §359-18
Moon Township	Ch. 27, 2015	Ch. 22, 2015	Ch. 23, 2015	Ch. 8, Ord. No. 652
Mt. Lebanon, City of	Ch. 20, 2012	Ch. 16, 2001	Ord. No. 3187, §809	Ord. 2954 and §804.3
Mount Oliver Borough	Ch. 260, 1990	Ch. 219, 1995	Ch. 212	§212-5.B(25)
Munhall Borough	Ch. 440, 1995	Ch. 389, 1967	Ch. 379 and §440-56	Ch. 227
Neville Township	Ord. No. 734, 2003 (amended by Ord. No. 817 of 2011)	Ord. No. 809, 2009	Ord. No. 826	Ord. No. 670 and §903
North Braddock Borough	North Braddock Borough Zoning Ordinance, 2014	Allegheny County SALDO applies; Ord. 09-12-OR, 2012	no	§ 404-A

Municipality	Zoning	Subdivision & Land Development	Stormwater	Floodplain
North Fayette Township	Ord. No. 360 (2004) as amended through Ord. No. 418 (2014)	Ord. No. 418/Ch. 222014	Ch. 19,§22-510	§27-602
North Versailles Township	Ch. 300, 2008	Ch. 265, 2007	Ch. 255	§154-18
Oakdale Borough	Ord. No. 318, 1977	Ord. No. 2007-3, 2007	Ord. No. 2007-3 §608	Ord. No. 2007-3, §603.3
Oakmont Borough	Ch. 205, 2014	Ord. No. O20-2003, 2003	Ch. 171, Ord. No. O29-2013, & §205-800.09	Ch. 109
O'Hara Township	Ch. 72, 2002	Ord. No. 1119 2004	Ord. No. 1295 (2015)	§72-17.135(A, B)
Ohio Township	Ord. No. 175, 1992	Ch. 112, 1992	Ord. No. 313, 2014	Ord. No. 310
Penn Hills, City of	Ord. No. 2420, 2004	Ord. No. 2136, 1993	§2136-8.11	§2136-8.10 (C)
Pennsbury Village Borough	no	Allegheny County SALDO applies; Ord. 09-12-OR, 2012	no	§ 404-A
Pine Township	Ch. 84, 2005	Ch. 78, 2005	Ch. 26 Part I	§ 56-18, § 56-23
Pitcairn Borough	Ch. 27	Allegheny County SALDO applies; Ord. 09-12-OR, 2012	Ch. 26	§§ 8-101 - 8-802, § 404-A
Pittsburgh, City of	Title Nine Codified through Ordinance No. 36-2014, December 2014 and also including Ordinance No. 11-2015, March, 2015 (Supp. No. 2015, S-25)	Exempt	Ch. 1003: Land Operations Control and Stormwater Management, § 906.07 Stormwater Management Overlay District	§ 906.02
Pleasant Hills Borough	Yes, Ch. 374 as amended by Ord. No. 818, 2003	Yes, Ch. 322 as amended by Ord. No. 636, 1986	Ch. 323, 2014	Chapter 216
Plum Borough	Unified Development Ord. No. 507-93	Unified Development Ord. No. 507-93	Ord. 491-92	§§ 301 & 302

Municipality	Zoning	Subdivision & Land Development	Stormwater	Floodplain
Port Vue Borough	Yes, Ord. No. 251 1965	Yes, 1958	no	no
Rankin Borough	Yes, Ord. No. 327 1994	Yes, 1991	§ 513.3	§ 506
Reserve Township	Yes, 2003	Yes, 1994	Ord. No. 465	Ord. No. 559
Richland Township	Yes, Ch. 27 Ord. 430, 7/16/2008; as amended by Ord. 438, 8/19/2009	Yes, Ch. 22 Ord. 278 (1991) as amended through Ord. 325 (1996)	Ch. 26	Chapter 8
Robinson Township	Ch. 300 (as amended through 2010)	Ch. 250 (210)	Ch. 240	Ch. 140
Ross Township	Ord. 1166 (1973); as amended through Ord. 2329 (2013)	Ord. 1166 (1973); as amended through Ord. 2288 (2010)	Ch. 23	Ch. 8
Rosslyn Farms Borough	Ch. 190 (2006)	Ch. 187 (2006)	§187-37	Ch. 1112
Scott Township	Ord. 937 (1975) as amended…?	Ord. No. 1194-83(1983)	Ord. No. 1541-04	Ord. No. 1541
Sewickley Borough	Ch. 27	Ch. 22 (1999)	Ch. 17	Ch. 8 §403 Floodplain Overlay
Sewickley Heights Borough	Ord. No. 294	Ord. No. 295	Ord. No. 298	Ord. No. 304
Sewickley Hills Borough	Zoning Ord. No. 1 of 1995	Ord. No. 1 of 1990	Ord. No. 3 (1990)	§ 512
Shaler Township	Ch. 225 (1990)	Ch. 195 (1965)	Ch. 190	Ch. 130 Article II
Sharpsburg Borough	Ch. 27 (1968)	Ord. No. 488 (1991)	§ 506 § 225-14	§ 513
South Fayette Township	Ch. 240 (2005)	Ch. 215 (2004) by Ord. No. 1-2002	§ 215-78	Ch. 160
South Park Township	Yes, 1996	Yes, 2000	Ord. 621	Ch. 70
South Versailles Township	Yes, Ord. No. 5, 1975	Yes, Ord. No. 2007-3, 2007	§ 509	Ord. 95-3
Springdale Borough	Yes, 1955	Yes, 1959	?	?
Springdale Township	Yes, 1969	Yes, 1958	no	no
Stowe Township	Yes, Ordinance No. 912 (2007)	Allegheny County SALDO applies; Ord. 09-12-OR, 2012	Ch. 26 Part 1	Ch. 8

Municipality	Zoning	Subdivision & Land Development	Stormwater	Floodplain
Swissvale Borough	Ch. 27 (1991)	Ch. 22 (1992)	Ch. 26; § 22-307	Ch. 8; § 27-502
Tarentum Borough	Yes, 2013	Allegheny County SALDO applies; Ord. 09-12-OR, 2012	Article V Sec. 780-515	§ 265-301.I § 404-A
Thornburg Borough	Yes Ch. 27 (2005)	Yes Ch. 22 (2005)	§ 22-610; § 27-1411	Ch. 8
Trafford Borough	Yes Ch. 202 (1989)	Yes Ch. 175 (1989)	Ch. 172	Ch. 110
Turtle Creek Borough	Yes, 1966	No?	no	Ord. No. 1072
Upper St. Clair Township	Yes, Ch. 130 (2002)	Yes, Ch.114 (1991)	§ 114.35	Ch. 64; § 130.21-130.25; § 114.43
Verona Borough	Yes, CH. 250 (1975)	Yes, Ch. 220 (1991)	Ch. 134 § 250-69 and § 220-21	§ 134-18; § 220-28
Versailles Borough	Yes, Ord. No. 422, 1973	Allegheny County SALDO applies; Ord. 09-12-OR, 2012	Article V Sec. 780-515	§ 404-A
Wall Borough	Yes, 2003	Yes Ch. 265, 2007 (multi-municipal)	Ch. 255	Ch. 300, Art. XII; Chapter 154
West Deer Township	Yes, Ch. 210, Adopted by the Board of Supervisors of the Township of West Deer,1997, by Ord. No. 269	Yes, Ch. 185 (1997)	Chapter 182	Ords. No. 399 & 400
West Elizabeth Borough	Yes, Ord. 2013-02, 2013	Allegheny County SALDO applies; Ord. 09-12-OR, 2012	Article V Sec. 780-515	§ 404-A
West Homestead Borough	Yes Ch. 27 (Ord. 560, 1996, as amended through Ord. 623, 2006)	Yes Ch. 22 (Ord. 571, 1998, as amended through Ord. 623, 2006)	§ 27-1114; §22-515	§22-510.C
West Mifflin Borough	Chapter 290, 2010	Chapter 250 (Adopted 2-4-1975 by Ord. No. 780 (Ch. 22 of the 1999 Code of Ordinances)	§ 240-9	Chapter 135;§ 250-30;Chapter 290 Article XIII
West View Borough	Yes, 1972	Yes, 1990	Chapter 240	Chapter 116 Part 1

Municipality	Zoning	Subdivision & Land Development	Stormwater	Floodplain
Whitaker Borough	Yes, 1993	Yes, 2009	Section 814	§ 809.3
White Oak Borough	Yes, 2013	Yes, 1986	§ 941.01, § 1339.04, § 1391.08	§1339
Whitehall Borough	Yes, Chapter 180, 2008	Yes, Chapter 157 1992	Chapter 153	Chapter 77; § 153.32
Wilkins Township	Yes, Chapter 173, 1973	Yes, Chapter 148, 1990 by Ord. No. 802	§ 148.24	§ 173.51
Wilkinsburg Borough	Yes, Ch. 260 (2002)	Yes, Ch. 229 (2001)	Ch. 224 & 229 (2004)	§ 260-504
Wilmerding Borough	Yes, Ch. 27,1967; updated 2013	Yes, Ch. 270	Chapter 260	§ 175-18

Table 10.7 - Allegheny County Municipal SALDO Ordinance Matrix

Municipality	Road	Grading	Erosion & Sedimentation	Water Quality	Release Rates (Sec. or Not)	Release Rates (quantitative)	Infiltration Requirements	Sustainable /Green	Other
Aleppo Township	Sec. 4.6	Ord. 183	Sec. 5.9	No	Sec. 5.8	100% predevel.	Sec. 5.13	No	No
Aspinwall Borough	Ch. 21	Ch. 9	No	No	Ch. 22-608	post development cannot exceed predevelopment	No.	Ord. 1060 Sec. 9.2	River Front Ord. Ord. 1060
Avalon Borough	Article V Sec 780-519 (county)	Ord. 1259	Ord. 1259	Article V Sec. 780-509 (county)	Appx. 5-2 (county)	100% predevel. (county)	Appx 5-3 (county)	Sec. 780-515(C/D) (county)	Sec. 780-504-507 (county)
Baldwin Borough	Ch. 154	Ch. 99	Ch. 142 Sec. 67	Ch. 142 Sec. 68.1	Ch. 142 Sec. 64	release rate percentage by zone	Ch. 142 Sec. 66	No.	No.
Baldwin Township	Ch. 21	Ch. 9	Ch. 9 Sec. 113	Ch. 17 Sec. B.13	Ch. 17 Sec. B.1303	no greater than predevelopment rates	Ch. 17 Sec. B.1304	No.	Ch 17 Sec 301.8
Bell Acres Borough	Ch. 149 Appx C (zoning)	No	No	Ch. 149 Sec. 34	Ch. 149 Appx. E.A.1.c	increase in post construction rate	Ch. 149 Appx. E.B.	No	No
Bellevue Borough	Article V Sec 780-519 (county)	Article V Sec. 780-503 (county)	Article V Sec. 780-503.C.4 (county)	Article V Sec. 780-509 (county)	Appx. 5-2 (county)	100% predevel.	Appx 5-3 (county)	Sec. 780-515(C/D) (county)	Sec. 780-504-507 (county)
Ben Avon Borough	Ch. 21	Ch. 9	Ord. 563	Ch. 23 Part 3	?	?	Appx 5-3 (county)	Ch. 23-A Low Impact Development	Sec. 780-504-507 (county)
Ben Avon Heights Borough	Article V Sec 780-519 (county)	Article V Sec. 780-503 (county)	Article V Sec. 780-503.C.4 (county)	Article V Sec. 780-509 (county)	Appx. 5-2 (county)	100% predevel.	Appx 5-3 (county)	Sec. 780-515(C/D) (county)	Sec. 780-504-507 (county)
Bethel Park, Municipality	Ch. 60 Art. 6.60.21	Ch.40	Ch. 40.16	No	Ch. 60.22.1	90% predevel.	Ch. 60.22.4	No	No

Municipality	Road	Grading	Erosion & Sedimentation	Water Quality	Release Rates (Sec. or Not)	Release Rates (quantitative)	Infiltration Requirements	Sustainable /Green	Other
Blawnox Borough	Article V Sec 780-519 (county)	Article V Sec. 780-503 (county)	Article V Sec. 780-503.C.4 (county)	Article V Sec. 780-509 (county)	Appx. 5-2 (county)	100% predevel.	Appx 5-3 (county)	Art. 5 Sec. 780-515(C/D) (county)	Art. 5 Sec. 780-504-507 (county)
Brackenridge Borough	Ch. 21	Article V Sec. 780-503 (county)	Article V Sec. 780-503.C.4 (county)	Article V Sec. 780-509 (county)	Appx. 5-2 (county)	100% predevel.	Appx 5-3 (county)	Art. 5 Sec. 780-515(C/D) (county)	Art. 5 Sec. 780-504-507 (county)
Braddock Borough	Article V Sec 780-519 (county)	Article V Sec. 780-503 (county)	Article V Sec. 780-503.C.4 (county)	Article V Sec. 780-509 (county)	Appx. 5-2 (county)	100% predevel.	Appx 5-3 (county)	Art. 5 Sec. 780-515(C/D) (county)	Art. 5 Sec. 780-504-507 (county)
Braddock Hills Borough	Ch. 21	Ch. 9	Ch. 26 Appx 2	No	Ch. 26 Sec. 103.D	subarea release rates percentage	Ch. 26 Sec. 104	No	No
Bradford Woods Borough	Ch. 194	Ch. 129	Ch. 190-9	No	Ch. 190 Appendix A	Percent by subarea	Ch. 190 Appendix B/C	Ch. 190 Appx. E	No
Brentwood Borough	Ch. 180	Ch. 102	Ch. 99	No	Sec. 177-2.4	by percentage	Sec. 177-B.3	No	No
Bridgeville Borough	Ch. 22	Ch. 9	Ch. 9	No	Ch 17 Part 3 Sec 304	Release Rate Map	No	No	No
Carnegie Borough	Ch. 21	Ch. 9	Sec. 27-406	No	Sec. 27-407.4	Sec. 27-407.4.B	No	Sec. 27-8	Steep Slope Sec. 27-408
Castle Shannon Borough	Ord. 819 Sec. 904 (SALDO)	Ord. 819 Sec. 903 (SALDO)	No	No	Ord. 819 Sec. 908.4.A (SALDO)	no greater than pre development	No	No	No
Chalfant Borough	Ch. 21	Ch. 9	Article V Sec. 780-503.C.4 (county)	Article V Sec. 780-509 (county)	?	?	23-103	Sec. 780-515(C/D) (county)	Sec. 780-504-507 (county)
Cheswick Borough	Ch. 141-9.A	No	No	No	Ch. 141-9.H.1.a	maximum rate of stormwater runoff is no greater after	No	No	No

Municipality	Road	Grading	Erosion & Sedimentation	Water Quality	Release Rates (Sec. or Not)	Release Rates (quantitative)	Infiltration Requirements	Sustainable /Green	Other
						than prior to development			
Churchill Borough	Ch. 264	Ch. 180	Ch. 180	No	Ch. 260-4.C	subarea release rates percentage	Ch. 260-4.A	No	No
Clairton City	Ch. 303	Ch. 193	Ch. 193	No	No	No	No	No	No
Collier Township	Ch. 21	Ch. 9	Ch. 23-303	Ch. 23 Part 3	Ch. 23-901	no greater than predevelopment	?	LID Appendix 23-A	?
Coraopolis Borough	Article V Sec 780-519 (county)	Article V Sec. 780-503 (county)	Article V Sec. 780-503.C.4 (county)	Article V Sec. 780-509 (county)	Appx. 5-2 (county)	100% predevel.	Appx 5-3 (county)	Sec. 780-515(C/D) (county)	Sec. 780-504-507 (county)
Crafton Borough	Ch. 193	Ch. 125	Ch. 197-37	No	Ch. 197-42.A	cannot exceed predevelopment	No	No	No
Crescent Township	Ch. 720	References E&S Manual	Sec. 445.13	No	Ch. 445-6.L	subarea release rates percentage	Ord. 556	No	No
Dormont Borough	Ch. 181	Ch. 117	Ch. 101	No	Ch. 179-22.A	maximum rate of stormwater runoff is no greater after than prior to development	Ch. 179-26	No	No
Dravosburg Borough	Article V Sec 780-519 (county)	Article V Sec. 780-503 (county)	Ord. 569 Art. 2 Sec. 405.8	Article V Sec. 780-509 (county)	Appx. 5-2 (county)	100% predevel.	Appx 5-3 (county)	Sec. 780-515(C/D) (county)	Sec. 780-504-507 (county)
Duquesne, City of	Sec. 405	Sec. 408	Sec. 408	No	Sec. 407.3.B	refers to SWMP / other - 2 100 year storms	Sec. 407.5	No	No

Municipality	Road	Grading	Erosion & Sedimentation	Water Quality	Release Rates (Sec. or Not)	Release Rates (quantitative)	Infiltration Requirements	Sustainable /Green	Other
East Deer Township	No	Ord. 481	No	No	No	No	No	No	No
East McKeesport Borough	Ch. 21	No	Ch. 26 Sec. 123	No	Ch. 26.C	release rate percentage by subbasin area	No	No	No
East Pittsburgh Borough	Ch. 21	Ch. 9	No	No	Ch. 26 Appendix A	release rate by subbasin area	No	No	No
Edgewood Borough	Ch. 177	No	Sec. 175-4	Appx. I-C	Ch. 180	release rate percentage by subbasin area	Appx. I-B	No	No
Edgeworth Borough	Ch. 109	Ch. 113 Art. 6 Sec. 113-30	Ch. 113 Art. 6 Sec. 113-30	Ch. 107 Sec. 6.B	No	No	No	No	No
Elizabeth Borough	No	No	No	No	No	No	No	No	No
Elizabeth Township	Ch. 21	Ch. 9	Ch. 26 Sec. 102	No	Ch. 26 Sec. 102.3.D	percentage by sub area	Ch. 26 Sec. 103	No	No
Emsworth Borough	Ch. 207	Ch. 212-38	Ch. 203-11	Ch. 203-12	Yes, Ch. 212-43 (SALDO)	post-development discharges cannot exceed predevelopment discharges	Ch. 203 Art. 4	Ch. 203 Appx A; Low Impact Developmen t	No
Etna Borough	Article V Sec 780-519 (county)	No	Ord. 1320 Sec.2.9	No	Ord. 1320 Appx A	release rate percentage by subarea	Ord. 1380 Sec. 4.1.2..B	Ord. 1320 Appx B	No
Fawn Township	Res. 65-7 Sec. 402	No	No	No	No	No	No	No	No
Findlay Township	Ord. 398 Art. 5	Ord. 398 Art 6 Sec. 103.615.3	Ord. 398 Art 6 Sec. 103.615	No	Art. I and II	release rate percentage by subbasin area	No	No	No

Municipality	Road	Grading	Erosion & Sedimentation	Water Quality	Release Rates (Sec. or Not)	Release Rates (quantitative)	Infiltration Requirements	Sustainable /Green	Other
Forest Hills Borough	Ch. 21	Ch. 9	Ch. 23-104	No	Ch. 23-102	release rate percentage by sub basin	Ch. 23-103	No	No
Forward Township	Ord 83-2 Sec.303	No	Ord. 83-1 Art.4 Sec. 403.8	Ord. 83-1 Art.4 Sec. 403.9	No.	No.	No.	No	No
Fox Chapel Borough	Ch. 22 Sec. 402	Ch. 9	No	Ch. 22 Sec. 404	Appx. A	release rate percentage by subarea	Ch.22 Sec. 404.4.C.2	Ch.22 Sec. 404.4.C.1.d	No
Franklin Park Borough	Ch. 180	Ch. 124	Ch. 184-911.C	Ch. 178 Sec. 4.A.1.b	Ch. 178 Appx. A	release rate map	Ch. 178 Sec. 4.A.2.b	Ch. 178 Appx. B; Non-Structural BMPs	No
Frazer Township	Ch. 21	Ch. 9	No	No	Ch. 26 Sec, 206.1.E.c	subbasin release rate percentage	No	Ch. 26 Appx 2-B/D	No
Glassport Borough	Ch. 21	Ch. 9	Ch. 9 Sec. 113	Article V Sec. 780-509 (county)	Appx. 5-2 (county)	100% predevelopment	Appx 5-3 (county)	Art. 5 Sec. 780-515(C/D) (county)	Art. 5 Sec. 780-504-507 (county)
Glen Osborne Borough	Ord. 323 Sec. 1006	Ord. 323 Sec. 806	Ord. 323 Sec. 1011	No	Ord. 323 Sec. 811.14	shall not exceed 10 year storm frequency	Ord. 323 Sec. 811.15	No	No
Glenfield Borough	Article V Sec 780-519 (county)	Article V Sec. 780-503 (county)	Article V Sec. 780-503.C.4 (county)	Article V Sec. 780-509 (county)	Appx. 5-2 (county)	100% predevelopment	Appx 5-3 (county)	Art. 5 Sec. 780-515(C/D) (county)	Art. 5 Sec. 780-504-507 (county)
Green Tree Borough	Ch. 295	Ch. 181	Ch. 289-11	Ch. 289-12	No	No	No	Ch. 289 Appx A	No
Hampton Township	Ch. 272	Ch. 161	Ch. 266-9	Ch. 266.B.1.b	Ch. 266-13.C.2	subbasin release rate percentage	Ch. 266-15.B.2	No	No
Harmar Township	Sec. 503	Sec. 504	Sec. 505	No	Sec. 514.7	100 percent predevelopment	No	No	No

Municipality	Road	Grading	Erosion & Sedimentation	Water Quality	Release Rates (Sec. or Not)	Release Rates (quantitative)	Infiltration Requirements	Sustainable /Green	Other
Harrison Township	Ch. 21	Ch. 9	Ch. 22 Sec. 512	No	No	No	No	No	No
Haysville Borough	Article V Sec 780-519 (county)	Article V Sec. 780-503 (county)	Article V Sec. 780-503.C.4 (county)	Article V Sec. 780-509 (county)	Appx. 5-2 (county)	100% predevelopment	Appx 5-3 (county)	Art. 5 Sec. 780-515(C/D) (county)	Art. 5 Sec. 780-504-507 (county)
Heidelberg Borough	Ch. 95	Article V Sec. 780-503 (county)	Ch. 94 Sec. 6	Ch. 94 Sec. 4.D	Ch. 94 Sec. 4.A	100% predevelopment	Ch. 94 Sec. 5.B	Art. 5 Sec. 780-515(C/D) (county)	Art. 5 Sec. 780-504-507 (county)
Homestead Borough	Ch. 225	Ch. 147	No	No	Ch. 222.3.C.4	release rate by percentage by subarea	No	No	No
Indiana Township	No	Ord. 229	Ord. 229 Sec. 14	No	Ord. 230 Watershed Standards	release rate by percentage by subarea	No	No	No
Ingram Borough	Ch. 159	Ch. 185-87G	Ch. 163-14	No	No	No	No	No	No
Jefferson Hills Borough	Ch. 21	Ch. 9	Ch. 9	No	Sec. 151.A	No greater after development than prior to development	No	No	No
Kennedy Township	No	Ord. 469	Ord. 413 Sec. 304	Ord. 413 Sec.305	Ord. 413 Sec.306.C	postconstruction shall replicate preconstruction runoff	Ord. 413 Sec. 306	Ord. 413 Appx. E	No
Kilbuck Township	Ch. 178	Ch. 115	Ch. 182-44	No	Ch. 182-33.Q	post development discharges cannot exceed predevelopment discharges for a two-year storm frequency		No	No

Municipality	Road	Grading	Erosion & Sedimentation	Water Quality	Release Rates (Sec. or Not)	Release Rates (quantitative)	Infiltration Requirements	Sustainable /Green	Other
Leet Township	Ord. 154	Ord. 155-B	Ord. 262 Part 5 Sec. 512	Ord. 2012-03 Sec. 109.3	No	No	No	No	No
Leetsdale Borough	Ch. 260	Ch. 265 Art. 9	Ch. 265-31	No	No	No	No	No	Steep Slope Ch. 265 Art. 9
Liberty Borough	No	No	No	No	Ch. 22 Sec. 302.D	release rate by percentage by subarea	Ch. 22 Sec. 303.2	No	No
Lincoln Borough	No	No	No	No	Ch. 22 Part 13 Sec, 1303	release rate by percentage by subarea	Ch. 22 Part 13 Sec, 1304	No	No
Marshall Township	§174-303, §174-404, §174-503	Ch. 88	§165-104.10	§§ 165-105.E-G	§ 165-106	§165-106.2.A.(2), § 165-106.2	§165-104.H(10)	Article 600 Natural Features, §174-507 Steep Slopes	Article 1600 Conservation Subdivision Design
McCandless Township	§1363.28-32, §1371.02-03	§1311.09.3 (a)	Ord. 1235, §1341.03.d(16)	no	no	no	§1342.06.c	§1371.12 Recreational Areas and Open Space	§1371.09 Preservable Trees
McDonald Borough	Article V Sec 780-519 (county)	Article V Sec. 780-503	Article V Sec. 780-503.C.4	Article V Sec. 780-509	Appx. 5-2 (county)	100% predevelopment	Appx 5-3 (county)	Sec. 780-515(C/D) (county)	Sec. 780-504-507 (county)
McKees Rocks Borough	?	?	?	?	?	?	?	?	Multi-municipal comp plan, 2011
McKeesport, City of	?	§408-61	§408-61	no	no	no	no	no	no
Millvale Borough	§780-503, Article V Sec 780-519	Article V §780-503	Article V Sec. 780-503.C.4	Article V Sec. 780-509	Appx. 5-2 (county)	100% predevelopment	Appx 5-3 (county)	Sec. 780-515(C/D) (county)	Sec. 780-504-507 (county)

Municipality	Road	Grading	Erosion & Sedimentation	Water Quality	Release Rates (Sec. or Not)	Release Rates (quantitative)	Infiltration Requirements	Sustainable /Green	Other
Monroeville, Municipality of	Ch. 320	§243-29	§319-4, §319-24, §324-14	Ch. 319 Article II	Ch. 319 Article I	§319-2.C(4)	§319-3	no	no
Moon Township	Ch. 21 §22-403	Ch. 9	Appendix 23-G, §9-118.C(5)	Appendix 23-H (A-C)	Appendix 23 (A-E)	Appendix 23(A-E)	Appendix 23-H	§22-404 Sidewalks and Trails	§27-422 Sensitive Natural Resources
Mt. Lebanon, Municipality of	Ch. 15	Ch. 6	§804.1	Ord. 3187 Section 2(C)	§809.4	§809.4.6.5	§809.4.6	Ch. 19 Trees, §707 Shade Tree Commission	Ord. No. 3187 Stormwater Collection and Management (Fee)
Mount Oliver Borough	§219-34	Ch. 124 and §219-31	§212-8	§212-7.F	§212-7	§212-7.E(3)	§212-7.D(2)	Ch. 42 Shade Tree Commission	
Munhall Borough	Ch. 385	Ch. 243 and §440-37	§§243-11 and 243-12, §379-4, §440-37	§1-16	§379-2	§379-2.C(3-4)	§379-2	§440-38 Vegetation Preservation	§440-40 Special recreation and open space requirements
Neville Township	§§802 and 12.10	§902.1	§301.D and §12.11	§301.C	§301.K, §303	§304	§301.J	§911.1 Street Trees	no
North Braddock Borough	Article V Sec 780-519	Article V Sec. 780-503	Article V Sec. 780-503.C.4	Article V Sec. 780-509	Appx. 5-2 (county)	100% predevelopment	Appx 5-3 (county)	Sec. 780-515(C/D) (county)	Sec. 780-504-507 (county)
North Fayette Township	§22-504	§22-503.3, Ch.9	§19-703-704	§19-601.7	§19-502	§19-502.E; Appendix 19-A	§19-804		§27-502. Existing Conditions; Sensitive to developme

Municipality	Road	Grading	Erosion & Sedimentation	Water Quality	Release Rates (Sec. or Not)	Release Rates (quantitative)	Infiltration Requirements	Sustainable /Green	Other
									nt of steep slopes
North Versailles Township	Ch. 260	Ch. 160	§255-11	Ch. 255 Article III	no	no	§255-12		§265-1101 Limitations on Steep Slope Disturbanc e
Oakdale Borough	Ord. No. 2007-3, §503 & §604	Ord. No. 2007-3, §603.1, §604.3-4, & §607.6	Ord. No. 2007-3, §603.1	no	no	no	no	no	no
Oakmont Borough	Ch. 112 & §173-6	§205-800.08(A)6 & §205-1113	§77-8	§157-23-24	Ord. No. O29-2013 §304	no	Ord. No. O29-2013 §303	Ch. 160 Shade Tree Commission	no
O'Hara Township	§1119-6.3	§1119-8.3	§72-17.135(G), §1295-2.9	§§1295-1.1, 1.5, 1.15	§1295- 4.2	§1295 Appendix A	§1295-4.1.3(B)4	Ord. No. 1237 (Renewable Energy) & Ord. No. 1280 (Riverfront Green Overlay District)	§72-17.135(C), Steep Slopes
Ohio Township	§112-13	?	§313-301(D) & §305-1401.9	§313-102 (C) & §305-1401.9	§313-303	§313-304	§313-701	Ord. No. 308 Shade Tree Commission	Steep slopes Ch. 257, Ord. 940

Municipality	Road	Grading	Erosion & Sedimentation	Water Quality	Release Rates (Sec. or Not)	Release Rates (quantitative)	Infiltration Requirements	Sustainable /Green	Other
Penn Hills, Municipality of	§2136-8.3	§2136-8.8	§2136-8.9	no	no	no	§2136-8.11(F)	no	no
Pennsbury Village Borough	Article V Sec 780-519	Article V Sec. 780-503	Article V Sec. 780-503.C.4	Article V Sec. 780-509	Appx. 5-2 (county)	100% predevelopment	Appx 5-3 (county)	Sec. 780-515(C/D) (county)	Sec. 780-504-507 (county)
Pine Township	§72-8	Ch. 48	§ 26-104	Ch. 73	no	no	§84-125	§78-48 Trees and woodlands; Not > 60% of woodlands may be cleared or developed, remaining 40% must be maintained as permanent open space	§78-49 Wetlands and watercourses; no development within 50'
Pitcairn Borough	Ch. 21	CH. 9	§26-104	Article VSec. 780-509	§26-103.3(A)	Appendix 26-A	§26-103	Sec. 780-515(C/D) (county)	Sec. 780-504-507 (county)
Pittsburgh, City of	?	§ 1003.17	?	?	?	?	?	§ 915.04. - Sustainable Development Bonuses	§ 906.04 Landslide-Prone Overlay District, § 906.08. - Steep Slope Overlay District

Municipality	Road	Grading	Erosion & Sedimentation	Water Quality	Release Rates (Sec. or Not)	Release Rates (quantitative)	Infiltration Requirements	Sustainable /Green	Other
Pleasant Hills Borough	§§ 322 - 2.02, 322-30	Ch. 222	§ 323-12	§ 323-13	§ 323-5.L(3)	§§ 322-9, 322-10	§ 323-5.O		
Plum Borough	Ord. No. 507-93, §903; Ord. No. 462, § II	Ord. No. 507-93, § 1012	Ord. No. 491-92, § 105	491-92, § 103.B(3)	§ 491-92.C(3-4)	§ 491-92.C(3-4)	§ 491-92.C(3-4)		
Port Vue Borough	no	no	no	no	no	no	no		
Rankin Borough	Article 4 (SALDO)	§ 514.3	§ 507.4	no	no	no	no		§ 507 Steep Slopes
Reserve Township	Ord. No. 549 Section 5.1	Ord. No. 402	§ 110	no	§ 108.3	no	no		
Richland Township	Chapter 21	Chapter 9	§26-110	Yes	§ 26-116, Subsection 2B(1)	§ 26-115B, Appendix A	§ 26-114.2	§ 26-114.3c	§ 27-601
Robinson Township	Ch. 245	Ch. 146	§ 146-22; § 240-45; § 268-9	§ 240-38	§ 240-14	§ 240-14	§ 240-13	§ 300-178 Tree and Vegetation Protection	§ 300-176 Steep Slopes provision
Ross Township	Ch. 21	Ch. 9	§ 22-618	§ 23-101	Appendix 23-A	Appendix 23-A	Ch. 23		
Rosslyn Farms Borough	Ch. 158	§ 120-15; § 170-20	§ 187-12B(3)(n)	§ 1401.9 Water Pollution	no	no	no	§ 187-40 Street trees	
Scott Township	Ord. No. 1194 Article III § 3(B)	Ord. No. 619 as amended through Ord. Nos.	Ordinance 937 § 4-103	Ord. No 1541-04 §404	Ord. No 1541-04 §404	Ord. No 1541-04 §404	Ord. No 1541-04 Appendix 3(C)	Ordinance No. 937 PRD	Ordinance No. 1455 Steep Slopes

Municipality	Road	Grading	Erosion & Sedimentation	Water Quality	Release Rates (Sec. or Not)	Release Rates (quantitative)	Infiltration Requirements	Sustainable /Green	Other
		1335 & 1467							
Sewickley Borough	§505 & §506	Ch. 9	§ 110	§111	no	no	no		§ 402 Steep Slope Overlay
Sewickley Heights Borough	Ord. No. 295 § 9.07	Ord. No. 300	§7.06	no	no	no	§7.03	Ord. No. 303 Tree Protection and Timber Harvest Management	
Sewickley Hills Borough	§ 503	Ord. No. 2 (1990)	Ord. No. 3 1990 § 2-2.G; § 511		Ord. No. 3 1990 § 2	Ord. No. 3 1990 § 2	no		§ 701 Natural Resource Protection Standards
Shaler Township	Ch. 192	§ 140-6	§ 190-9	§ 218-19	§ 190-15	§ 190-15	§ 190-12	Article XIX PRD	
Sharpsburg Borough	§ 503, § 504	§ 507	§ 512	no	no	no	no	Ord. No. 13-10 Riverfront Green Overlay District	
South Fayette Township	§ 215-74	Ch. 163-4	§ 163-13	no	no	no	no	§ 215-84.1 wetland buffers	§ 215-70 Mandatory dedication of open space or payment of

Municipality	Road	Grading	Erosion & Sedimentation	Water Quality	Release Rates (Sec. or Not)	Release Rates (quantitative)	Infiltration Requirements	Sustainable /Green	Other
									fees in lieu thereof
South Park Township	Ord. 560	Ord. No. 599	Ch. 63	no	no	no	no		
South Versailles Township	§ 502	§ 506	§ 609		§ 606.4	no	no		
Springdale Borough	?	?	?	?	?	?	?		
Springdale Township	Ord. No. 76	no	no	no	no	no	no		
Stowe Township	Article V Sec 780-519	Ch. 9	§ 123.2	Article V Sec. 780-509	CH. 26, § 111, Appx. 5-2 (county)	§ 121.2, 100% predevelopment	Appx 5-3 (county)	Sec. 780-515(C/D) (county), Conservation Districts	Sec. 780-504-507 (county)
Swissvale Borough	§ 22-305	§ 22-308; Ch. 9	§ 9-113; § 22-308	§ 26-301-26.304	Ch. 26, Appendix A	no	§ 26-304.3(A)	§ 22-302 Retain natural land features	Ch. 26 Appendix A, Low impact development
Tarentum Borough	Article V Sec 780-519	Article V Sec. 780-503	Article V Sec. 780-503.C.4	Article V Sec. 780-509	Appx. 5-2 (county)	100% predevelopment	Appx 5-3 (county)	§ 265-406 Riverfront Overlay, Sec. 780-515(C/D) (county)	§ 265-301.I, steep slopes, Sec. 780-504-507 (county)
Thornburg Borough	Ch. 21	Ch. 9; § 22-601	§ 27-1411; § 22-616	§ 9-117	no	no	§ 9-117	Ch. 25 Part I Shade Tree Commission	§ 27-401 Conservancy District

Municipality	Road	Grading	Erosion & Sedimentation	Water Quality	Release Rates (Sec. or Not)	Release Rates (quantitative)	Infiltration Requirements	Sustainable /Green	Other
Trafford Borough	Ch. 170	Ch. 99	§ 172-11	Ch. 172 Art III Stormwater Management for Water Quality	no	no	no	Ch. 141 Parks, Recreation, and Conservation Land	§ 202-10.H Permanent Preserve District (slopes)
Turtle Creek Borough	no	Ord. No. 1010	no	no	no	no	no	na	na
Upper St. Clair Township	Ch. 112	Ch. 71	§ 99.3.3	?	no	no	no	§ 114.30.3 open space and preservation of natural features	§ 130.7.15 steep slopes
Verona Borough	§ 220-19; § 220-22	§ 220-19	§ 220-27	no	no	no	no	§ 220-25 Landscaping	Slopes § 220-17
Versailles Borough	Article V Sec 780-519	Article V Sec. 780-503	Article V Sec. 780-503.C.4	Article VSec. 780-509	Appx. 5-2 (county)	100% predevelopment	Appx 5-3 (county)	Sec. 780-515(C/D) (county)	Sec. 780-504-507 (county)
Wall Borough	§ 265-902	CH. 160; § 265-906	§ 255-11	§ 255-12	no	no	§ 255-12	265-201.17 Environmentally Sensitive Areas	§ 265-1101 Limitations on slope disturbance; 265-201{46} Steep Slopes
West Deer Township	§185-26	§185-38	§185-36	§185-32	no	no	no	§185-54; § 210-64	§210-81 PRD
West Elizabeth Borough	Article V Sec 780-519	Article V Sec. 780-503	Article V Sec. 780-503.C.4	Article V Sec. 780-509	Appx. 5-2 (county)	100% predevelopment	Appx 5-3 (county)	Sec. 780-515(C/D) (county)	Sec. 780-504-507 (county)

Municipality	Road	Grading	Erosion & Sedimentation	Water Quality	Release Rates (Sec. or Not)	Release Rates (quantitative)	Infiltration Requirements	Sustainable /Green	Other
West Homestead Borough	§ 27-1113	§ 27-1113; §22-503	§ 27-1114?	§22-509	?	?	?	§22-504. Protection of Steep Slopes	Ch. 27 Part IX Waterfront Development District
West Mifflin Borough	Chapter 246	Chapter 141, § 250-26	§ 141-13, § 250-27	§ 240-2.C; § 240-3	Chapter 290 Article XIII	no	no	§ 10-1 Shade Tree Commission	Chapter 17 Planned Residential Development; Flood District Overlays
West View Borough	Chapter 245	Chapter 172	§ 240-3	§ 240-9	no	no	§ 240-3		na
Whitaker Borough	§ 810	§ 809.1	§ 809.1	§ 802	§ 814.4.F	no	no		Zoning Ordinance, Article 9 - Slope District
White Oak Borough	§1339; §1391.04	§1367.02	941.03C	§941.03	no	no	no	Appendix A Low Impact Development	§1367.01 Removal of Natural Growth
Whitehall Borough	Chapter 154	Chapter 107	Chapter 152; §153.32	no	§153.28	60%-100% based on Zone	no	§ 180.144 Solar Energy	§ 166.1. Permit required to trim or remove trees.
Wilkins Township	Chapter 144	Chapter 94	§ 94.2	§ 148.24	§ 148.24.C(4)	Chapter 148 Appendix A	§ 148.24.C(3)	148.28 Open space, lot siting beautification for subdivision	§ 173.59, § 173.60, Floodway Districts

Municipality	Road	Grading	Erosion & Sedimentation	Water Quality	Release Rates (Sec. or Not)	Release Rates (quantitative)	Infiltration Requirements	Sustainable /Green	Other
								and land developments; § 173.24 Removal of topsoil	
Wilkinsburg Borough	§ 229-27	§ 154-17	§ 229-46	§ 224-11	no	no	§ 224-11	Ch. 221 - Tree management	Ch. 260 Article V Transit Oriented Dev. Overlay
Wilmerding Borough	Chapter 265	Chapter 160	§ 260.4	no	no	no	§ 260-3	na	na

RELATED PLANS

Review of previous planning efforts is another important component of regional planning. An analysis of previous plans, and the results achieved through implementation of recommendations within those plans, provides invaluable information for current and future planning efforts. The following table is a summary of related plans:

Table 10.8 - Related Plans Review

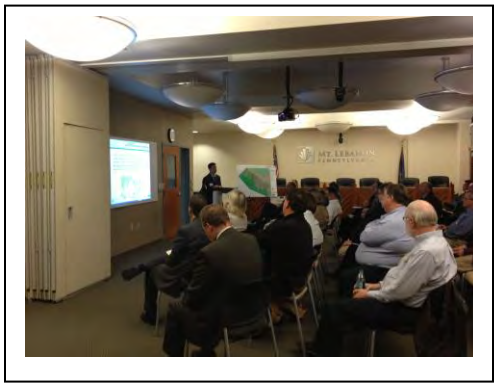
Plan Title	Author	Date
Allegheny Places – Allegheny County Comprehensive Plan	Allegheny County Economic Development, Planning Division & McCormick Taylor, Inc., et. al.	December 2008
Allegheny County 2015 Hazard Mitigation Plan Update	Michael Baker Jr., Inc.	October 5, 2015
Allegheny County Stormwater Management Plan – Phase I Report	Michael Baker Jr. Inc.	December 2014
Act 167 Stormwater Management Plan Update – Girtys Run, Pine Creek, Squaw Run and Deer Creek Watersheds	Art Gazdik, P.E., Ross Township Engineer and the Watershed Planning Advisory Committee	April 28, 2008
Flaugherty Run Watershed Stormwater Management Plan Act 167	GAI Consultants	July 1998
Little Sewickley Creek Watershed Act 167 Stormwater Management Plan	URS Corporation	Volume I (2001) Volume II (2002)
Monongahela River Watershed Act 167 Stormwater Management Plan	Chester Environmental	February 1993
Montour Run Watershed Stormwater Management Plan	GAI Consultants	February 1989
Turtle Creek Watershed Act 167 Stormwater Management Plan	The Chester Engineers	December 1991

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Section 11 – Provisions for Plan Implementation, Review, and Update

PLAN REVIEW AND ADOPTION

The opportunity for local review of the draft Stormwater Management Plan is a prerequisite to County adoption of the PLAN. Local review of the PLAN is facilitated by the County through the WPAC. Local review of the PLAN was initiated with the completion of the draft PLAN by the County and distribution to the WPAC members on September 20, 2016. Presented below is a chronological listing and brief narrative of the required local review steps through County adoption.



1. WPAC Review / Municipal Review - The Watershed Plan Advisory Committee was formed to assist in the development of the PLAN. The WPAC included all 130 municipalities; regional planning agencies; County officials and department heads; County Council; Councils of Government (COGs); Allegheny County Conservation District (ACCD) and CCDs in adjacent counties; water and sewer authorities (PWSA and ALCOSAN); federal and state regulatory agencies including PaDEP and PaDOT; watershed associations; environmental groups; and other regional organizations involved with stormwater management. See the Acknowledgement Section for a complete list of the individual WPAC members. Members of the WPAC have contributed to the process in the form of storm drainage problem area identification, storm sewer documentation, identification of flood and stormwater control facilities, etc. During Phases 1 and 2, the WPAC met six times to review the progress of the PLAN. Municipal representatives on the WPAC had the responsibility to report on the progress of the PLAN to their municipalities. Review of the draft PLAN by the WPAC was expedited by the fact that the members were already familiar with the objectives of the PLAN, the runoff control strategy employed, and the basic contents of the PLAN. Comments received from the WPAC contributed to revisions of the draft PLAN for Municipal and County consideration.

a. Municipal Engineers Review – WPAC #4 was specifically identified as being for the municipal engineers to provide input as well as comments and direction in the development of the Model Ordinance and implementation requirements of the PLAN. Municipalities were encouraged to invite their municipal engineers to attend this and other WPAC meetings.

b. WPAC #5 presented and distributed the Draft Stormwater Management Plan and Draft Model Ordinance on September 20, 2016. The hydrologic model was reviewed and several portions of the Draft Model Ordinance were highlighted for the WPAC to provide input as well as insights, comments and direction. This meeting began the comment period on the Draft PLAN. The WPAC members were encouraged in the August 25 letter and during WPAC #5 to carefully review the PLAN to ensure that it meets each community's stormwater concerns and needs. The CDs of the Draft PLAN were distributed to the WPAC members at the September 20 meeting; were mailed on September 26 to those who did not attend; and was posted on the Allegheny County Stormwater Management Plan (SWMP) website on September 27 along with the WPAC #5 PowerPoint presentation. While feedback/comments were requested within 2 months through November 21, 2016, comments were accepted through January 13, 2017. Twenty-three WPAC members provided approximately 263 comments on the September 20 draft PLAN. The

comments are included in *Appendix F* and range from comments on how to improve the wording to how the Model Ordinance is or is not consistent with other ordinances, plans, and programs for the County's watersheds. The submitted written comments encompassed all comments made during the WPAC #5 meeting. Responses were developed for each comment, either describing how the comment was incorporated into the PLAN or explaining why it could not be. The responses were mailed to the respective commenter and are also included in *Appendix F*. The PLAN and Model Ordinance were revised in January to address the comments received to that point.

c. Legal Advisory Review – WPAC #6 (February 15, 2017) was specifically identified as being focused on the legal aspects of the PLAN and for the municipal solicitors to provide input as well as comments and direction on the development and adoption of the Model Ordinance and implementation requirements of the PLAN. WPAC #6 was announced and the revised Model Ordinance was distributed to the entire WPAC membership on February 3, 2017 and placed on the SWMP website. Municipalities were encouraged to invite their municipal solicitors to attend this meeting. As discussed at the WPAC #6 meeting and noted in the announcement, an additional period was provided for comments on the revised Ordinance and PLAN. The comments provided by six WPAC members are included in *Appendix F* along with the responses which were sent to the respective commenter. The submitted written comments encompassed all comments made during the WPAC #6 meeting.

2. County Review and Adoption - Following review by the WPAC members and each municipality, the draft PLAN will be submitted to Allegheny County Council to begin the formal adoption process. In accordance with County procedures, the PLAN will be read at one meeting and voted on at a later meeting. Act 167 requires a public hearing on the PLAN to be held, pursuant to public notice.

3. Review and Approval by PaDEP – After the PLAN has been adopted by Allegheny County, it will be submitted to PaDEP for review and approval, along with the comments received from the WPAC members. The PaDEP has 90 days to review and comment on the PLAN. If no comments are received, the PLAN becomes effective.

IMPLEMENTATION OF THE PLAN

Upon final approval by PaDEP, each municipality within the County will become responsible for implementation of the PLAN. PLAN implementation 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 Table 11.1 below. It may be advantageous for multiple municipalities to implement the PLAN cooperatively or even on a county-wide basis.

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.

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. Two areas are highlighted:

1. It is recommended that the resulting regulatory framework be reviewed by the municipal engineer, 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.
2. Training and education are essential to administration of the ordinances and plan reviews. Some suggestions to aid in implementation include: periodic training for reviewers; development of a guidance manual; and correlation of the number of reviews performed and the results by an agency staffed to administer this function.

PROCEDURE FOR UPDATING THE PLAN

Act 167 specifies that the County must review and, if necessary, revise the adopted and approved County PLAN every five years, at a minimum. Any proposed revisions to the PLAN would require municipal and public review prior to County adoption consistent with the procedures outlined above. An important aspect of the PLAN is a procedure to monitor the implementation of the PLAN and initiate review and

revisions in a timely manner. The process to be used for the Allegheny County Act 167 Stormwater Management Plan will be as outlined below.

1. Monitoring of the PLAN Implementation - Allegheny County will be responsible for monitoring the implementation of the PLAN by maintaining a record of all development activities within the study area. Development activities are defined and included in the Model Ordinance. Specifically, the County will monitor the following data records:
   a. All subdivision and land developments subject to review per the PLAN which have been approved within the study area.
   b. All building permits subject to review per the PLAN which have been approved within the study area (municipalities would have to voluntarily provide).
   c. All PaDEP permits issued under Chapter 105 (Dams and Waterway Management) and Chapter 106 (Floodplain Management), including location and design capacity (if applicable).

2. Review of Adequacy of the PLAN - The WPAC will be convened periodically to review the PLAN and determine if the PLAN is adequate for minimizing the runoff impacts of new development. At a minimum, the information to be reviewed by the WPAC will be as follows:
   a. Development activity data as monitored by the County.
   b. Information regarding new or changed storm drainage problem areas as provided by the WPAC members.
   c. Zoning amendments within the study area.
   d. Information associated with any regional detention alternatives implemented within the study area.
   e. Adequacy of the administrative aspects of regulated activity review.

The WPAC will review the above data and make recommendations to the County as to the need for revision to the Allegheny County Act 167 Stormwater Management Plan. Allegheny County will review the recommendations of the WPAC and determine if revisions are to be made. A revised PLAN would be subject to the same procedure of adoption as the original PLAN preparation. Should the County determine that no revisions to the PLAN are required for a period of five years, the County will adopt a resolution stating that the PLAN has been reviewed by PaDEP and has been found to satisfactorily to meet the requirements of Act 167. The resolution will be forwarded to PaDEP.

MUNICIPALITY ADOPTION OF THE MODEL ORDINANCE

Allegheny County offered grants to municipalities to help them cover the cost of updating or adopting a compliant storm water management ordinance (SWMO). After the last WPAC meeting was held, the County continued to educate municipalities about the benefits of addressing MS4 requirements through the model SWMO and review procedures for amending and adopting ordinances at a number of events. These included the ALOM (Allegheny League of Municipalities) and the Three Rivers Wet Weather (3RWW) annual conferences in 2016, 2017 and 2018; and 3RWW's Working Group and Green Infrastructure (GIN) meetings in 2018.

It is the responsibility of each municipality to adopt a Storm Water Management Ordinance consistent with Allegheny County's Model Ordinance. The procedure outlined in Section 12, *"Failure of Municipalities to Adopt Implementing Ordinances"* of the State's Storm Water Management Act (Act 167) will be implemented for those municipalities not adopting the Ordinance. As referenced in Section 12 (c) all funds payable to the municipality from the General Fund may be withheld until the municipality adopts a Storm Water Management Ordinance that is consistent with the Model Ordinance.

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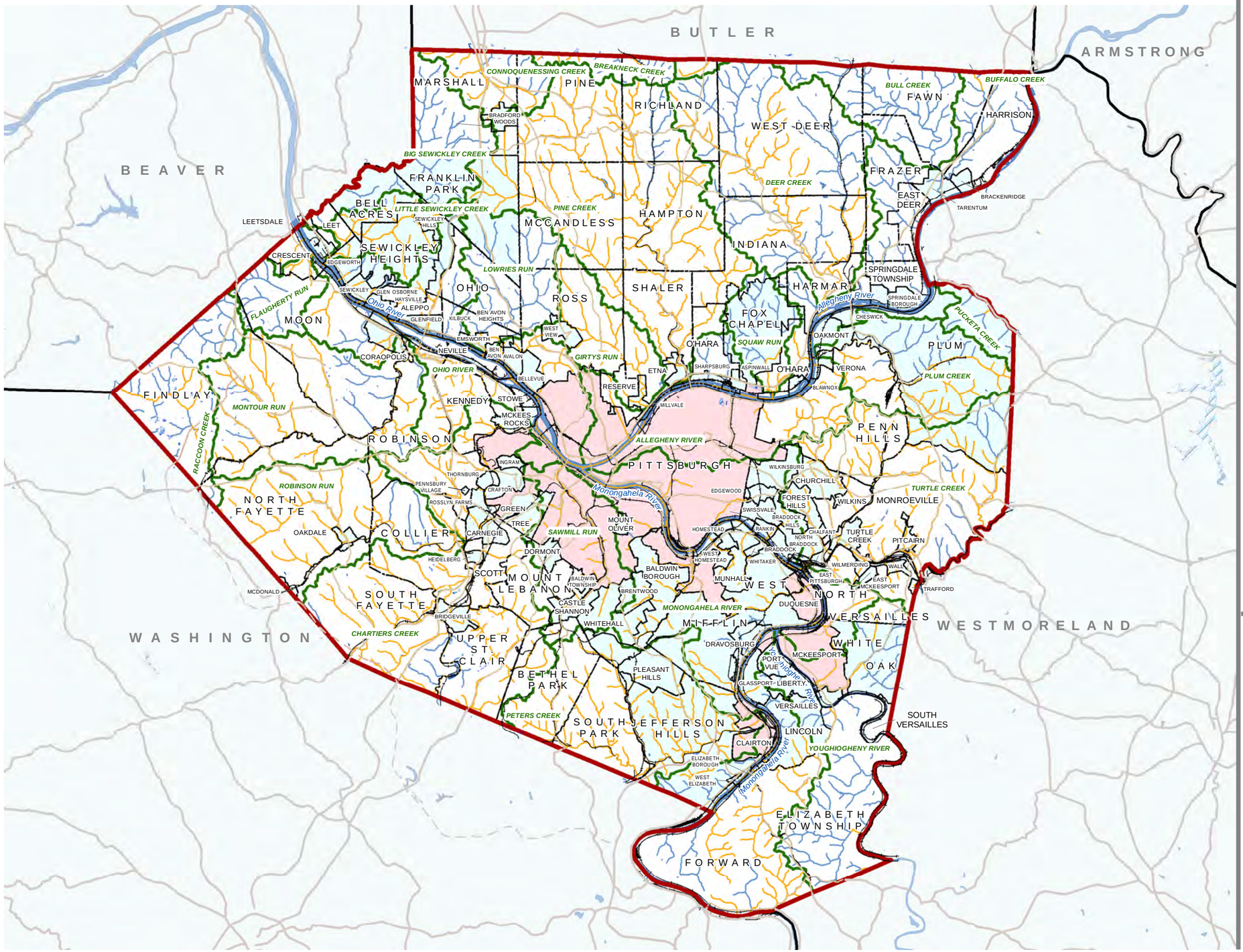
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MAP 1 through MAP 14

Map 1 - Base Map

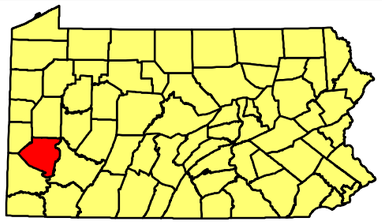
Allegheny County
Stormwater Management Plan



LEGEND

- Major Roadways
- Railroad
- Allegheny County Boundary
- Municipal Boundaries
- Bordering Counties
- Impaired Streams
- Streams
- Rivers, Lakes, and Ponds
- Reservoirs
- Act 167 Watersheds Boundaries
- City
- Borough

LOCATION MAP



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0 1 2 4 6 8 Miles

DATA SOURCES

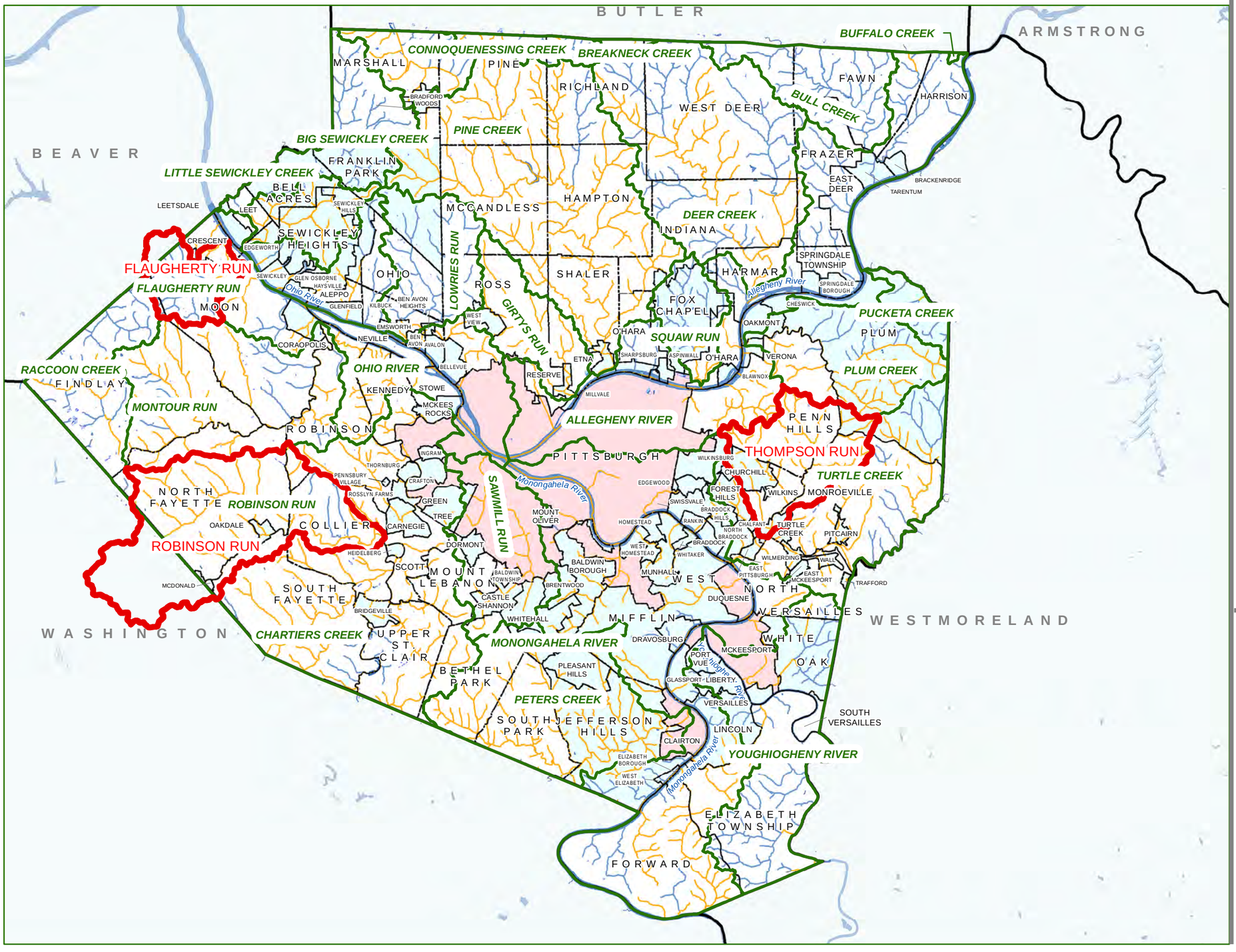
Allegheny County
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset
Pennsylvania Department of Environmental Protection

Michael Baker INTERNATIONAL

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Map 2 - Act 167 Designated Watersheds

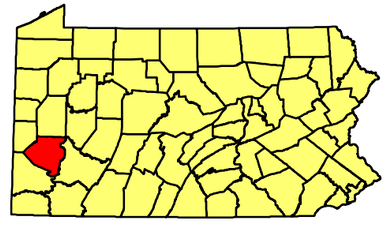
Allegheny County
Stormwater Management Plan



LEGEND

- Watershed Study Area
- Act 167 Watersheds Boundaries
- Municipal Boundaries
- Bordering Counties
- Impaired Streams
- Streams
- Rivers, Lakes, and Ponds
- Reservoirs
- City
- Borough

LOCATION MAP



N
W E
S

0 1 2 4 6 8 Miles

DATA SOURCES

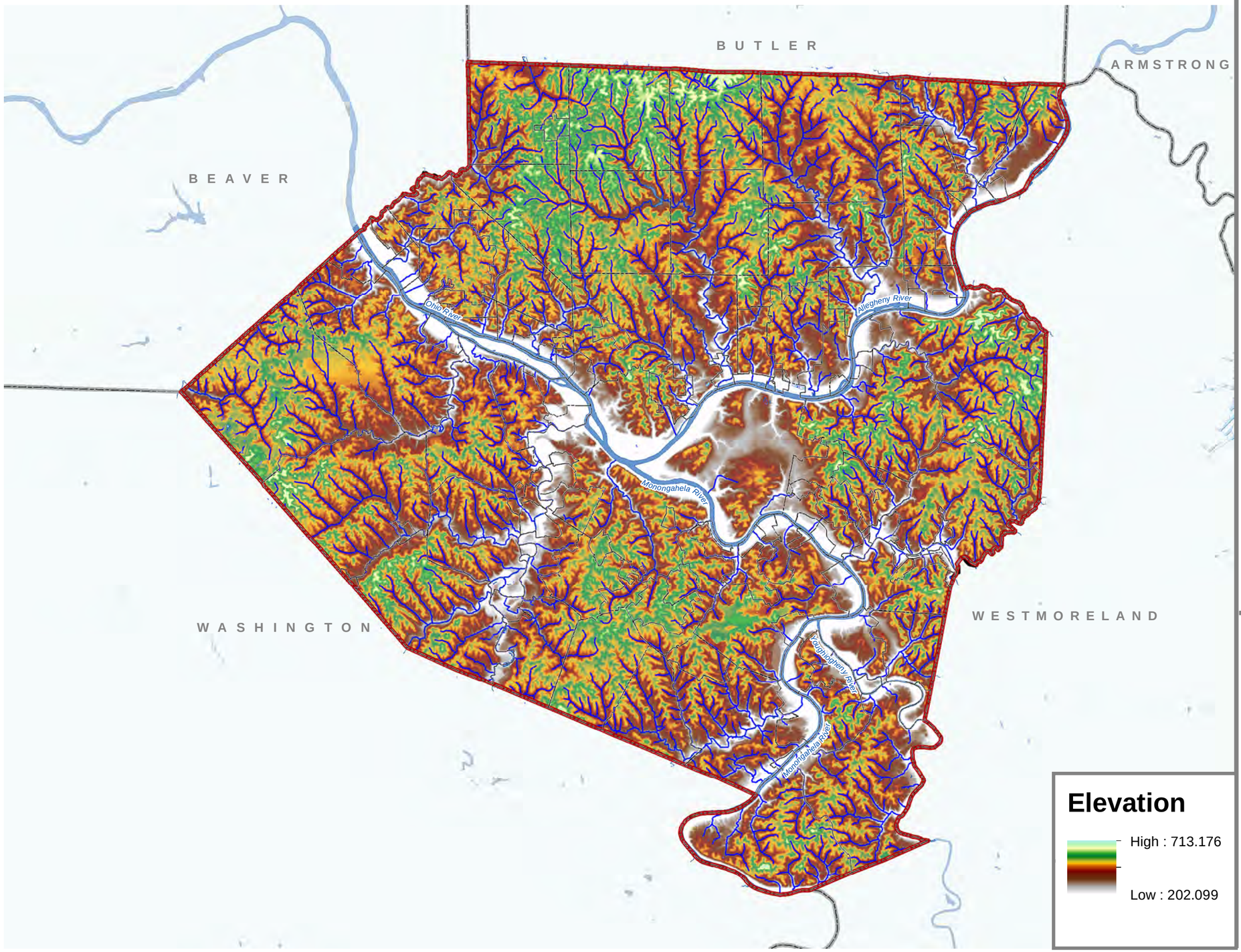
Allegheny County
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset
Pennsylvania Department of Environmental Protection

Michael Baker INTERNATIONAL

June 2016

Map 3 - Digital Elevation Model

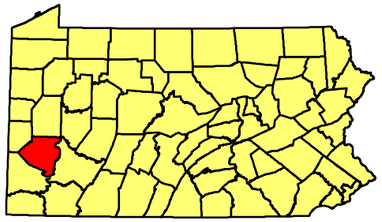
Allegheny County
Stormwater Management Plan



LEGEND

- Allegheny County Boundary
- Municipal Boundaries
- Bordering Counties
- Rivers, Lakes, and Ponds
- Reservoirs
- Streams

LOCATION MAP



N
W E
S

0 1 2 4 6 8 Miles

Elevation

High : 713.176

Low : 202.099

DATA SOURCES

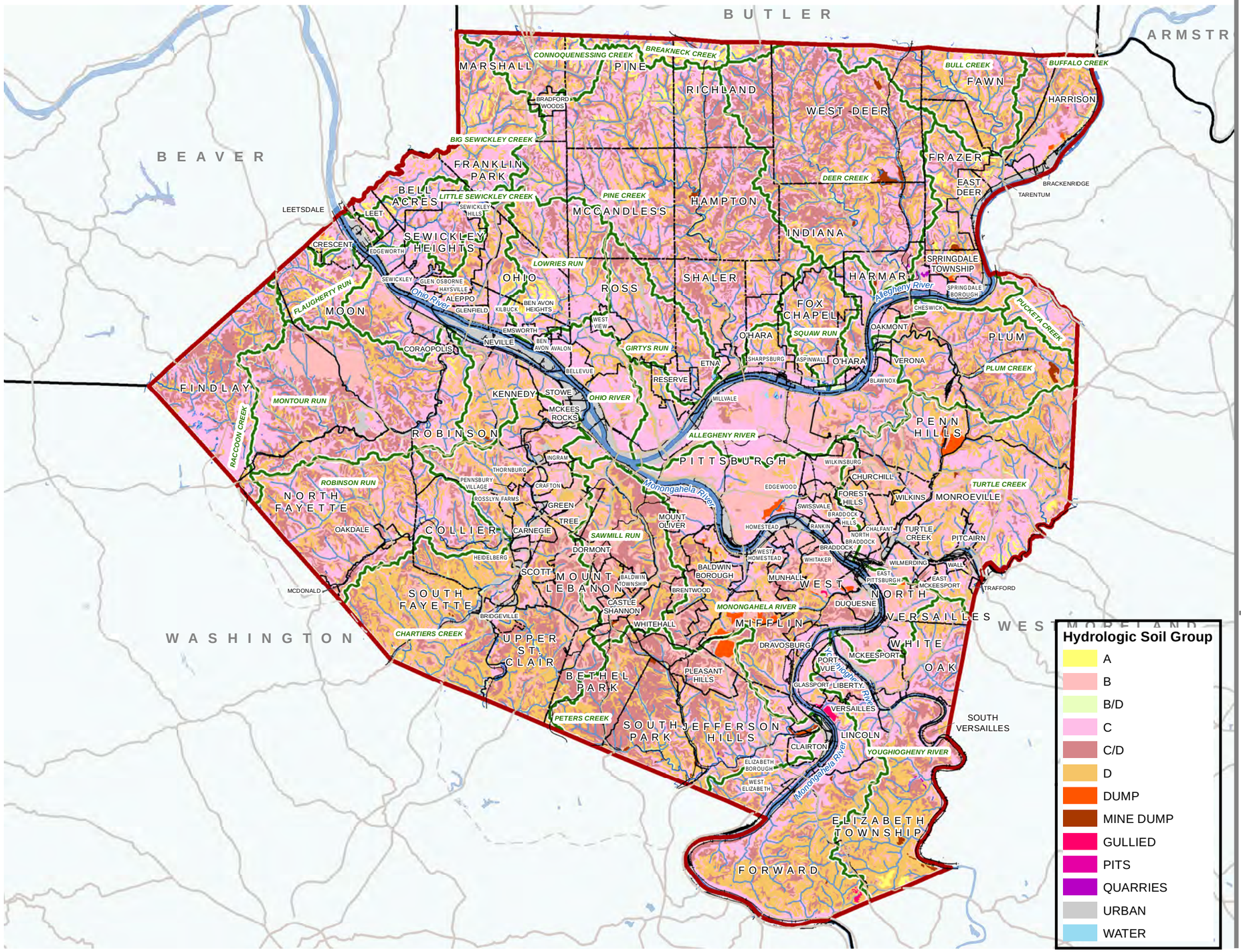
Allegheny County
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset
Digital elevation model - U.S. Geological Survey,

Michael Baker INTERNATIONAL

June 2016

Map 4 - Soils Information

Allegheny County
Stormwater Management Plan

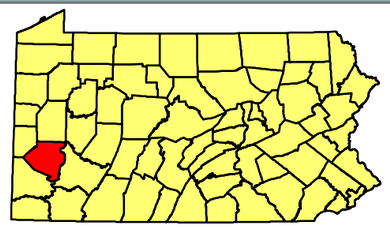


LEGEND

- Major Roadways
- Railroad
- Allegheny County Boundary
- Municipal Boundaries
- Bordering Counties
- Rivers, Lakes, and Ponds
- Reservoirs
- Streams
- Act 167 Watersheds Boundaries

Note:
See Section 4, Hydrologic Soil Groups For An Explanation Of The Soil Groups

LOCATION MAP



N
W E
S

0 1 2 4 6 8 Miles

DATA SOURCES

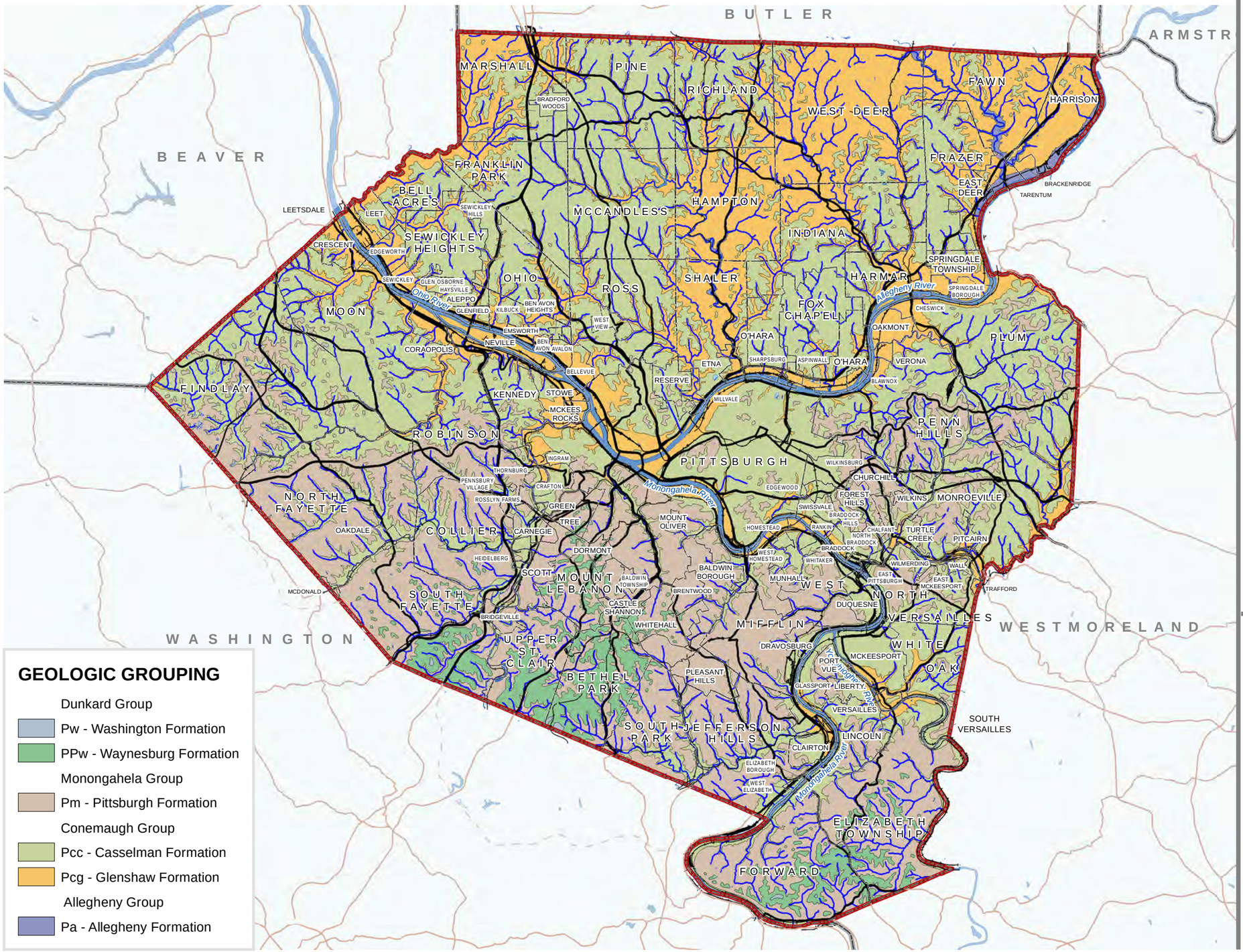
Allegheny County
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset
US Department of Agriculture,
Natural Resources Conservation service
Pennsylvania Department of Environmental Protection

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Map 5 - Geology

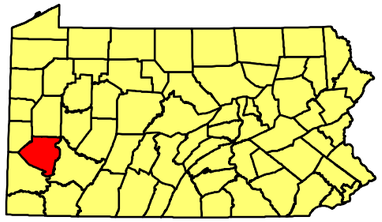
Allegheny County Stormwater Management Plan



LEGEND

- Municipal Boundaries
- Major Roadways
- Railroad
- Allegheny County Boundary
- Rivers, Lakes, and Ponds
- Reservoirs
- Streams

LOCATION MAP



GEOLOGIC GROUPING

Dunkard Group
- Pw - Washington Formation
- PPw - Waynesburg Formation

Monongahela Group
- Pm - Pittsburgh Formation

Conemaugh Group
- Pcc - Casselman Formation
- Pcg - Glenshaw Formation

Allegheny Group
- Pa - Allegheny Formation

N
W E
S

0 1 2 4 6 8 Miles

DATA SOURCES

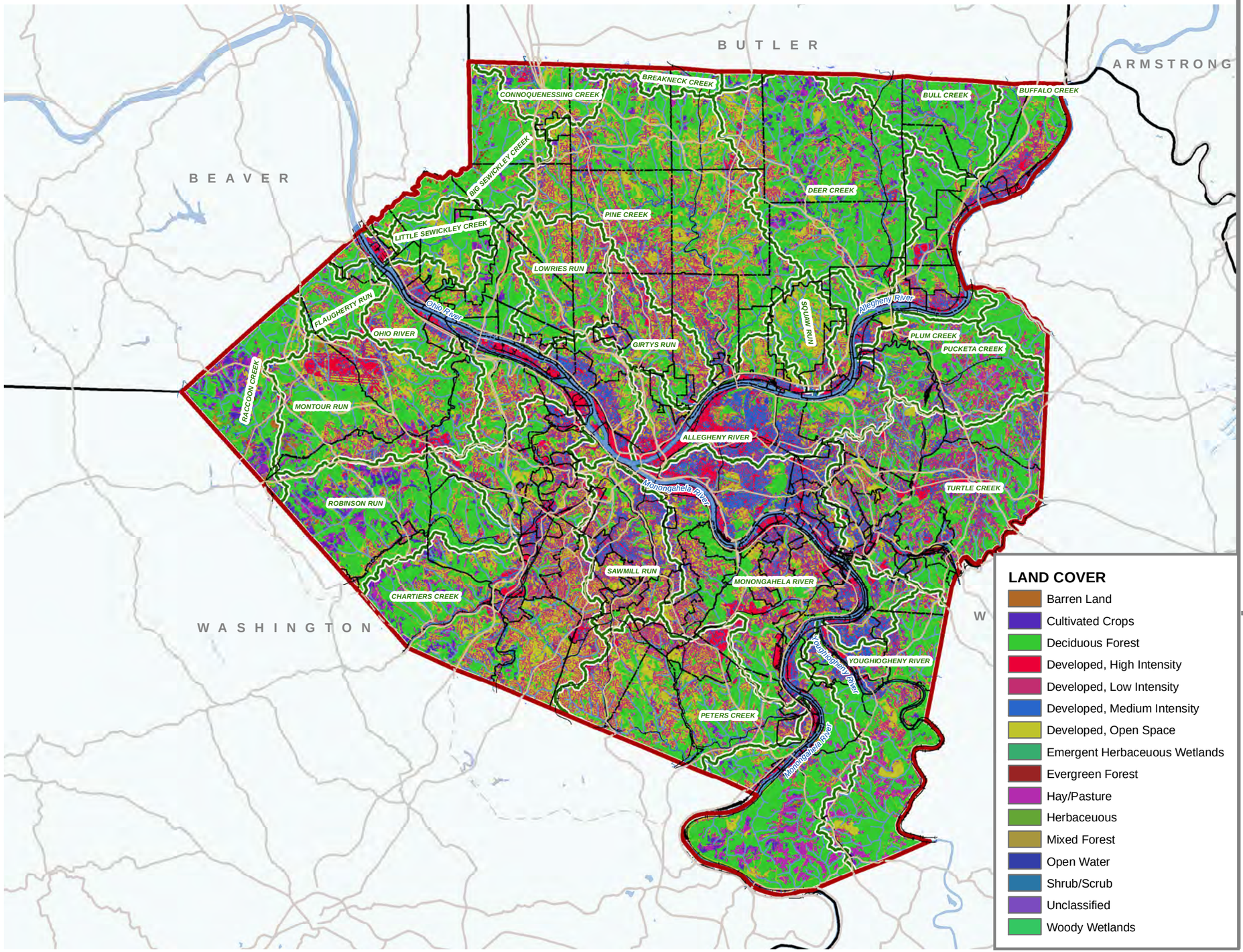
Allegheny County
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset
Geologic Features - DCNR - Pennsylvania Department of Conservation and Natural Resources
Pennsylvania Department of Environmental Protection

Michael Baker INTERNATIONAL

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Map 6 - Existing Land Use/Land Cover

Allegheny County
Stormwater Management Plan



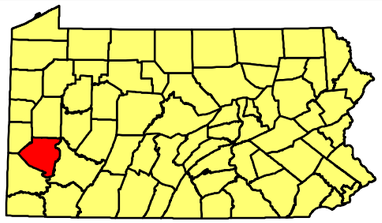
LEGEND

- Allegheny County Boundary
- Municipal Boundaries
- Bordering Counties
- Rivers, Lakes, and Ponds
- Reservoirs
- Streams
- Act 167 Watersheds Boundaries
- Major Roadways
- Proposed Roads
- Railroad

LAND COVER

- Barren Land
- Cultivated Crops
- Deciduous Forest
- Developed, High Intensity
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, Open Space
- Emergent Herbaceuous Wetlands
- Evergreen Forest
- Hay/Pasture
- Herbaceuous
- Mixed Forest
- Open Water
- Shrub/Scrub
- Unclassified
- Woody Wetlands

LOCATION MAP



N
W E
S

0 1 2 4 6 8 Miles

DATA SOURCES

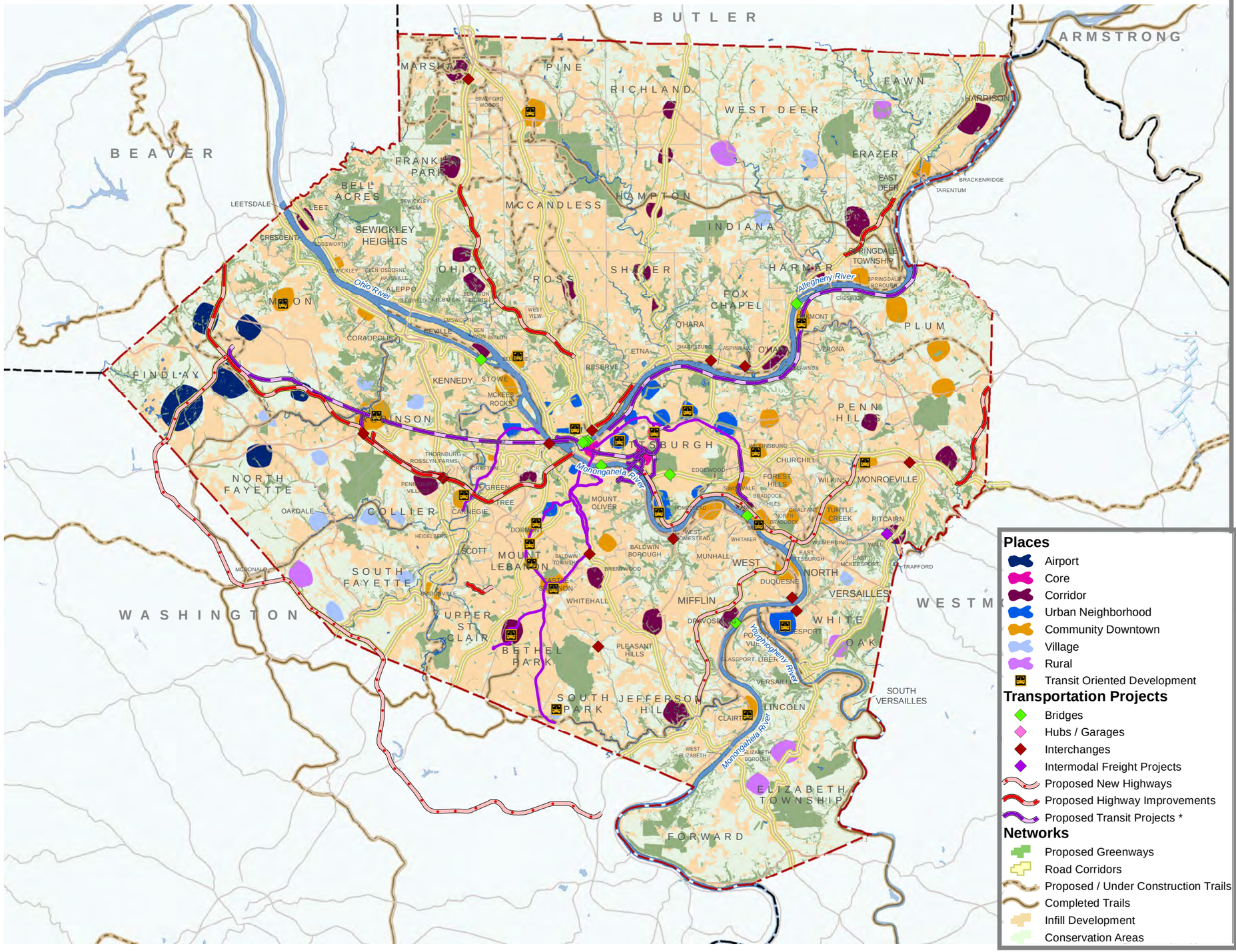
Allegheny County
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset
National Land Cover Database NLCD
Pennsylvania Department of Environmental Protection

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Map 7 - Future Land Use Conditions 2025

Allegheny County
Stormwater Management Plan



LEGEND

Base Map

- Allegheny County Boundary
- Municipal Boundaries
- Bordering Counties
- Hydrology
- Major Roadways
- Existing Transit System

* These alignments are conceptual, alternatives will be studied.

Places

- Airport
- Core
- Corridor
- Urban Neighborhood
- Community Downtown
- Village
- Rural
- Transit Oriented Development

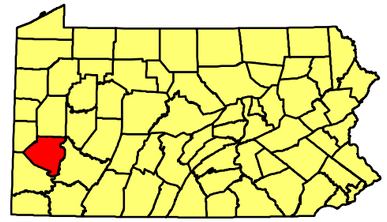
Transportation Projects

- Bridges
- Hubs / Garages
- Interchanges
- Intermodal Freight Projects
- Proposed New Highways
- Proposed Highway Improvements
- Proposed Transit Projects *

Networks

- Proposed Greenways
- Road Corridors
- Proposed / Under Construction Trails
- Completed Trails
- Infill Development
- Conservation Areas

LOCATION MAP



N
W E
S

0 1 2 4 6 8 Miles

DATA SOURCES

Allegheny County, Allegheny County Municipalities, City of Pittsburgh,
Southwestern Pennsylvania Commission,
Western Pennsylvania Conservancy, Individual Land Trusts
AirPhoto USA, Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission and
National Hydrography Dataset

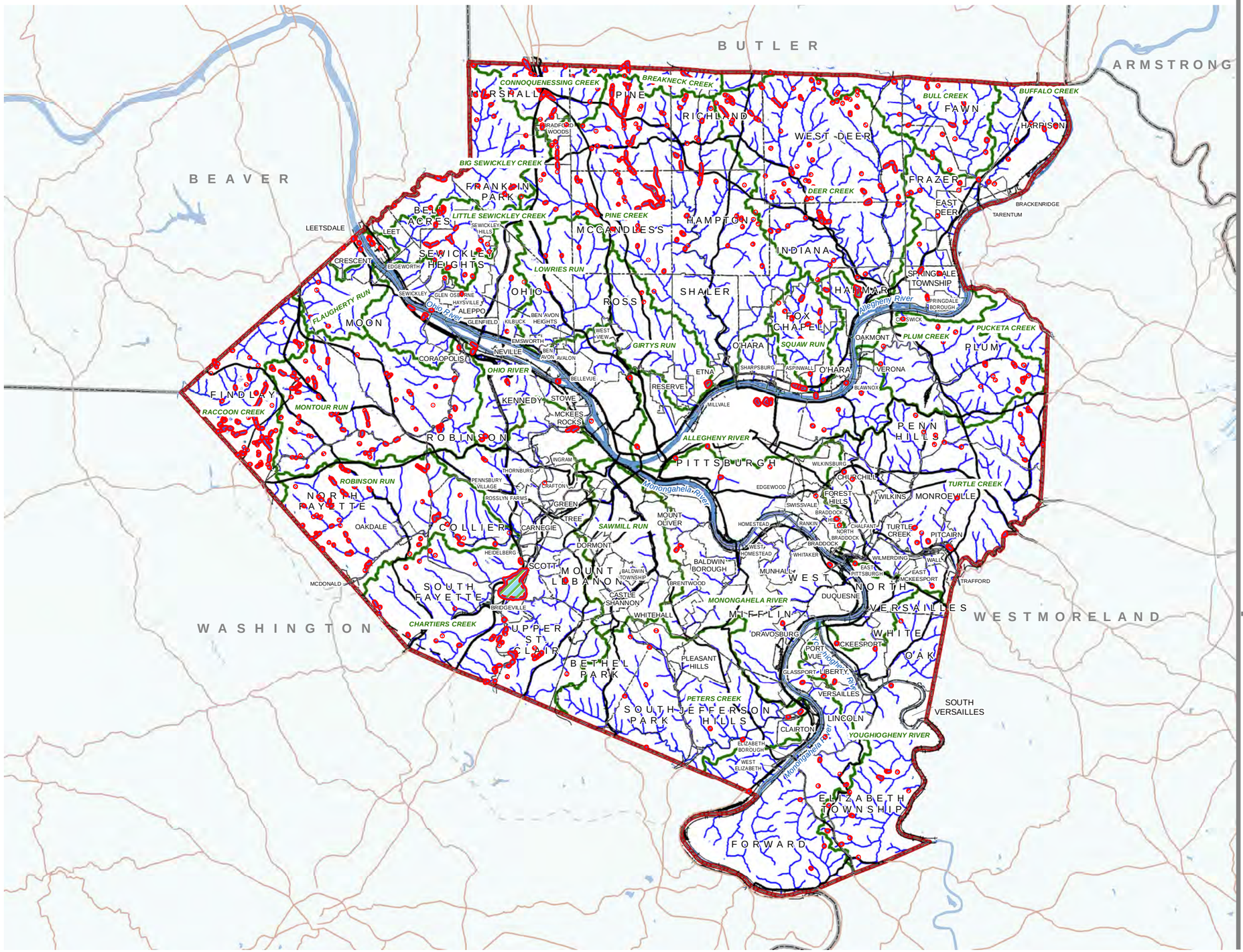
SOURCE: December 17, 2008
This map is property of Allegheny County and should be used for reference purposes only.

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Map 8 - Wetlands

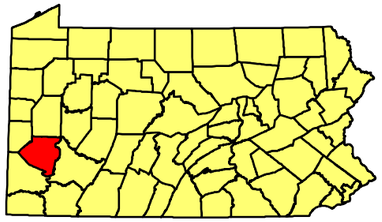
Allegheny County
Stormwater Management Plan



LEGEND

- Allegheny County Boundary
- Rivers, Lakes, and Ponds
- Reservoirs
- Streams
- Act 167 Watersheds Boundaries
- Wetlands
- Municipal Boundaries
- Major Roadways
- Railroad

LOCATION MAP



N
W E
S

0 1 2 4 6 8 Miles

DATA SOURCES

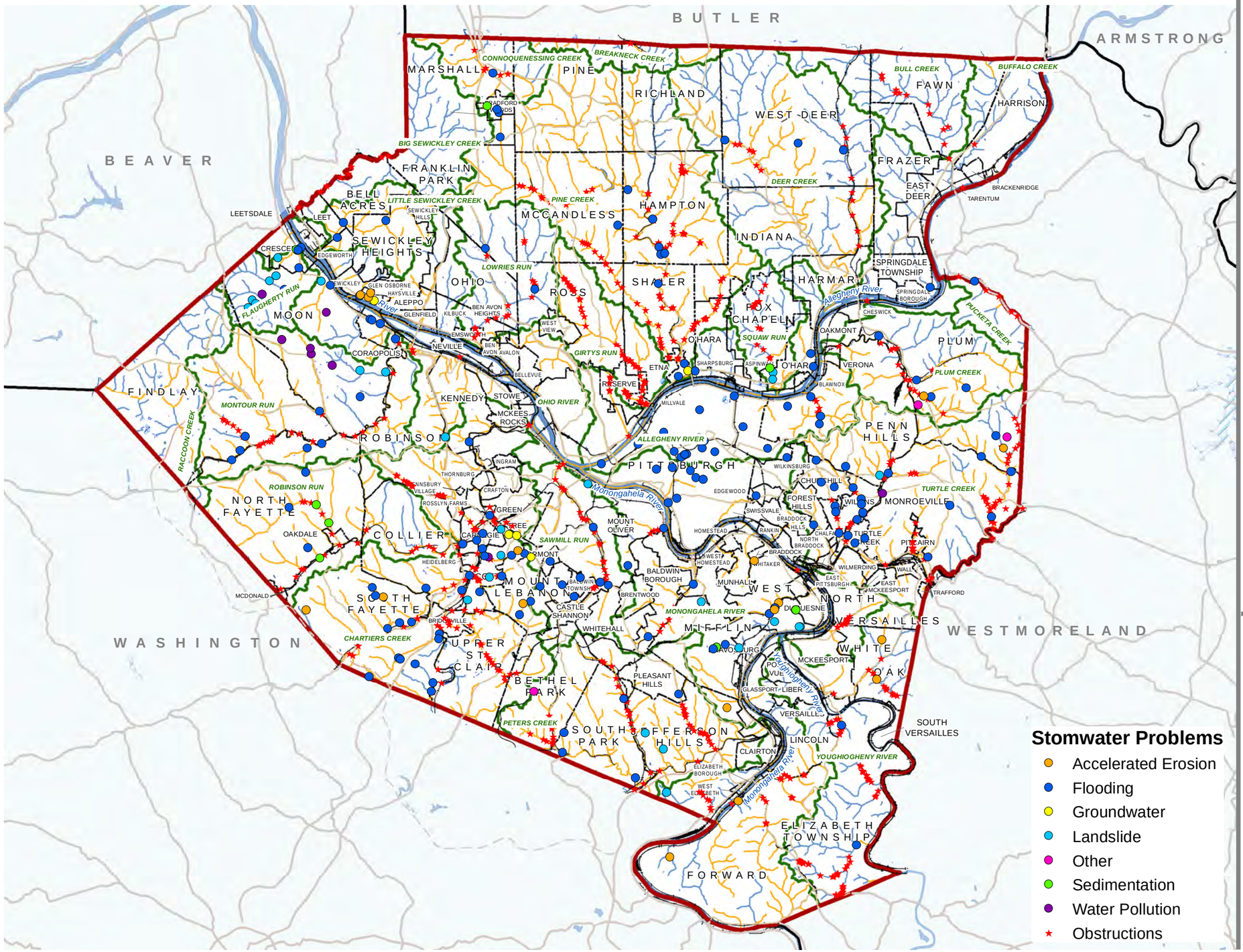
Allegheny County
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset
Wetland - The National Wetlands Inventory
Pennsylvania Department of Environmental Protection

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Map 9 - Stormwater Problems and Obstructions

Allegheny County
Stormwater Management Plan



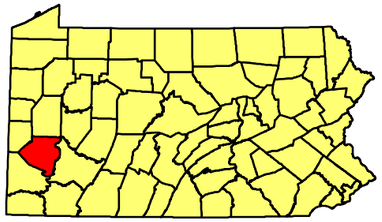
Stomwater Problems

- Accelerated Erosion
- Flooding
- Groundwater
- Landslide
- Other
- Sedimentation
- Water Pollution
- Obstructions

LEGEND

- Major Roadways
- Railroad
- Allegheny County Boundary
- Municipal Boundaries
- Bordering Counties
- Impaired Streams
- Streams
- Rivers, Lakes, and Ponds
- Reservoirs
- Act 167 Watersheds Boundaries

LOCATION MAP



N
W E
S

0 1 2 4 6 8 Miles

DATA SOURCES

Allegheny County
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset
Obstructions Source Federal Emergency Management Agency
Problem areas were Identified by Municipalities and Conservation district
Pennsylvania Department of Environmental Protection

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Map 10 - Water Resources

Allegheny County
Stormwater Management Plan



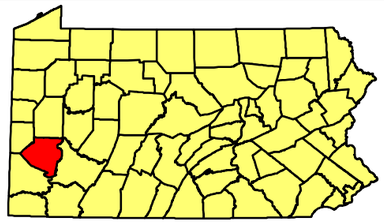
LEGEND

- Impaired Streams
- Streams
- Act 167 Watersheds Boundaries
- City
- Borough

Water Resources

- DISCHARGE
- GROUND WATER WITHDRAWAL
- INTERCONNECTION
- STORAGE
- SURFACE WATER WITHDRAWAL
- WATER ALLOCATION

LOCATION MAP



N
W E
S

0 1 2 4 6 8 Miles

DATA SOURCES

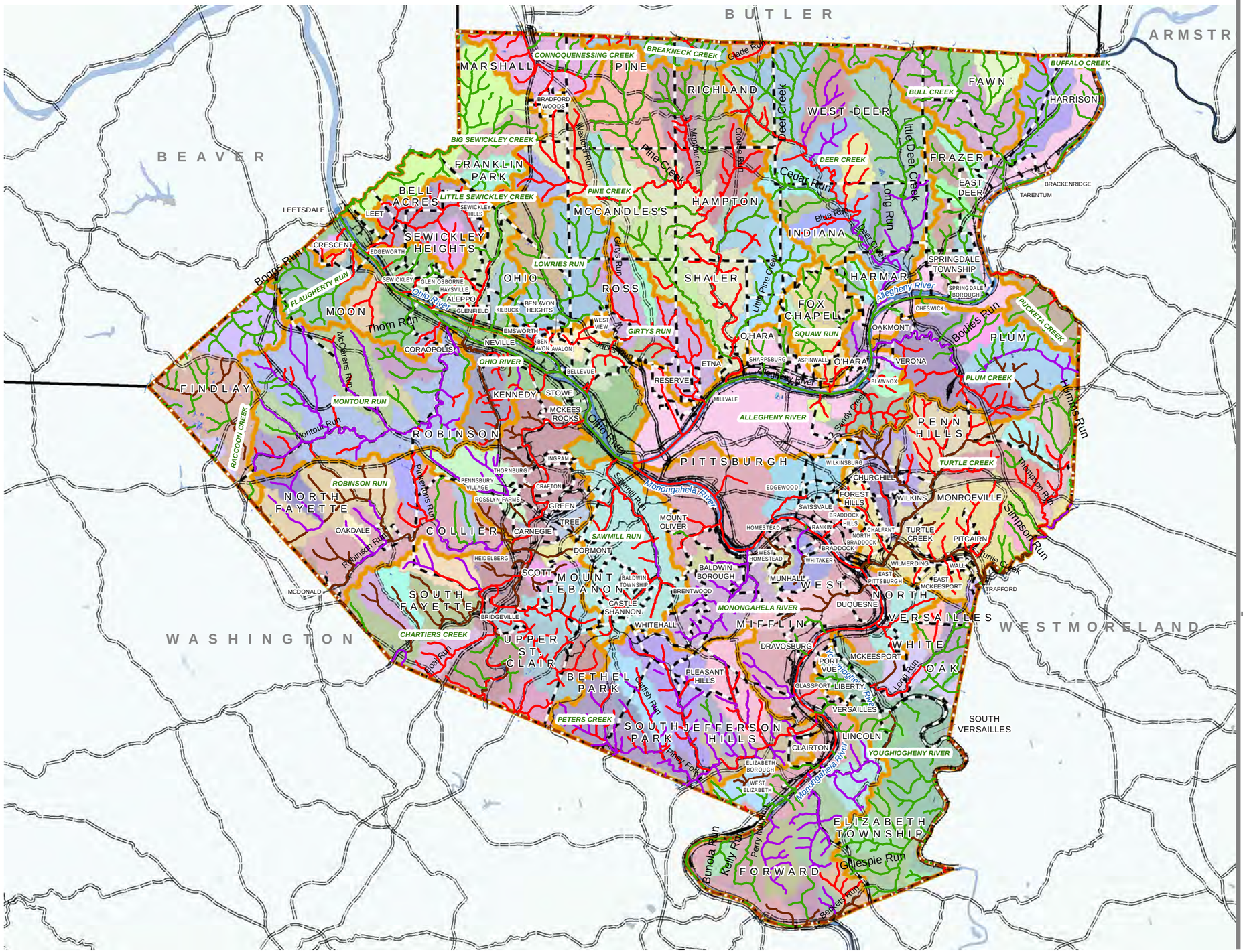
Allegheny County
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset
Water Resources, Pennsylvania Spatial Data Access (PASDA)
Pennsylvania Department of Environmental Protection

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Map 11 - Stream Water Quality

Allegheny County
Stormwater Management Plan

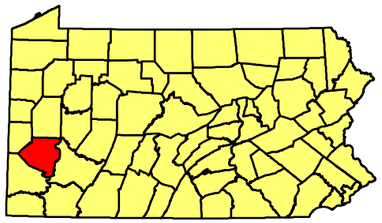


LEGEND

- Stream Attaining Designated Use
- Stream Impaired for Designated Use (Non-AMD)
- Stream Impaired for Designated Use (Other Pollutants and AMD)
- Stream Impaired for Designated Use by Acid Mine Drainage (AMD) Only
- Major Roadways
- Allegheny County Border
- Municipality Borders
- Act 167 Watersheds Boundaries

Note:
Only Significance Of The Colors Is To Identify Sub-Watersheds.

LOCATION MAP



N
W E
S

0 1 2 4 6 8 Miles

DATA SOURCES

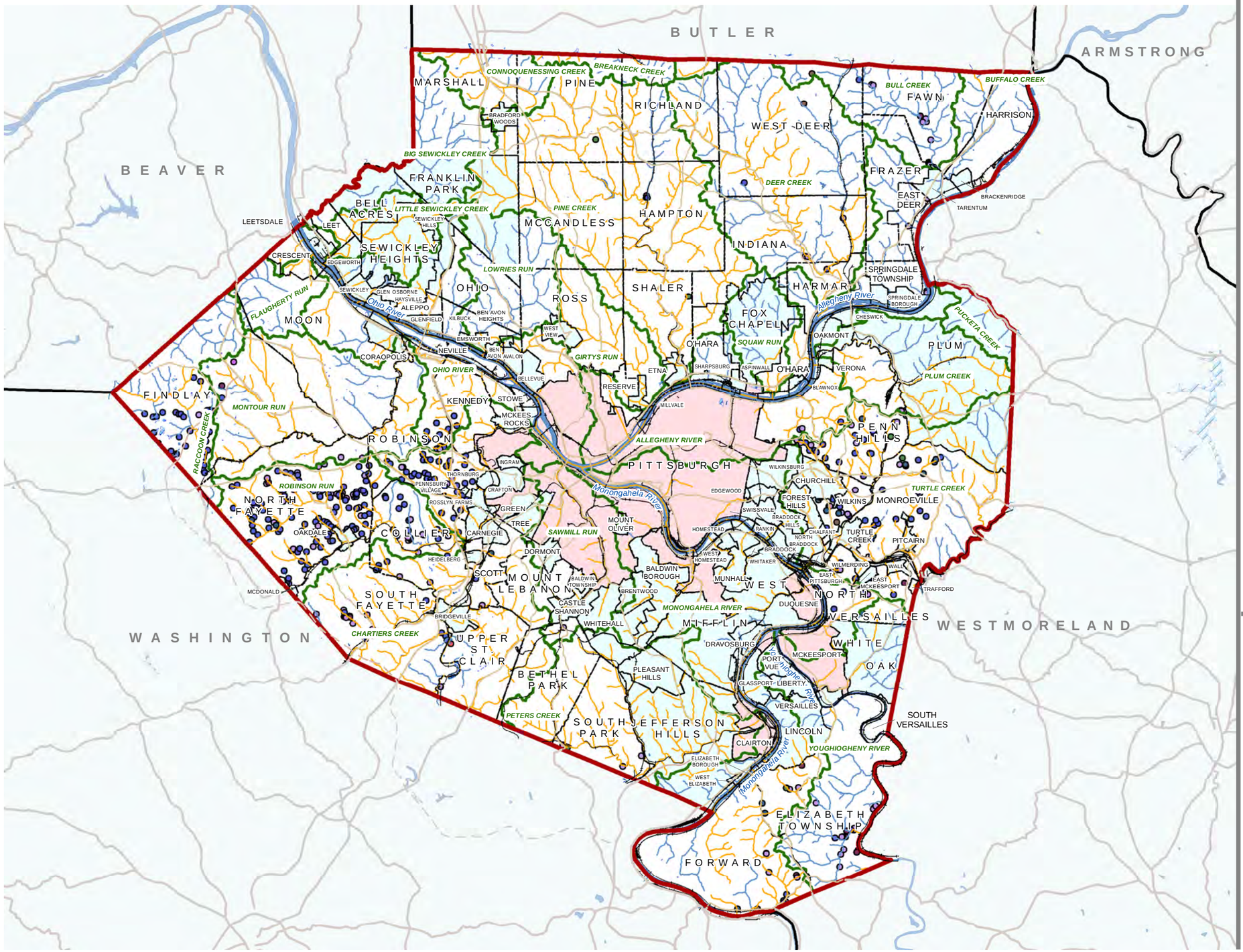
Allegheny County
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset
Stream Quality Source:3 Rivers Wet Weather Report 2014
Pennsylvania Department of Environmental Protection

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Map 12 - Abandoned Mine Land Inventory

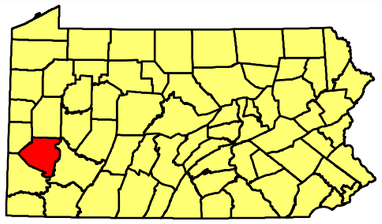
Allegheny County
Stormwater Management Plan



LEGEND

- Impaired Streams
- Streams
- AMD Ground Saturation
- Coal Deep Mine
- Coal Surface Mine
- Entry Point/Opening
- Equipment
- Impacted Water Source
- Refuse Pile
- Settling Basin
- Spoil Area
- Structure
- Subsidence Area
- Waters Affected by Impacted Water Source

LOCATION MAP



N
W E
S

0 1 2 4 6 8 Miles

DATA SOURCES

Allegheny County
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset
AML Source: Pennsylvania Spatial Data Access (PASDA)
Pennsylvania Department of Environmental Protection

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MAP 13 - Regulated Dams and Local Stormwater Control Facilities

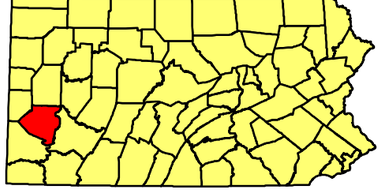
Allegheny County
Stormwater Management Plan



LEGEND

- Stormwater Control Facilities
- Regulated Dams
- Floodwalls
- Levees
- Major Roadways
- Railroad
- Allegheny County Boundary
- Bordering Counties
- Impaired Streams
- Streams
- Rivers, Lakes, and Ponds
- Reservoirs
- Act 167 Watersheds Boundaries

LOCATION MAP



N
W E
S

0 1 2 4 6 8 Miles

DATA SOURCES

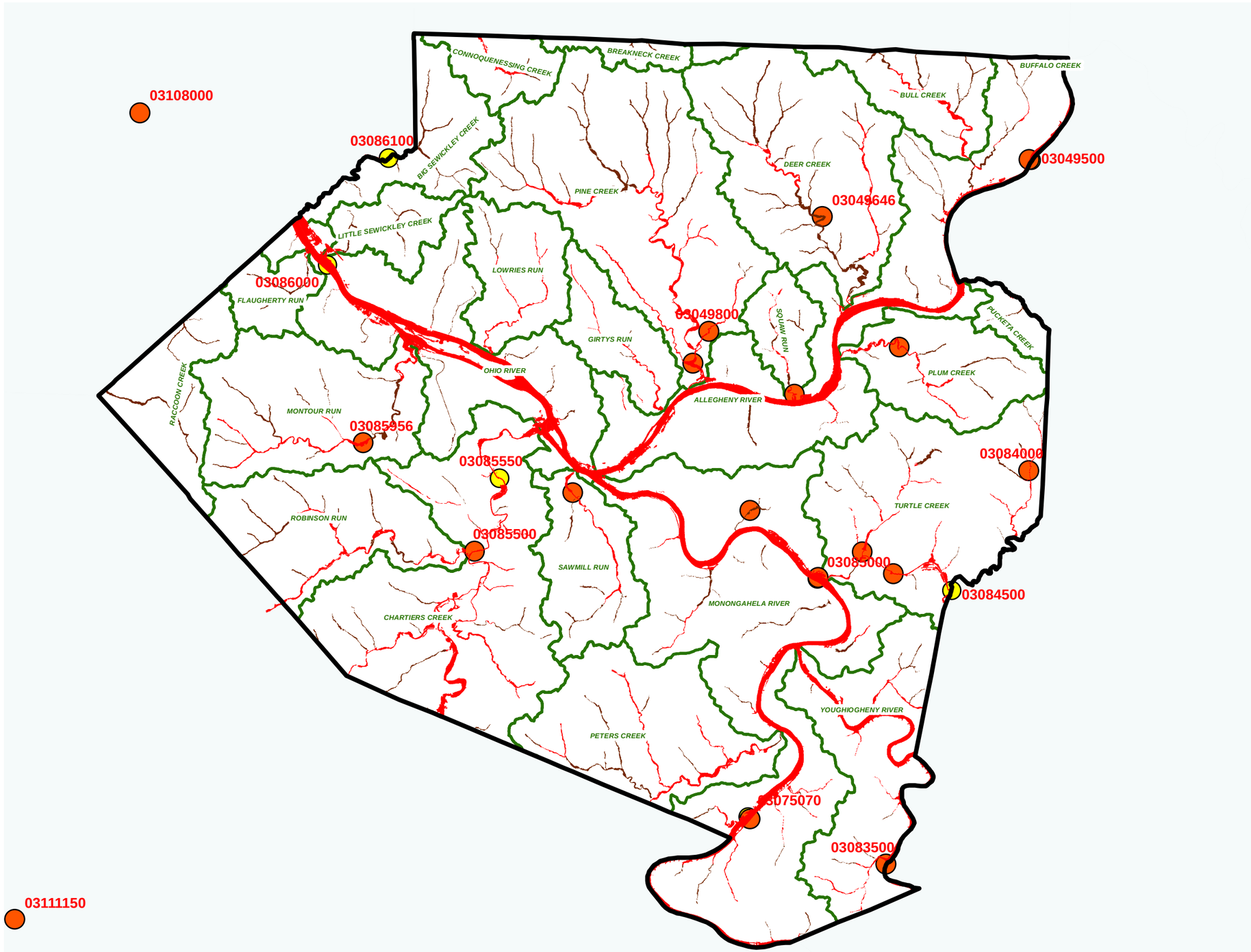
Allegheny County
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset
Pennsylvania Department of Environmental Protection
Municipality Data Forms
FEMA-Region III Mid Term Inventory 2009
U.S. Army Corps of Engineers

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June 2016

MAP 14 - FEMA Flood Map

Allegheny County
Stormwater Management Plan



LEGEND

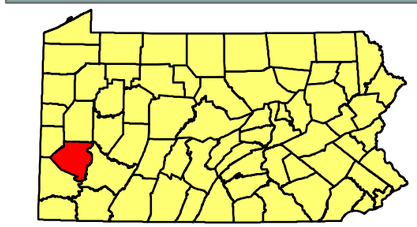
- Allegheny County Boundary
- Act 167 Watersheds Boundaries
- USGS_Gages II
- USGS_Streamgages-NHD

FEMA Zone Classifications

- A = 1% annual chance flooding - no BFEs
- AE = 1% annual chance flooding - with BFEs

Note:
BFE is Computed Base Flood Elevation (100-Year Flood)

LOCATION MAP



N
W E
S

0 1 2 4 6 8 Miles

DATA SOURCES

Allegheny County
Pennsylvania Department of Transportation
Pennsylvania Turnpike Commission
National Hydrography Dataset
Gages, US Geological Survey Streamgages
FEMA, Pennsylvania Spatial Data Access (PASDA)
Pennsylvania Department of Environmental Protection

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June 2016

May 31, 2018

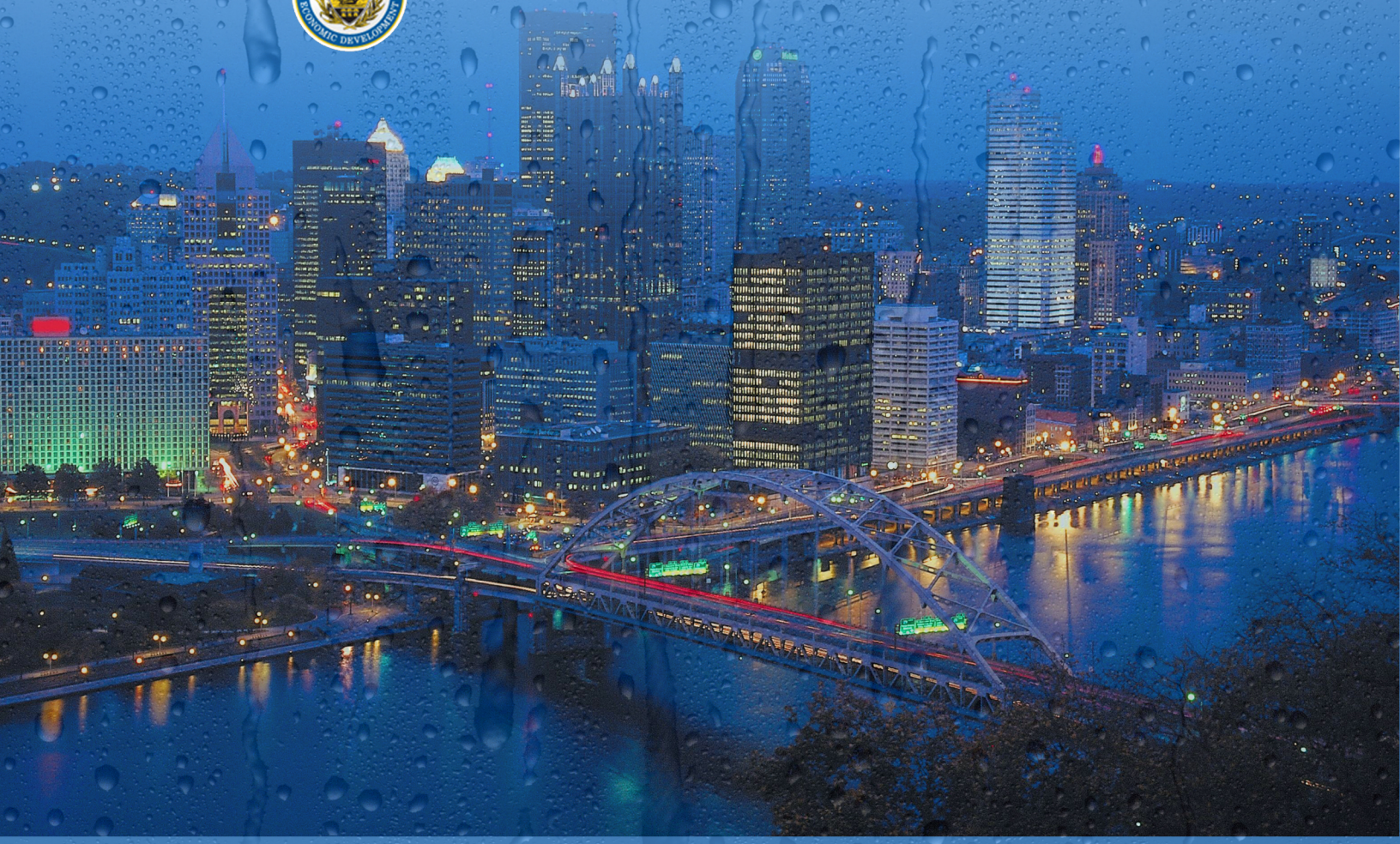
Appendix A

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

Allegheny County Department of Economic Development
One Chatham Center
112 Washington Place, Suite 900
Pittsburgh, PA 15219

Michael Baker International, Inc.
100 Airside Drive
Moon Township, PA 15108

Michael Baker
INTERNATIONAL



APPENDIX A

WATERSHED MODELING TECHNICAL DATA

APPENDIX A – WATERSHED MODELING TECHNICAL DATA

I. HYDROLOGIC MODEL PARAMETER DATA

For HEC-HMS to calculate the runoff volume using the NRCS Curve Number Runoff method a number of model parameters were developed using the HEC-GeoHMS extension within ESRI ArcGIS. Using the data previously described the key parameters such Subbasin Area, Curve Number (CN), Lag Time were determined.

Subbasin areas were defined to best suit the needs of this study using the tools within HEC-GeoHMS. Watershed areas were subdivided to into areas approximately 0.5 square miles in size. A portion of these subdivision were based on the problem areas discussed else were in this report

Lag Time was determined as a function of each subbasins time of concentration using Flow Segment Parameters as outlined in TR55 and are also a function of watershed geometry. These flow path segments define Sheet, Shallow Concentrated and Open Channel flows. These segments parameters are defined in HEC-GeoHMS by either the geometry data, such as lengths and slopes, or based on aerial photography.

The Curve Numbers are determined as a function of soil type and land use. By overlaying these two layers, the hydrologic soil groups are paired with the land use so they can be correlated to the curve number values listed in Urban Hydrology for Small Watersheds TR-55 Table 2-2. These CNs represent an "average" antecedent runoff condition (ARC = 2). Other antecedent runoff conditions, such as extremely dry or wet weather preceding the event, can influence these CN's however given the unpredictably of significant hydrologic events the average was chosen to best represent the watersheds. These CNs are altered later on during the calibration process so that model results are within a reasonable range which is described in section III.

Optional inputs such as initial abstraction were left as default. The default initial abstraction (Ia) is calculated automatically in HEC-HMS as 0.2S where S is the potential maximum soil moisture retention after runoff begins. This is typically considered conservative given the conditions in these urbanized watersheds. The value of S is calculated using the formula below.

$$S = \frac{100}{CN} - 10$$

These inputs are then input into the HEC-HMS model which uses the following equation to determine runoff volume.

$$Q_{volume} = \frac{(P - Ia)^2}{(P - Ia) + S}$$

Where P = rainfall for a specific storm in inches. Values of P where obtained from the NOAA Atlas 14 website for number of 24-hour storm events for each of the studied watersheds.

II. HYDROLOGIC ANALYSES

A detailed analysis for three watersheds, Flaugherty Run, Robinson Run, and Thompson Run, was performed for this study. In order to determine target peak flows for calibration of the HEC-HMS models, peak flows for each watershed were developed using the USGS SIR 5102 method, USGS WRIR 4189 method, a regional gage analysis, and any previous studies, including Federal Emergency Management Agency (FEMA) studies and previous Act 167 analyses. Details of the hydrologic analysis of Flaugherty Run, Robinson Run, and Thompson Run are included in the sections below and in **Technical Appendix A.2, B.2,** and **C.2**, respectively.

Flaugherty Run

The drainage area of Flaugherty Run at the confluence with the Ohio River, is 8.84 square miles. A drainage area map is provided in **Technical Appendix A.1**. The basin was divided into eight points of interest (POI) where flows will be calculated. The HEC-HMS model for the project will be calibrated against the chosen flows at each POI. The POI are indicated in **Figure 1** below.

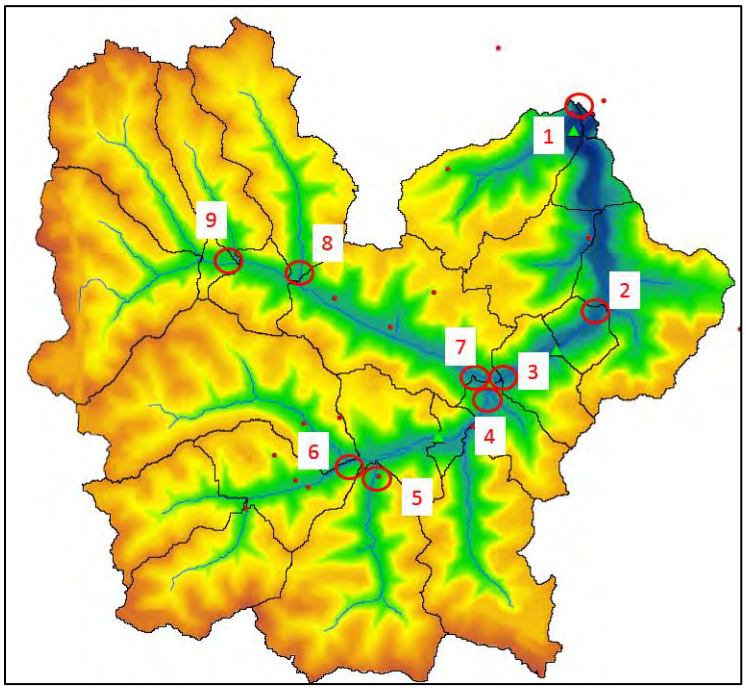


Figure 1: Flaugherty Watershed Points of Interest

The Federal Emergency Management Agency (FEMA) published a Flood Insurance Study (FIS) for Allegheny County which was revised on September 26, 2014. The project is located in an approximate FEMA study area; there are no peak flows or base flood elevations for Flaugherty Run included in the FIS. Flaugherty Run does not have a stream gage that can be used to develop a flood-frequency curve.

An Act 167 (Stormwater Management Plan) for the Flaugherty Run watershed was published in 1998, by GAI Consultants and the Allegheny County Department of Economic Development. The design discharges for Flaugherty Run throughout the watershed were determined using the Penn State Runoff Model (PSRM) and the resulting flows were verified using high water marks at the Flaugherty House and a residence near Boggs Run and peak flows calculated using the USGS regional regression equations, the SCS method, and the USACE empirical equations for the Ohio River Basin. The results from the 1998 PSRM model are summarized in **Table 1**. Excerpts of the Act 167 Plan report are in **Technical Appendix A.2**.

WRIR 4189 is a methodology that uses regression equations to predict peak flows for basins between 1.5 and 2,000 square miles. The regression equations were developed using stream gage data through the 1997 water year. This method includes parameters for drainage area, mean basin elevation, carbonate coverage, and storage area. The watershed is located in USGS Region A. Drainage areas and land use coverages were obtained from the USGS StreamStats website[1]. Input parameters and calculations are provided in **Technical Appendix A.2**.

SIR 5102 is an updated regression method valid for basins between 1 and 2,000 square miles. It incorporates flood-magnitude and flood-frequency data through the 2006 water year. This site is in Region 3, which considers parameters for drainage area and mean basin elevation, which were calculated using the USGS StreamStats website. Input parameters and calculations are provided in **Technical Appendix A.2**.

The regional gage analysis included an analysis of all gages in Allegheny, Armstrong, Beaver, Butler, Washington, and Westmoreland counties that included at least 10 years of peak flow data and had drainage areas less than 150 square miles. The following gages were used:

- #03049000 Buffalo Creek near Freeport, PA
- #03049100 Little Buffalo Creek at Cabot, PA
- #03049800 Little Pine Creek near Etna, PA
- #03083600 Gillespie Run near Sutersville, PA
- #03084000 Abers Creek near Murrysville, PA
- #03084500 Turtle Creek at Trafford, PA
- #03084698 Turtle Creek at Wilmerding, PA
- #03084800 Thompson Run at Turtle Creek
- #03085213 Sawmill Run at Duquesne Heights, PA
- #03086100 Big Sewickley Creek near Ambridge, PA
- #03111150 Brush Run near Buffalo Creek

[1] http://water.usgs.gov/osw/streamstats/pennsylvania.html

An additional gage, #03106300 Muddy Creek near Portersville, PA, met the drainage area and record length criteria, but subject to regulation from flood controls; therefore, the Muddy Creek gage was not included in the regional gage analysis. The recorded data at each gage was analyzed using PeakFQ. Peak flows at each gage were plotted by drainage area, as shown in the example in **Figure 2**. A linear regression equation was developed for each flow event using the flow vs. drainage area charts. The regression equations were then used to calculate the flows at each subbasin in the watershed based on the drainage area. Supporting documentation for the regional gage analysis is included in **Technical Appendix A.2**.

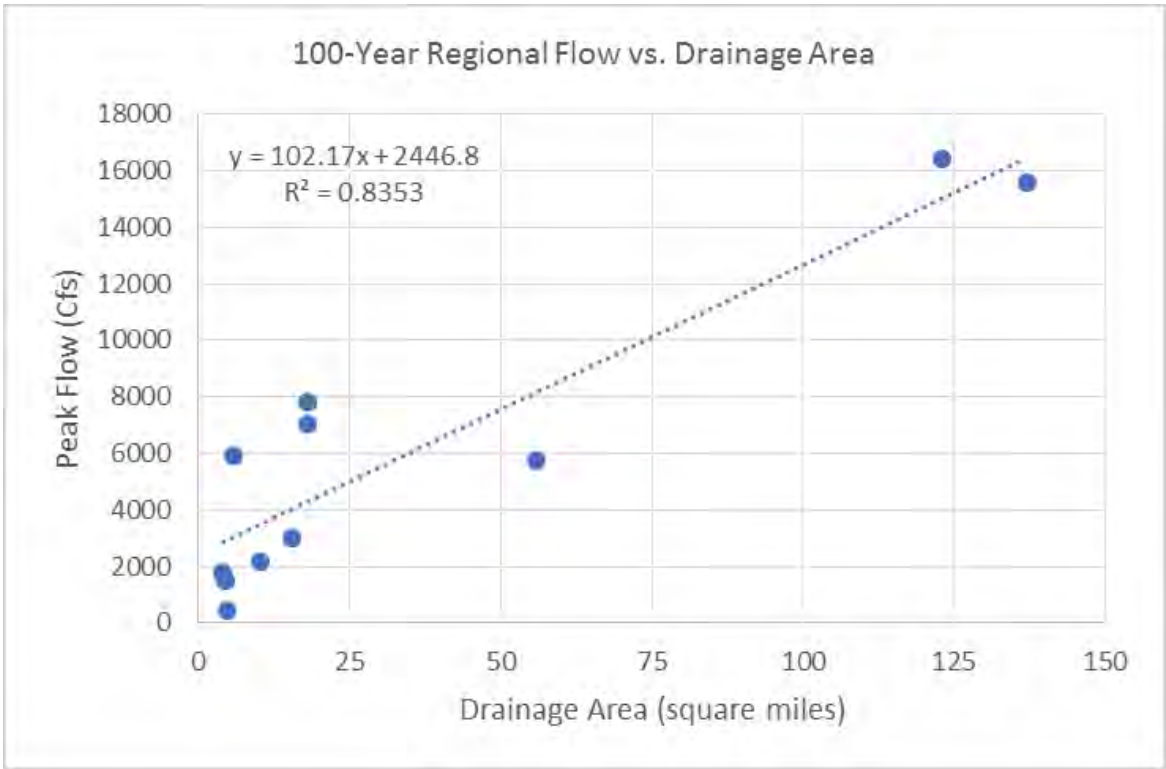


Figure 2: Peak Flow vs. Drainage Area

Table 1: Estimated Peak Flows on Flaugherty Run

Return Period (years)	1	2	2.33	5	10	25	50	100
Method	WRIR 4189							
POI1	727	893	934	1170	1420	1913	2334	2805

POI2	589	727	762	962	1174	1596	1959	2369
POI3	570	705	739	933	1140	1551	1905	2305
POI4	321	401	421	538	663	916	1136	1387
POI5	80	103	109	144	183	265	339	427
POI6	179	226	238	309	385	542	680	839
POI7	123	154	161	206	253	348	431	525
POI8	154	195	206	268	335	474	597	740
	SIR 5102							
POI1	152	488	520	839	1120	1554	1840	2190
POI2	125	413	440	713	953	1326	1570	1870
POI3	121	400	426	690	922	1283	1520	1810
POI4	59	233	247	409	551	775	921	1100
POI5	7	65	68	119	164	238	284	345
POI6	26	134	141	240	326	465	553	666
POI7	5	56	58	102	141	206	246	299
POI8	22	116	122	208	283	404	481	580
	REGIONAL GAGE ANALYSIS							
POI1	184	729	805	1179	1546	2121	2664	3351
POI2	162	685	757	1112	1461	2010	2531	3194
POI3	158	677	748	1101	1446	1990	2507	3166
POI4	110	581	643	954	1259	1745	2213	2820
POI5	69	499	554	829	1101	1537	1964	2526
POI6	85	530	589	877	1162	1617	2060	2639
POI7	67	495	550	823	1093	1527	1952	2512
POI8	81	522	580	864	1146	1596	2035	2609
	1998 PSRM							
POI1	375	846	1063	1683	2318	3135	3562	3995
POI2	252	712	901	1475	2072	2859	3261	3671
POI3	241	699	884	1451	2042	2822	3222	3630
POI4*	151	415	526	862	1199	1657	1889	2128
POI5	27	89	110	184	264	368	427	481
POI6	83	235	298	488	688	944	1082	1215
POI7	24	103	114	184	261	371	432	497
POI8	0	117	144	264	402	581	681	788
	Grey cell shading indicates that flows were interpolated							

*Flows calculated at 1998 PSRM subbasin 28, slightly downstream of POI4

A table of peak flows and charts comparing flows calculated using each method are included in the **Technical Appendix A.2.** The regional gage analysis flows ranged from producing flows consistent with the regression methods at the point of interest with the largest drainage area to the most conservative at the points of interest with the smallest drainage area. The SIR 5102 and WRIR 4189 methods produced similar results and were generally consistent with the flows calculated by the 1998 PSRM. The SIR 5102 method did not account for land use parameters when computing flows at each point of interest and the WRIR 4189 method does not compute flows for events smaller than

the 10-year return period. Because the 1998 PSRM model accounts for local watershed features, computes flows for small return periods and is consistent with the flows calculated using the regression methods, the 1998 PSRM flows will be used to calibrate the HEC-HMS model.

Robinson Run

The drainage area of Robinson Run at the confluence with Chartiers Creek, as delineated with the USGS StreamStats website, is 39.9 square miles. A drainage area map is provided in **Technical Appendix B.1**. The basin was divided into ten points of interest (POI) where flows will be calculated. The HEC-HMS model for the project will be calibrated against the chosen flows at each POI. The POI are indicated in **Figure 3** below.

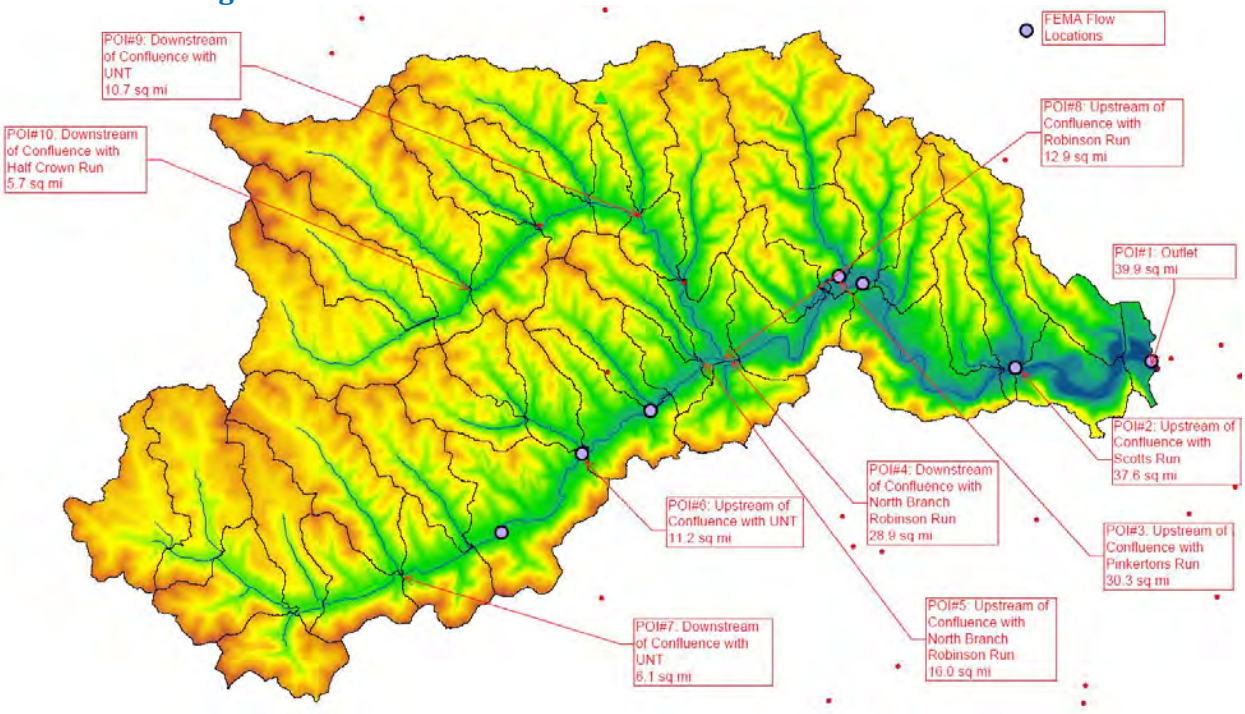


Figure 3: Robinson Run Points of Interest

The Federal Emergency Management Agency (FEMA) published a Flood Insurance Study (FIS) for Allegheny County which was revised on September 26, 2014. The FEMA FIS includes peak flows and base flood elevations for Robinson Run. FEMA flows were calculated using the LPIII method outlined in the WRC Bulletins 15, 17, 17A, and 17B, and are listed in the **Table 2**. Robinson Run does not have a stream gage that can be used to develop a flood-frequency curve, nor is there an existing Act 167 Stormwater Management Plan for the watershed. Peak flows for the current study were computed using the USGS SIR 2008-5102 method, USGS WRIR 2000-4189 method, and a regional gage analysis.

WRIR 4189 is a methodology that uses regression equations to predict peak flows for basins between 1.5 and 2,000 square miles. The regression equations were developed using stream gage data through the 1997 water year. This method includes parameters for drainage, forest, urban, carbonate, and controlled areas. The watershed is located in USGS Region A. Drainage areas and land

use coverages were obtained from the USGS StreamStats website[2]. Input parameters and calculations are provided in **Technical Appendix B.2**.

SIR 5102 is an updated regression method valid for basins between 1 and 2,000 square miles. It incorporates flood-magnitude and flood-frequency data through the 2006 water year. This site is in Region 3, which considers parameters for drainage area, mean basin elevation, carbonate rock coverage, and storage area, which were calculated using the USGS StreamStats website. Input parameters and calculations are provided in **Technical Appendix B.2**.

The regional gage analysis included an analysis of all gages in Allegheny, Armstrong, Beaver, Butler, Washington, and Westmoreland counties that included at least 10 years of peak flow data and had drainage areas less than 140 square miles. The following gages were used:

- #03049000 Buffalo Creek near Freeport, PA
- #03049100 Little Buffalo Creek at Cabot, PA
- #03049800 Little Pine Creek near Etna, PA
- #03083600 Gillespie Run near Sutersville, PA
- #03084000 Abers Creek near Murrysville, PA
- #03084500 Turtle Creek at Trafford, PA
- #03084689 Turtle Creek at Wilmerding, PA
- #03084800 Thompson Run at Turtle Creek
- #03085213 Sawmill Run at Duquesne Heights, PA
- #03086100 Big Sewickley Creek near Ambridge, PA
- #03111150 Brush Run near Buffalo Creek

An additional gage, #03106300 Muddy Creek near Portersville, PA, met the drainage area and record length criteria, but subject to regulation from flood controls; therefore, the Muddy Creek gage was not included in the regional gage analysis. The recorded data at each gage was analyzed using the PeakFQ. Peak flows at each gage were plotted by drainage area. A linear regression equation was developed for each flow event using the flow vs. drainage area charts. The regression equations were then used to calculate the flows at each subbasin in the watershed based on the drainage area. Supporting documentation for the regional gage analysis is included in **Technical Appendix B.2**.

Table 2: Estimated Peak Flows on Robinson Run

Return Period (years)	1	2	2.33	5	10	25	50	100
Method	WRIR 4189							
POI1	2366	2897	3029	3785	4584	6142	7477	8974
POI2	2244	2750	2875	3597	4360	5849	7127	8562

[2] http://water.usgs.gov/osw/streamstats/pennsylvania.html

POI3	1936	2386	2499	3145	3833	5184	6351	7671
POI4	1837	2267	2375	2994	3654	4951	6074	7346
POI5	1176	1457	1527	1934	2369	3229	3976	4826
POI6	788	985	1035	1324	1635	2257	2803	3431
POI7	534	675	711	920	1,149	1,611	2,023	2,503
POI8	834	1052	1107	1430	1782	2491	3122	3854
POI9	738	933	983	1273	1589	2229	2799	3462
POI10	396	510	539	713	907	1307	1672	2105
	SIR 5102							
POI1	711	1640	1771	2710	3530	4745	5570	6550
POI2	660	1550	1670	2560	3340	4501	5290	6220
POI3	557	1330	1430	2200	2870	3880	4560	5370
POI4	515	1250	1343	2070	2710	3666	4310	5080
POI5	286	768	824	1290	1710	2331	2750	3250
POI6	170	499	534	851	1130	1556	1840	2180
POI7	92	310	330	536	716	998	1180	1410
POI8	221	623	668	1060	1400	1923	2270	2690
POI9	189	551	589	938	1240	1711	2020	2400
POI10	96	325	346	562	752	1048	1240	1480
	REGIONAL GAGE ANALYSIS							
POI1	625	1613	1767	2525	3259	4368	5357	6523
POI2	589	1542	1689	2416	3121	4187	5141	6268
POI3	498	1359	1491	2139	2768	3724	4585	5614
POI4	469	1300	1426	2048	2652	3572	4403	5400
POI5	285	932	1026	1489	1940	2638	3284	4082
POI6	195	750	827	1211	1587	2175	2728	3427
POI7	135	630	698	1029	1356	1871	2365	2999
POI8	234	830	915	1333	1742	2378	2972	3714
POI9	210	781	862	1259	1648	2255	2825	3540
POI10	139	639	707	1042	1372	1892	2390	3028
	FEMA FIS							
POI1	N/A	N/A	N/A	N/A	3350	N/A	6100	7500
POI2	N/A	N/A	N/A	N/A	3100	N/A	5600	7000
POI3	N/A	N/A	N/A	N/A	2600	N/A	4700	5800
POI8	N/A	N/A	N/A	N/A	1170	N/A	2200	2700
	Grey cell shading indicates that flows were interpolated							

A table of peak flows and charts comparing flows calculated using each method are included in the **Technical Appendix B.2.** The regional gage analysis flows ranged from the least conservative at the point of interest with the largest drainage area and the most conservative at the points of interest with the smallest drainage area. The SIR 5102 and WRIR 4189 methods produced similar results and were generally consistent with the flows calculated by FEMA. The SIR 5102 method did not account for land use parameters when computing flows at each point of interest, therefore the WRIR 4189 flows were chosen as the target values for the HEC-HMS model calibration. Because the WRIR 4189

method does not compute flows for events smaller than the 10-year return period, the SIR 5102 flows were used as the calibration target flows for the 1-, 2-, 2.33-, and 5-year events.

Thompson Run

The drainage area of Thompson Run at the confluence with Turtle Creek, as delineated with the USGS StreamStats website, is 17.9 square miles. Drainage area maps are in **Technical Appendix C.1**. The basin was divided into eight points of interest (POI) where flows will be calculated. Hydrology was also calculated for three additional locations (labeled A, B, and C on the map below) because there are FEMA flows at these sites. These locations are not compatible with the junctions in HEC-HMS model and will be used to validate the flows from the various hydrologic methods, but will not be used in the calibration analysis of the model. The HEC-HMS model for the project will be calibrated against the chosen flows at each POI. The POI are indicated in **Figure 4** below.

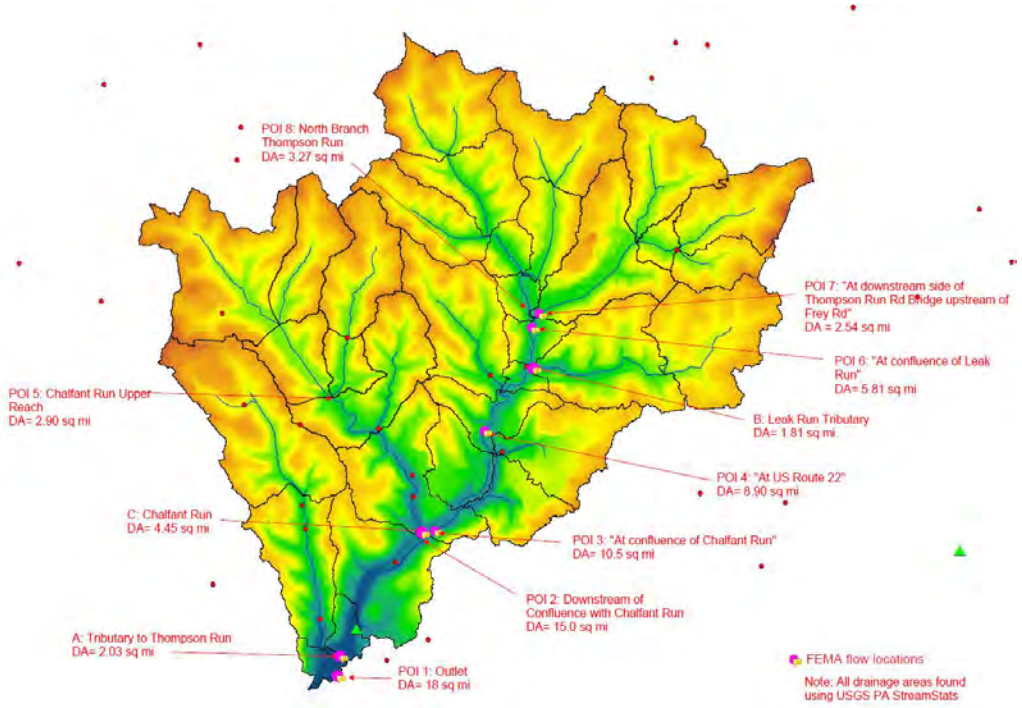


Figure 4: Thompson Run Watershed Points of Interest

The Federal Emergency Management Agency (FEMA) published a Flood Insurance Study (FIS) for the Allegheny County which was revised on September 26, 2014. The hydrology contained in the FEMA FIS was calculated using multiple regression formulae for rural watersheds with drainage areas between 0 and 25 square miles. The FEMA flows are listed in **Table 3**.

An Act 167 (Stormwater Management Plan) for the Thompson watershed was published in February 2004, by Skelly and Loy, Inc. and the Allegheny County Commissioners. The Act 167 includes a table of calculated release rates, but there is not enough information available to determine the release rate for Thompson Run.

The USGS publication *Guidelines for Determining Flood Flow Frequency (Bulletin 17B)* uses a log-Pearson Type III distribution analysis of annual peak flow data from a stream gage. Peak flows from the Thompson Run at Turtle Creek (03084800) stream gage were used to perform the analysis. A weighted skew of 0.095 was determined from 10 years (2005-2014) of peak flow data. The USGS PeakFQ version 5.2 computer program, which follows the Bulletin 17B methodology, was used to perform the analysis. Detailed output is included in **Technical Appendix C.2**. There is only 10 years of gage data available, which meets the criteria outlined in PUB 584 Chapter 7.10 stating that a minimum of 10-years of data is necessary in order to warrant statistical analysis.

A peak flow transposition was performed for POI's with greater than 9.0 square mile drainage areas in order to obtain more gage data. The peak flow transposition produced a total of 4 sets of gage flow data. These gage flows were graphed vs. their drainage areas in order to develop a power curve formula and ultimately calculate flows for all POIs.

USGS 4189 is a methodology that uses regression equations to predict peak flows for basins between 1.5 and 2,000 square miles. The regression equations were developed using stream gage data through the 1997 water year. This method includes parameters for drainage, forest, urban, carbonate, and controlled areas. The watershed is located in USGS Region A. Land use coverages for forest, urban, carbonate, and controlled areas were obtained from the USGS StreamStats website[3]. Input parameters and calculations are provided in **Technical Appendix C.2**.

USGS 5102 is an updated regression model valid for basins between 1 and 2,000 square miles. It incorporates flood-magnitude and flood-frequency data through the 2006 water year. This site is in Region 4, which considers parameters for drainage area and mean basin elevation, which were calculated using the USGS StreamStats website. Input parameters and calculations are provided in **Technical Appendix C.2**.

Comparison of Results

A table of peak flows and charts comparing flows calculated using each method are included in **Technical Appendix C.2.** The FEMA FIS flows were only available for certain POI's and, based on a comparison between these POI's, the flows from the FEMA FIS were found to be higher than the SIR flows and overall more compatible with the WRIR flows.

WRIR method produced flows much higher flows than the SIR method; the WRIR flows are approximately twice as high. The systematic record gage flows calculated from Gage 03084800 Thompson Run at Turtle Creek are applicable for POI#1 and were used to transpose flows for watersheds with a drainage area greater than 9.0 square miles (which is half of POI#1's drainage

[3] http://water.usgs.gov/osw/streamstats/pennsylvania.html

area of 18.0 square miles). A graphical curve of the transposed gage peak flow data was used to determine the peak flows for all POI's with drainage areas less than 9.0 square miles. A majority of the flows produced from the gage analysis and peak flow transposition graph were found to have a magnitude between the USGS SIR and USGS WRIR flows for all storm events. The gage flows are therefore considered a more accurate average of the flows throughout Thompson Run watershed and are the most applicable for the calibration of the HEC-HMS model.

Table 3: Estimated Peak Flows on Thompson Run

Return Period (years)	1	2	2.33	5	10	25	50	100
Method	WRIR 4189							
POI1	2789	3265	3380	4021	4665	5860	6828	7868
POI2	2299	2705	2804	3354	3911	4950	5796	6711
POI3	1529	1822	1894	2296	2709	3490	4136	4843
POI4	1388	1650	1714	2073	2441	3137	3709	4334
POI5	777	921	957	1155	1358	1739	2053	2396
POI6	923	1110	1156	1416	1686	2203	2635	3112
POI7	325	406	426	544	671	925	1147	1402
POI8	737	880	916	1113	1317	1703	2023	2375
A	563	674	701	856	1016	1319	1572	1852
B	416	501	523	643	767	1007	1207	1430
C	1078	1273	1320	1586	1856	2361	2775	3224
	SIR 5102							
POI1	179	765	785	1300	1730	2485	2940	3560
POI2	143	656	672	1120	1500	2157	2550	3100
POI3	88	485	495	837	1130	1636	1940	2360
POI4	69	422	429	731	988	1439	1710	2080
POI5	8	164	164	294	405	603	719	885
POI6	36	294	298	517	704	1033	1230	1500
POI7	4	146	146	264	364	544	649	800
POI8	10	181	182	324	445	662	789	970
A	1	121	121	220	305	458	546	674
B	-1	110	109	200	278	418	500	617
C	20	235	236	416	569	842	1000	1230
	GAGE 03084800 THOMPSON RUN AT TURTLE CREEK							
POI1	871	1193	1386	2399	3247	4982	6322	7815
POI2	701	1023	1142	1773	2808	4316	5493	6800
POI3	516	757	847	1323	2113	3260	4173	5181
POI4	437	659	725	1086	1852	2862	3674	4567
POI5	150	256	263	329	758	1184	1548	1942
POI6	291	459	493	689	1318	2046	2645	3299
POI6	132	229	233	286	682	1067	1398	1755
POI7	168	283	293	374	834	1302	1698	2128

POI8	107	189	191	225	570	895	1176	1480
A	96	172	172	199	520	817	1077	1356
B	225	367	387	519	1066	1659	2153	2692
C	871	1193	1386	2399	3247	4982	6322	7815
	FEMA FIS							
POI1	N/A	N/A	N/A	N/A	2890	N/A	5000	6000
POI3	N/A	N/A	N/A	N/A	2100	N/A	3650	4400
POI4	N/A	N/A	N/A	N/A	1850	N/A	3210	3880
POI6	N/A	N/A	N/A	N/A	1320	N/A	2300	2750
POI7	N/A	N/A	N/A	N/A	640	N/A	1120	1340
A	N/A	N/A	N/A	N/A	540	N/A	930	1110
B	N/A	N/A	N/A	N/A	520	N/A	900	1080
C	N/A	N/A	N/A	N/A	1070	N/A	1850	2210
	Grey cell shading indicates that flows were interpolated							

III. MODEL CALIBRATION

In order to simulate storm flows for a watershed with confidence and reliability, the computer model must first be calibrated. This involves "fine tuning" the model to provide the most accurate representation of the real runoff and timing conditions of a watershed. Calibration of a model involves the adjustment of input parameters (within acceptable value ranges) to reproduce the recorded response of storm events.

When actual storm event data is available (i.e. stream flow and rain gauge data), this information can be input into the model and simulated "hydrographs" developed by the model. Hydrographs are simply a plot of time versus flow in cubic feet per second. To simulate a specific event, antecedent moisture conditions and rainfall distribution must be duplicated in the model input.

Adjustments to other parameters are then made to attempt to duplicate hydrograph shapes and peak flow rates at points in the watershed where flow recordings were made. In order to utilize actual stream flow and rain gauge data for calibration, sufficient data must be available. Rain gauges must be in close proximity to the watershed so that actual rainfall conditions from these gages are representative of the actual rainfall that occurs over the watershed. Localized events, snowmelt and unique conditions are typically not used for calibration due to their unique circumstances.

If suitable rain gauge and stream gauge data is not available, the model can be calibrated against a statistical analyses performed on annual flood peaks and/or regression methods. Oftentimes a combination of the various methods can be utilized to achieve the best results.
In order to maximize the accuracy of the HEC-HMS model, a calibration effort was undertaken. At several essential points in the watershed, HEC-HMS generated flows were compared to discharges discussed in the Hydrologic Analysis section, which were developed from regression methods,

recorded stream gage data, FEMA studies, and previous Act 167 plans. The flows used for calibration of each model are listed in **Table 4**.

Table 4: Flows Used for HEC-HMS Model Calibration

Return Period (years)	1	2	2.33	5	10	25	50	100
Method	Flaugherty Run (1998 PSRM)							
POI1	375	846	1063	1683	2318	3135	3562	3995
POI2	252	712	901	1475	2072	2859	3261	3671
POI3	241	699	884	1451	2042	2822	3222	3630
POI4	151	415	526	862	1199	1657	1889	2128
POI5	27	89	110	184	264	368	427	481
POI6	83	235	298	488	688	944	1082	1215
POI7	24	103	114	184	261	371	432	497
POI8	0	117	144	264	402	581	681	788
	Robinson Run (SIR 5102 Low Flow/WRIR 4189 High Flow)							
POI1	711	1640	1771	2710	4584	6142	7477	8974
POI2	660	1550	1670	2560	4360	5849	7127	8562
POI3	557	1330	1430	2200	3833	5184	6351	7671
POI4	515	1250	1343	2070	3654	4951	6074	7346
POI5	286	768	824	1290	2369	3229	3976	4826
POI6	170	499	534	851	1635	2257	2803	3431
POI7	92	310	330	536	1,149	1,611	2,023	2,503
POI8	221	623	668	1060	1782	2491	3122	3854
POI9	189	551	589	938	1589	2229	2799	3462
POI10	95.9	325	346	562	907	1307	1672	2105
	Thompson Run (Gage Transform)							
POI1	871	1193	1386	2399	3247	4982	6322	7815
POI2	701	1023	1142	1773	2808	4316	5493	6800
POI3	516	757	847	1323	2113	3260	4173	5181
POI4	437	659	725	1086	1852	2862	3674	4567
POI5	150	256	263	329	758	1184	1548	1942
POI6	291	459	493	689	1318	2046	2645	3299
POI7	132	229	233	286	682	1067	1398	1755
POI8	168	283	293	374	834	1302	1698	2128

There are several potential calibration parameters within HEC-HMS. These include initial abstraction, lag time, runoff curve numbers, lag times, and hydrograph routing parameters. After several efforts on sensitivity analyses of each of these parameters, it was determined that the curve number, initial rainfall abstraction, and hydrograph routing parameters were the most sensitive parameters. These numbers could be revised with confidence, while remaining within an acceptable range of values, for similar soil and sloped subareas, to arrive at flow values developed in the

regression analyses. **Table 5** lists available calibration parameters and acceptable ranges. The reach width was not used as a calibration parameter, but was approximated using LiDAR data for each reach. An initial abstraction of 0.2*S was used for Flaugherty and Thompson Run; this is within the acceptable range of values. The parameters have unavoidably different affects during storm events that are smaller in magnitude as compared to higher magnitude storm events. For instance, the initial abstraction, when calibrated for a small storm event, may underestimate the losses during a larger storm event. Similarly, the Manning's n values for the channels may also be dependent on the amount of rainfall in areas where the floodplain Manning's n values differ significantly from the channel Manning's n. To account for this, the HEC-HMS calibration efforts for Thompson Run and Flaugherty Run were split into two distinct models with slightly varying parameters, one model for the low magnitude storm events (1, 2, 2.33, 5, and 10-year) and one model for the high magnitude storm events (25, 50, and 100-year).

Table 5: Calibration Parameters and Acceptable Ranges

Calibration Parameter		Acceptable Range	Acceptable Variation from Calculated Values
Subbasin Parameters	Initial Abstraction	0.1-0.2*S	Within acceptable range
	Curve Number	40-100	+/- 20%
	Lag Time	>0	+/- 20%
Reach Parameters	Length	>0	+/- 20%
	Slope	>0	+/- 20%
	Manning's n	0.03-0.1	Within acceptable range
	Width	N/A	N/A

For calibration purposes, the 2 and 50-year design storms were evaluated to compare HEC-HMS generated flow to flows shown in **Table 4**. It should be noted that regression methods oftentimes do not account localized variables such as soils and topography, therefore the results may vary on a subwatershed basis. Tables of the final calibrated model parameters and calibrated model output are included in **Technical Appendix A.3, B.3,** and **C.3**.

IV. STORMWATER MANAGEMENT DISTRICTS

The regional philosophy used in Act 167 planning introduces a different stormwater management approach than is found in the traditional on-site approach. The specification of a 100% release rate as a performance standard would represent the conventional approach to runoff control philosophy, namely controlling the post-development peak runoff to pre-development levels. The difference between the on-site stormwater control philosophy and the Act 167 watershed-level philosophy is

the consideration of downstream impacts throughout an individual watershed. The objective of typical on-site design is to control post-development peak flow rates from the site itself; however, a watershed-level design is focused on maintaining existing peak flow rates in the entire drainage basin.

The watershed approach requires knowledge of how the site relates to the entire watershed in terms of the timing of peak flows, contribution to peak flows at various downstream locations, and the impact of the additional runoff volume generated by the development of the site. The proposed watershed-level stormwater runoff control philosophy is based on the assumption that runoff volumes will increase with development and the philosophy seeks to manage the increase in volumes such that peak rates of flow throughout the watershed are not increased. The controls implemented in this Plan are aimed at minimizing the increase in runoff volumes and their impacts, especially for the 2-year, 24-hour storm event. The basic goal of both on-site and watershed-level philosophies is the same, i.e. no increase in the peak rate of stream flow, however, the end products can be very different, as illustrated in the following simplified example.

Presented in **Figure 5** is a typical on-site runoff control strategy for dealing with the increase in the peak rate of runoff with development. The Existing Condition curve represents the predevelopment runoff hydrograph. The Developed Condition curve illustrates three (3) important changes in the site runoff response with development:

- A higher peak rate;
- A faster occurring peak (shorter time for the peak rate to occur); and
- An increase in total runoff volume.

The "Controlled" Developed Condition hydrograph is based on limiting the post-development runoff peak rate to the pre-development level through use of detention facilities; but the volume is still increased. The impact of lowering the post-development peak rate to the predevelopment peak rate without reducing the volume causes the peak rate to extend over a longer period of time. The instantaneous pre-development peak has become an extended peak (approximately two (2) hours long in this example) under the "Controlled" Developed Condition.

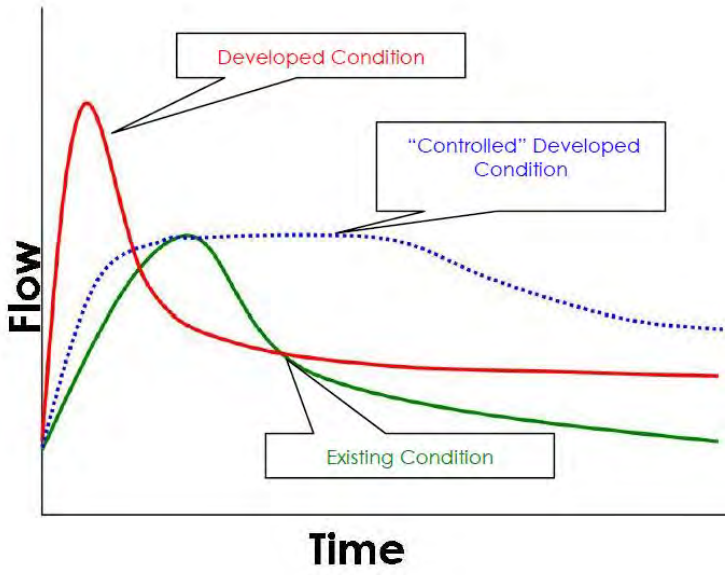


Figure 5: Typical On-Site Runoff Control Strategy

The maintenance of the existing condition peak rate flow of runoff is an effective management approach, however, **Figures 6 and 7** illustrate the potential detrimental impact of this approach. **Figure 6** represents the existing hydrograph at the point of confluence of Watershed A and Watershed B. Watershed A peaks more quickly (at time TpA) than the Total Hydrograph, while Watershed B peaks later (at time TpB), than the Total Hydrograph, resulting in a combined time to peak approximately in the middle (at time Tp). Watershed A is an area of significant development pressure and all new development proposals are met with the on-site runoff control philosophy as depicted in **Figure 5**. Eventually, the end product of the Watershed A development under the "Controlled" Development Condition is an extended peak rate of runoff as shown in **Figure 7**. The extended Watershed A peak rate flow occurs long enough that it coincides with the peak of Watershed B. Since the Total Hydrograph at the confluence is the summation of Watershed A and Watershed B, the Total Hydrograph peak is increased under these conditions to the "Controlled" Total Hydrograph. The conclusion from the example is that simply controlling peak rates of runoff on-site does not guarantee an effective watershed level of control because of the increase in total runoff volume. The net result is that downstream peaks can increase and extend for longer durations.

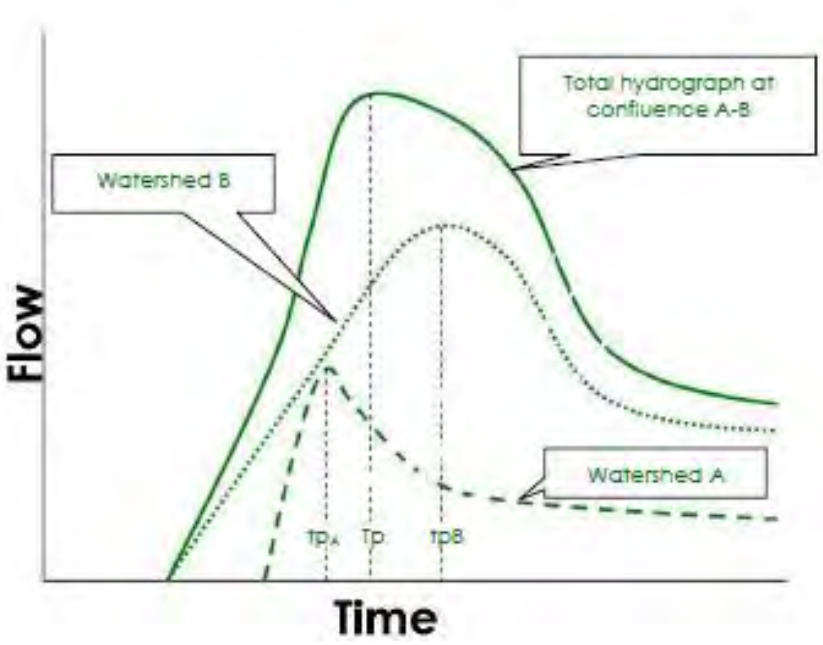


Figure 6: Existing Hydrograph (Pre-Development)

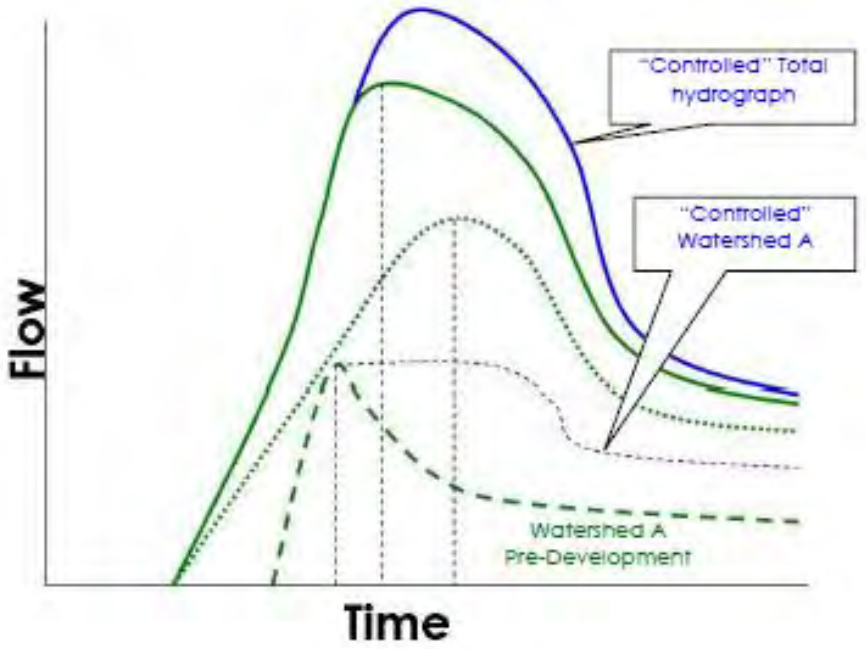


Figure 7: Controlled Runoff Condition (Post-Development)

RELEASE RATE CONCEPT

The previous example indicated that, in certain circumstances, it is not enough to control postdevelopment runoff peaks to pre-development levels if the overall goal is no increase in peak runoff at any point in the watershed. The reasons for this potential increase are how the various parts

of the watershed interact over a period of time and how the increased rate and volume of runoff associated with development are proportional to increases in impervious surfaces. The critical runoff criteria for a given site or watershed area is not necessarily its own predevelopment peak rate of runoff but rather the pre-development contribution of the site or watershed area to the peak flow at a given point of interest.

To account for increases of volume and peak flow resulting from the combination of these postdevelopment hydrographs, stormwater management districts have been assigned to various areas within the county boundary that have more restrictive release rates than the conventional 100% release rate. As shown in the Management District Maps, some areas within specific watersheds have reduced release rates where CG-1 may be difficult to completely implement.

This is a well-established and technically feasible control that is effective at-site and, where appropriate, would be an effective watershed-level control.

Combining volume controls with peak rate controls, as proposed in this Plan, will be more effective than having only peak rate controls. Volume controls have several advantages, such as: Increased runoff volume may infiltrate and provide recharge to existing groundwater supplies. This may not happen with strictly rate controls since all of the runoff excess is discharged in a relatively short time frame. Volume controls tend to mimic natural systems (i.e., excess runoff volume is infiltrated) and are therefore more effective in controlling natural storms since they are not highly sensitive to timing issues.

Volume controls often have enhanced water quality benefits. The Design Storm Method and The Simplified Method as implemented in this Plan, provide the benefits described above.

Flaugherty Run Watershed

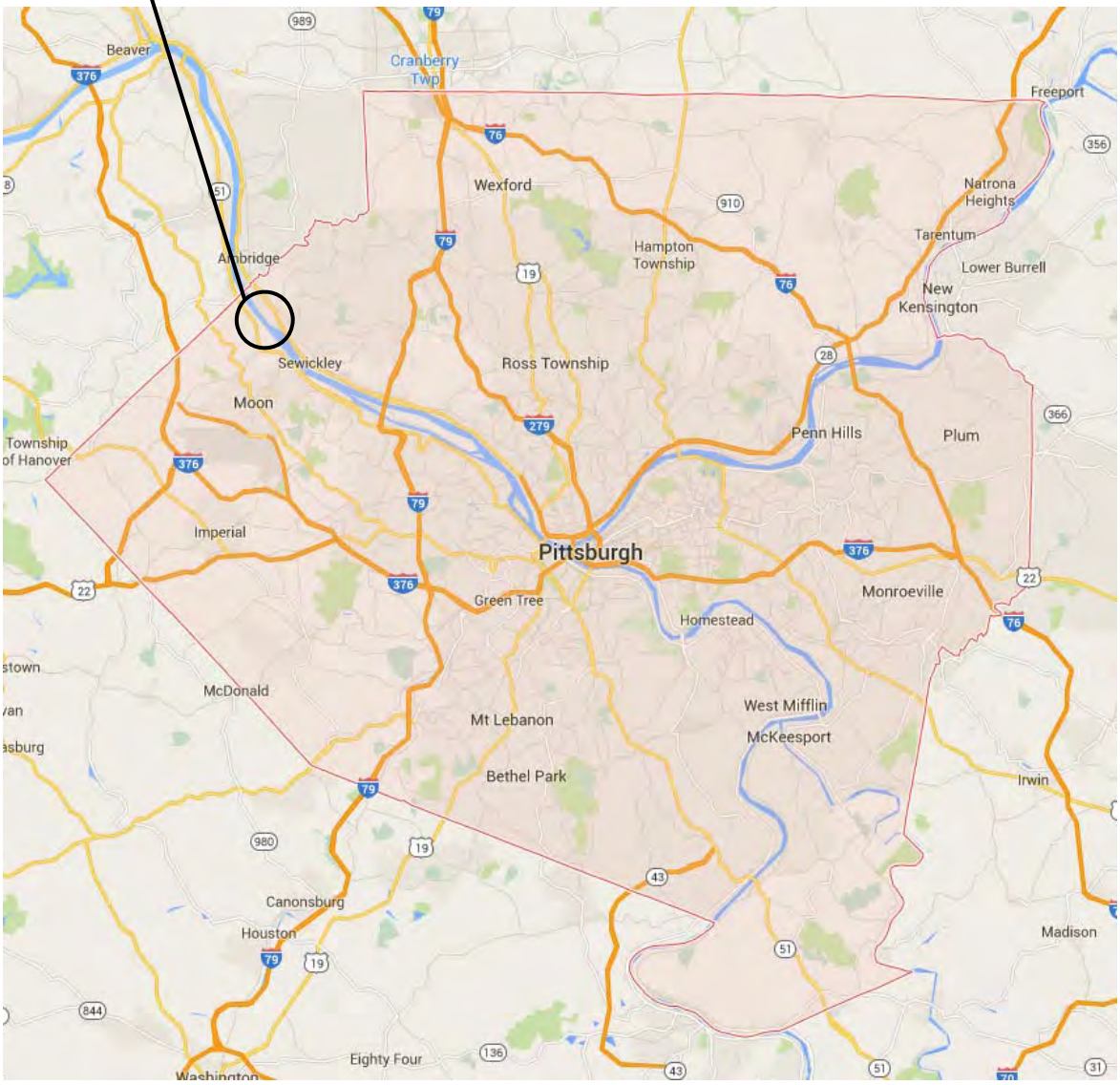
TECHNICAL APPENDIX A.1

Location Maps

Allegheny County
PennDOT District 11-0

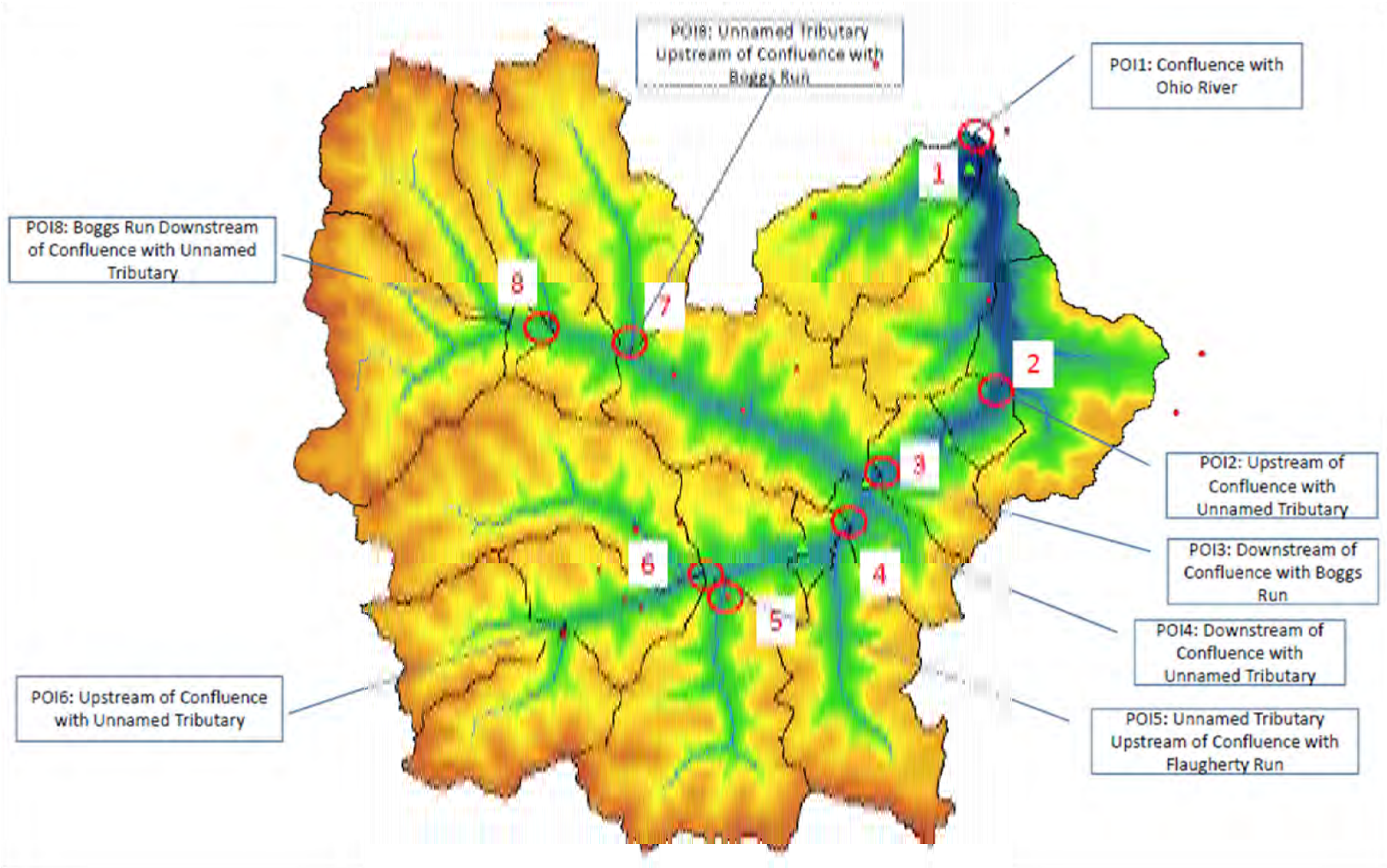
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Allegheny County Location Map: Flaugherty Run Watershed Outlet



Source: Google Maps

Points of Interest (POI) Map



Flaugherty Run Watershed

TECHNICAL APPENDIX A.2

Hydrology

Allegheny County
PennDOT District 11-0

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TECHNICAL APPENDIX A.2

Peak Flows

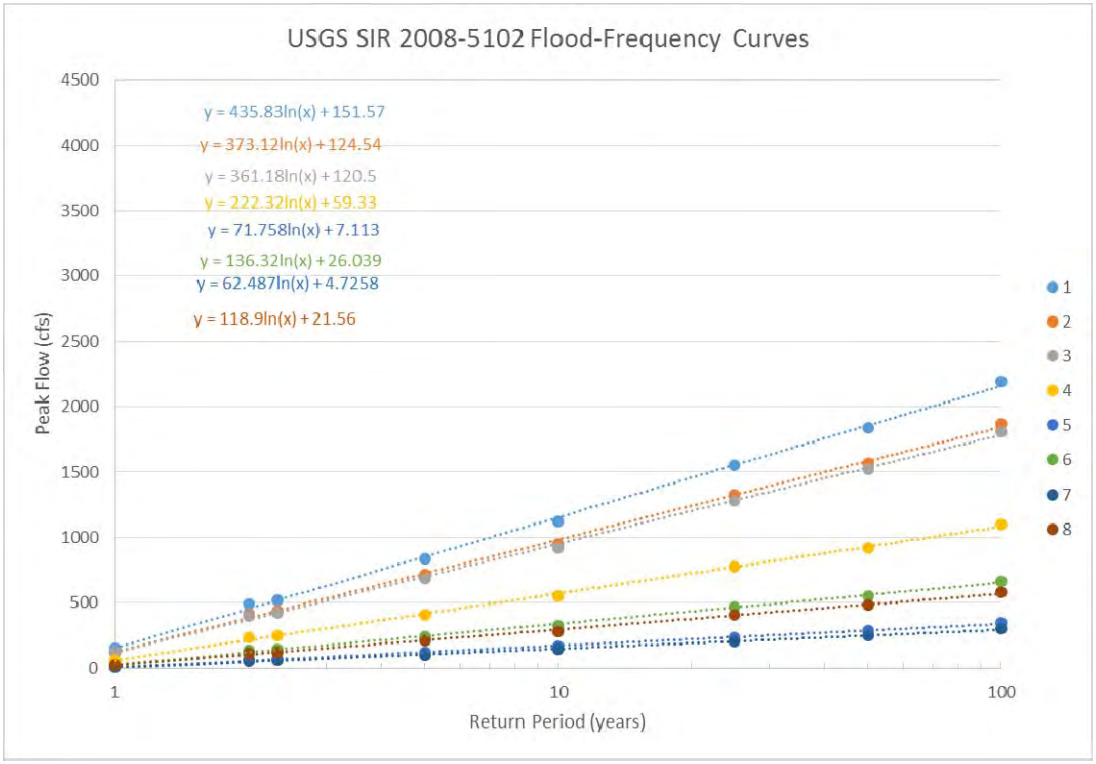
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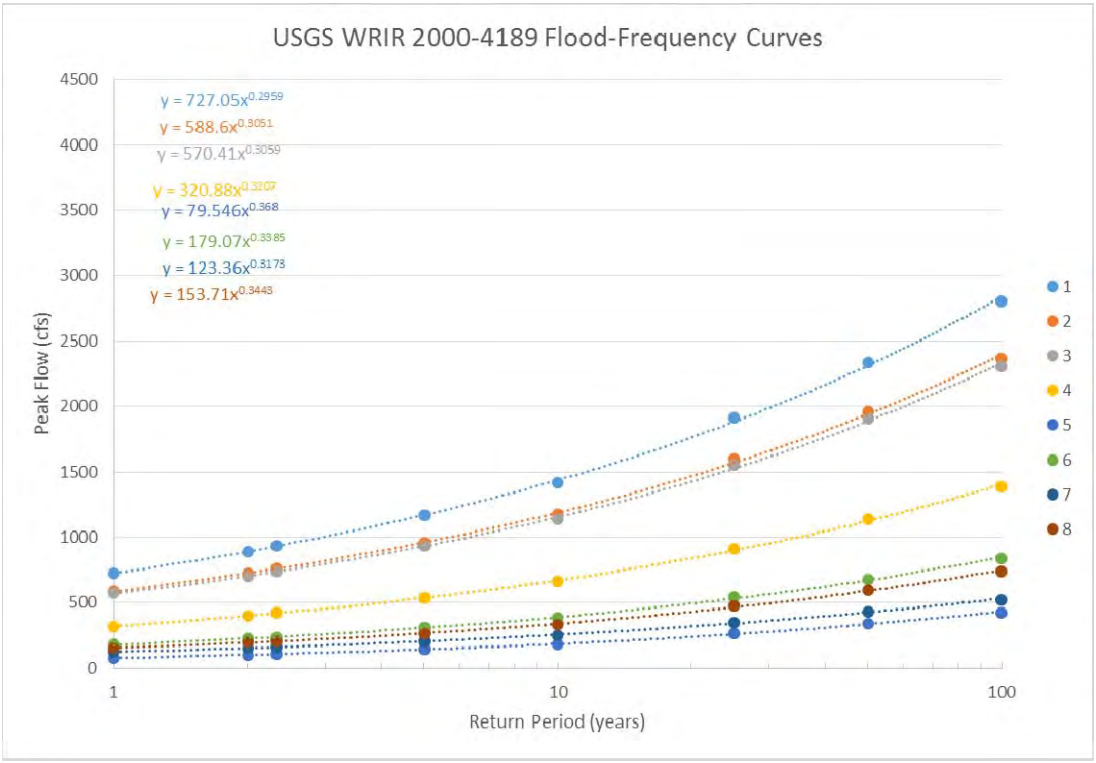
Flaugherty Run Flows

Flaugherty Run Flows																	
Method		SIR 5102								WRIR 4189							
POI\Event	Drainage Area (sq mi)	1	2	2.33	5	10	25	50	100	1	2	2.33	5	10	25	50	100
1	8.85	152	488	520	839	1120	1554	1840	2190	727	893	934	1170	1420	1913	2334	2805
2	7.31	125	413	440	713	953	1326	1570	1870	589	727	762	962	1174	1596	1959	2369
3	7.04	121	400	426	690	922	1283	1520	1810	570	705	739	933	1140	1551	1905	2305
4	3.65	59	233	247	409	551	775	921	1100	321	401	421	538	663	916	1136	1387
5	0.78	7	65	68	119	164	238	284	345	80	103	109	144	183	265	339	427
6	1.88	26	134	141	240	326	465	553	666	179	226	238	309	385	542	680	839
7	0.64	5	56	58	102	141	206	246	299	123	154	161	206	253	348	431	525
8	1.59	22	116	122	208	283	404	481	580	154	195	206	268	335	474	597	740
	Interpolated																

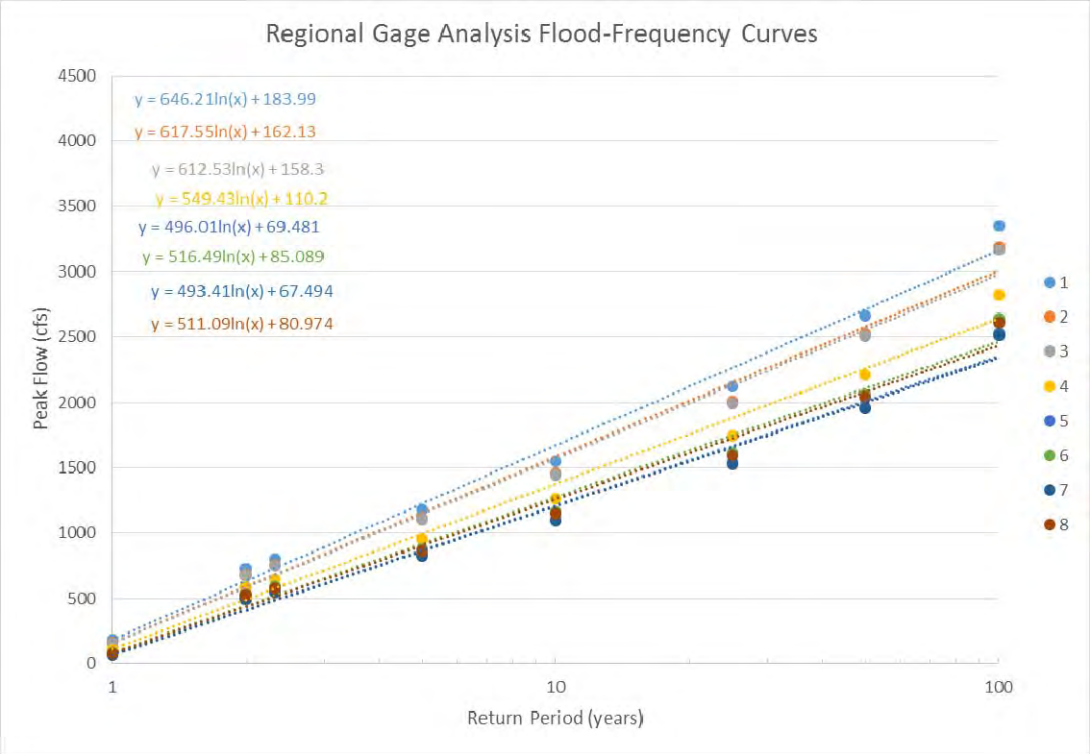
Method		Regional Gage Analysis									1998 PSRM						
POI\Event	Drainage Area (sq mi)	1	2	2.33	5	10	25	50	100	1	2	2.33	5	10	25	50	100
1	8.85	184	729	805	1179	1546	2121	2664	3351	375	846	1063	1683	2318	3135	3562	3995
2	7.31	162	685	757	1112	1461	2010	2531	3194	252	712	901	1475	2072	2859	3261	3671
3	7.04	158	677	748	1101	1446	1990	2507	3166	241	699	884	1451	2042	2822	3222	3630
4	3.65	110	581	643	954	1259	1745	2213	2820	151	415	526	862	1199	1657	1889	2128
5	0.78	69	499	554	829	1101	1537	1964	2526	27	89	110	184	264	368	427	481
6	1.88	85	530	589	877	1162	1617	2060	2639	83	235	298	488	688	944	1082	1215
7	0.64	67	495	550	823	1093	1527	1952	2512	24	103	114	184	261	371	432	497
8	1.59	81	522	580	864	1146	1596	2035	2609	0	117	144	264	402	581	681	788
	Interpolated																

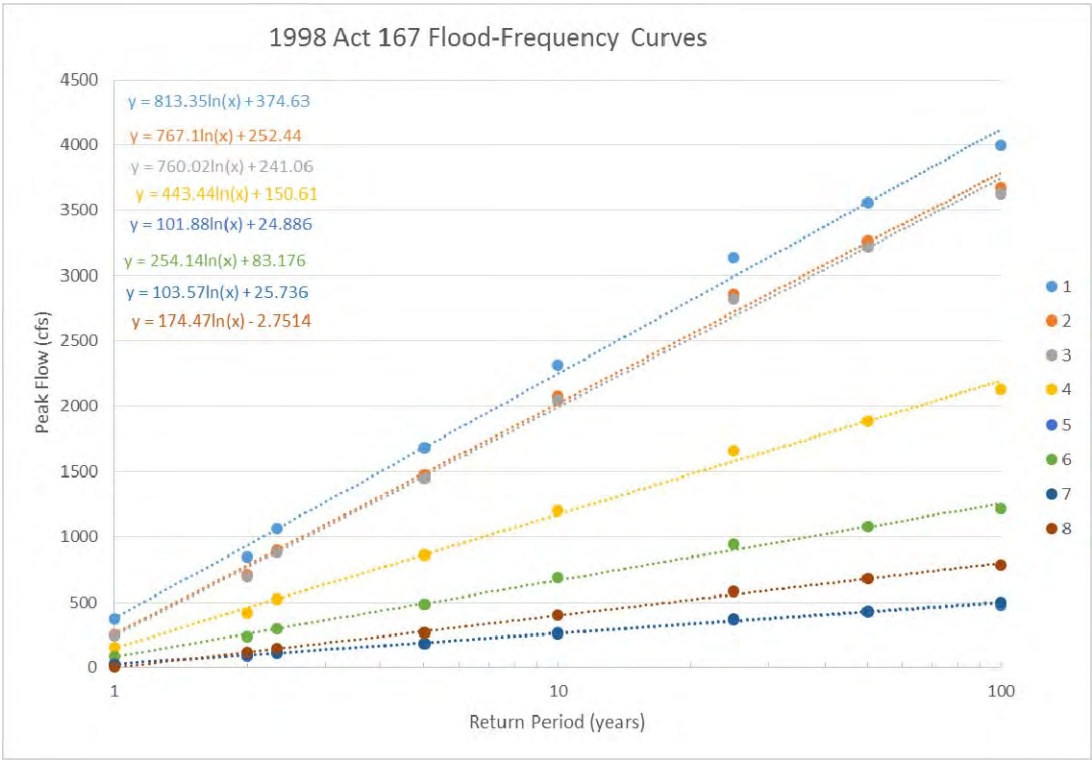
Flaugherty Run Flood-Frequency Curves



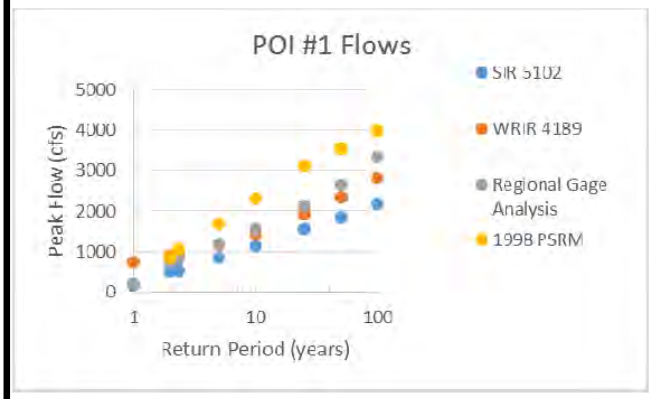


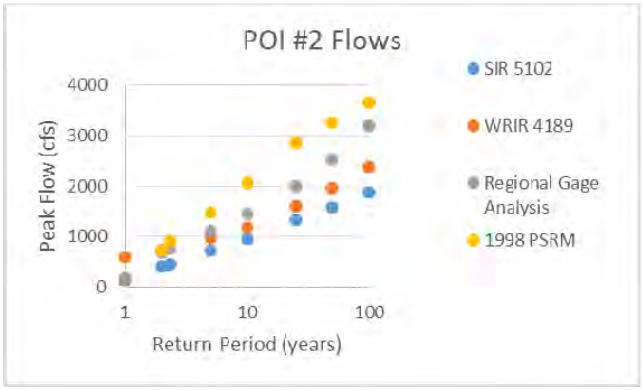
Flaugherty Run Flood-Frequency Curves

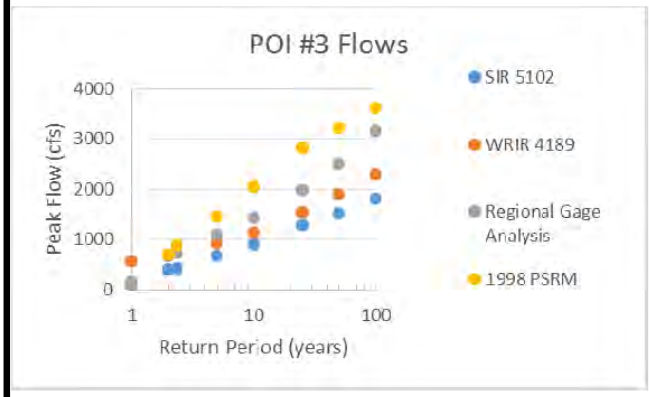


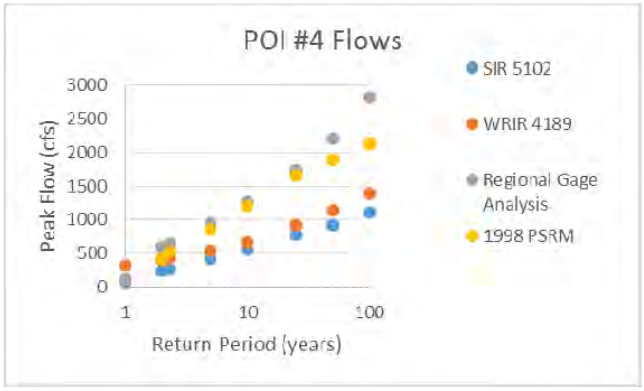


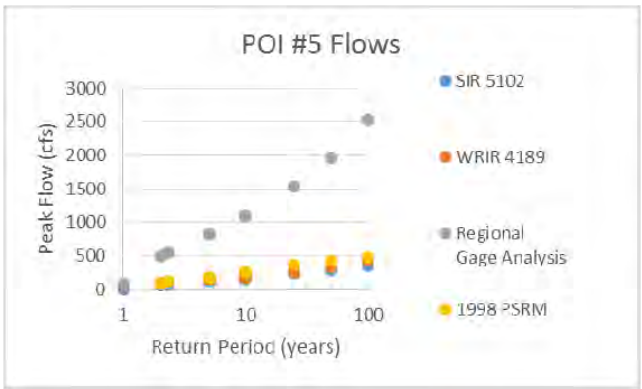
Hydrologic Method Comparison at Points of Interest

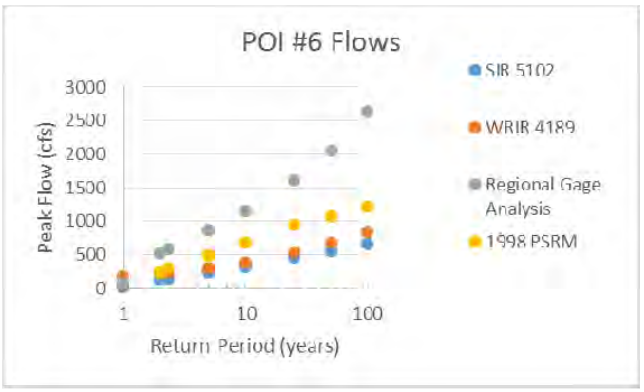


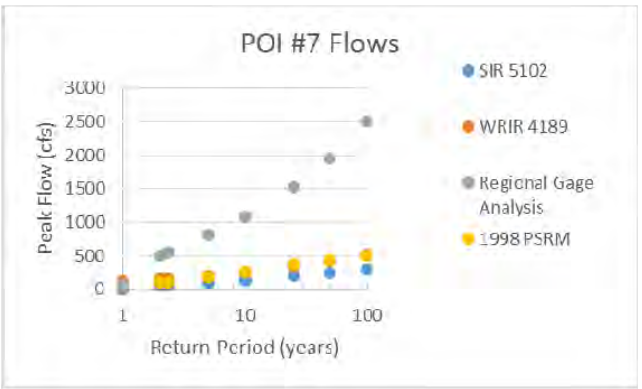


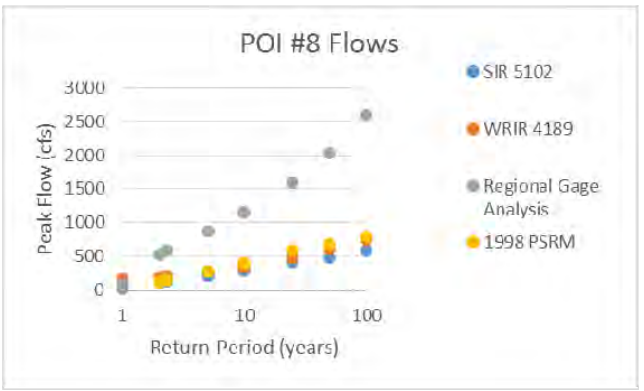












TECHNICAL APPENDIX A.2

USGS WRIR 2000-4189



USGS WRIR 2000-4189 Regional Map

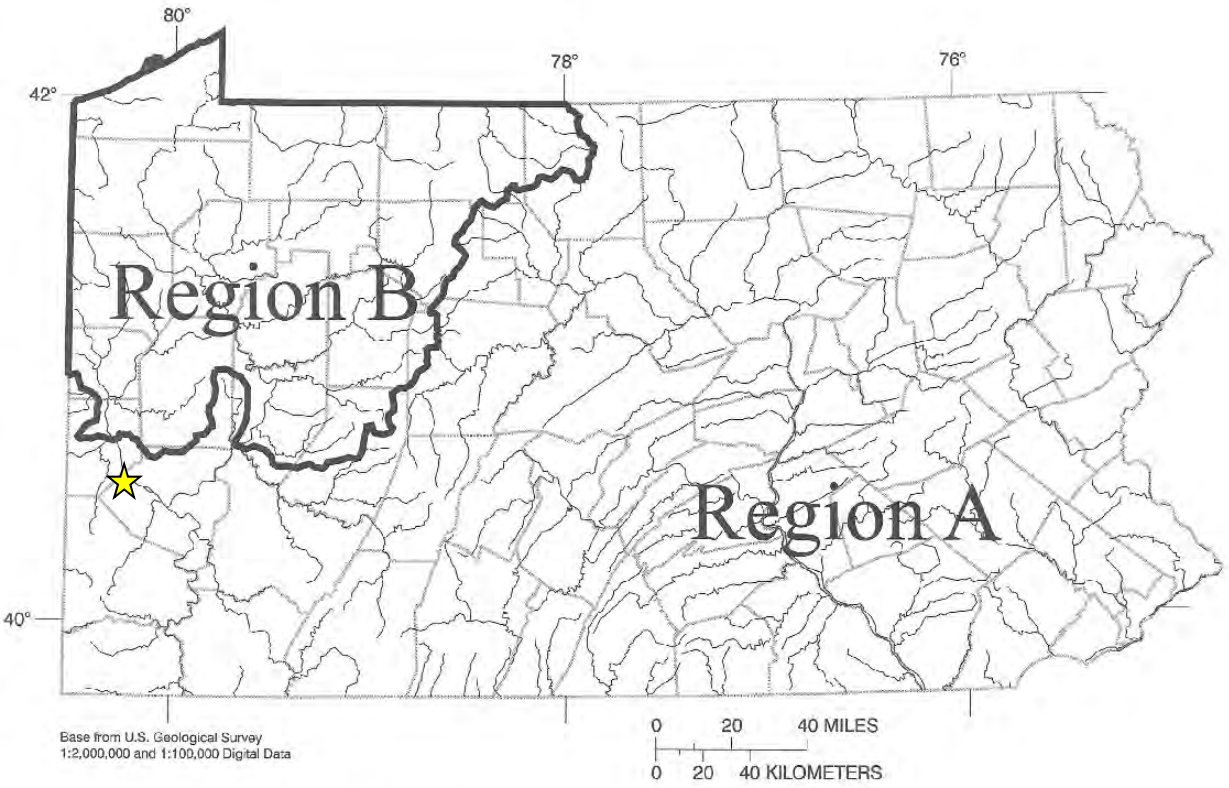


Figure 3. Flood-frequency regions in Pennsylvania.

☆ - Indicates project location

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USGS WRIR 2000-4189 Pennsylvania
Carbonate Coverage Map

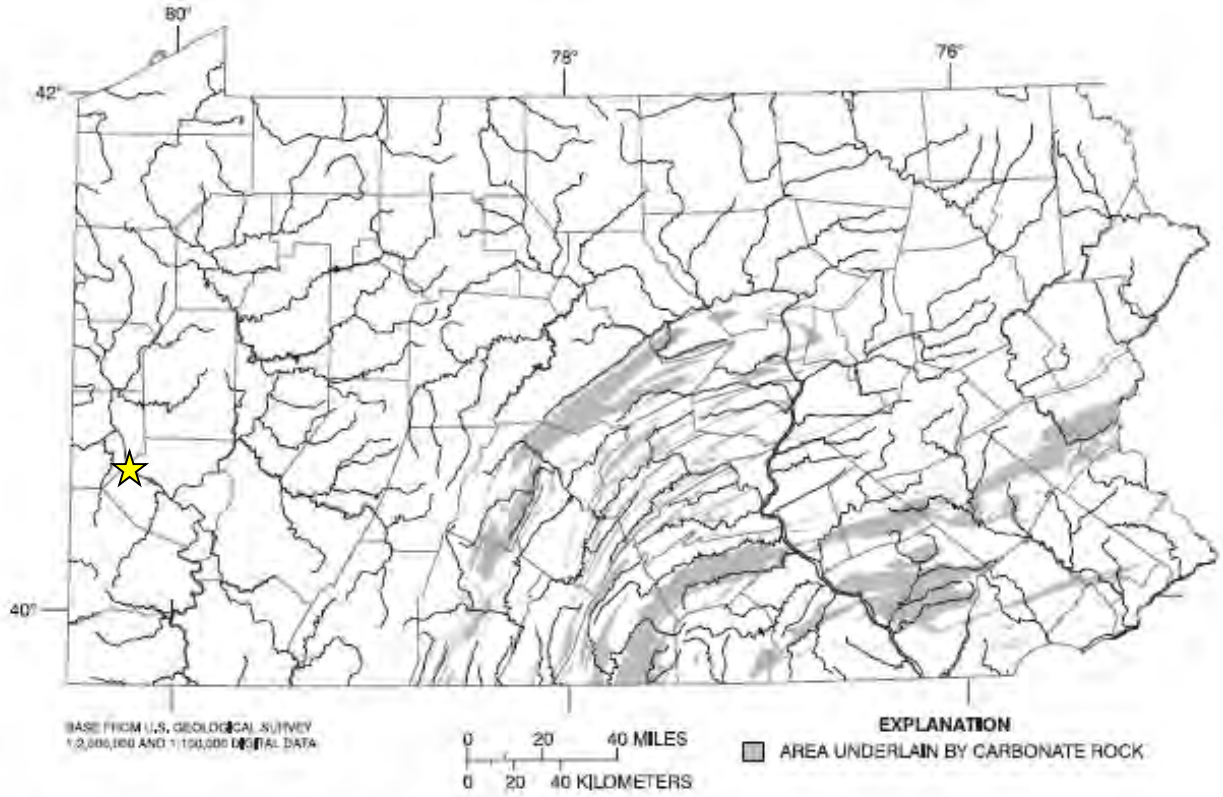


Figure 2. Carbonate regions in Pennsylvania (modified from Environmental Resources Research Institute, 1998).

☆ - Indicates project location

NEWELL TERESKA & MACKAY ENGINEERING

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: CMW Ckd: BBS
Date: 12/17/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Flaugherty Run POI#1: Confluence with Ohio River

Total drainage area (mi^2) =	8.85
Total forest area in watershed (mi^2) =	5.84
% Forested (F) =	66.0
Total urban area in watershed (mi^2) =	2.39
% Urban Development (U) =	27.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
1,420	**1,913**	**2,334**	**2,805**	**4,122**

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: CMW Ckd: BBS
Date: 12/17/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Flaugherty Run POI #2: Upstream of Confluence with Unnamed Tributary

Total drainage area (mi^2) =	7.31
Total forest area in watershed (mi^2) =	5.04
% Forested (F) =	69.0
Total urban area in watershed (mi^2) =	1.75
% Urban Development (U) =	24.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
1,174	**1,596**	**1,959**	**2,369**	**3,523**

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: CMW Ckd: BBS
Date: 12/17/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Flaugherty Run POI #3: Downstream of Confluence with Boggs Run

Total drainage area (mi^2) =	7.04
Total forest area in watershed (mi^2) =	4.86
% Forested (F) =	69.0
Total urban area in watershed (mi^2) =	1.69
% Urban Development (U) =	24.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
1,140	**1,551**	**1,905**	**2,305**	**3,432**

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: CMW Ckd: BBS
Date: 12/17/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Flaugherty Run POI #4: Downstream of Confluence with Unnamed Tributary

Total drainage area (mi^2) =	3.65
Total forest area in watershed (mi^2) =	2.66
% Forested (F) =	73.0
Total urban area in watershed (mi^2) =	0.84
% Urban Development (U) =	23.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
663	**916**	**1,136**	**1,387**	**2,104**

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: CMW Ckd: BBS
Date: 12/17/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:
DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Flaugherty Run POI #5: Unnamed Tributary to Flaugherty Run Upstream of Confluence with Flaugherty Run

Total drainage area (mi^2) =	0.78
Total forest area in watershed (mi^2) =	0.61
% Forested (F) =	78.0
Total urban area in watershed (mi^2) =	0.12
% Urban Development (U) =	16.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
183	**265**	**339**	**427**	**689**

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: CMW Ckd: BBS
Date: 12/17/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Flaugherty Run POI #6: Upstream of Confluence with Unnamed Tributary

Total drainage area (mi^2) =	1.88
Total forest area in watershed (mi^2) =	1.41
% Forested (F) =	75.0
Total urban area in watershed (mi^2) =	0.39
% Urban Development (U) =	21.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
385	**542**	**680**	**839**	**1,303**

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: CMW Ckd: BBS
Date: 12/17/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Flaugherty Run Run POI #7: Unnamed Tributary Upstream of Confluence with Boggs Run

Total drainage area (mi^2) =	0.64
Total forest area in watershed (mi^2) =	0.28
% Forested (F) =	43.0
Total urban area in watershed (mi^2) =	0.32
% Urban Development (U) =	50.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
253	**348**	**431**	**525**	**796**

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: CMW Ckd: BBS
Date: 12/17/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Flaugherty Run POI #8: Boggs Run Downstream of Confluence with Unnamed Tributary

Total drainage area (mi^2) =	1.59
Total forest area in watershed (mi^2) =	1.19
% Forested (F) =	75.0
Total urban area in watershed (mi^2) =	0.32
% Urban Development (U) =	20.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

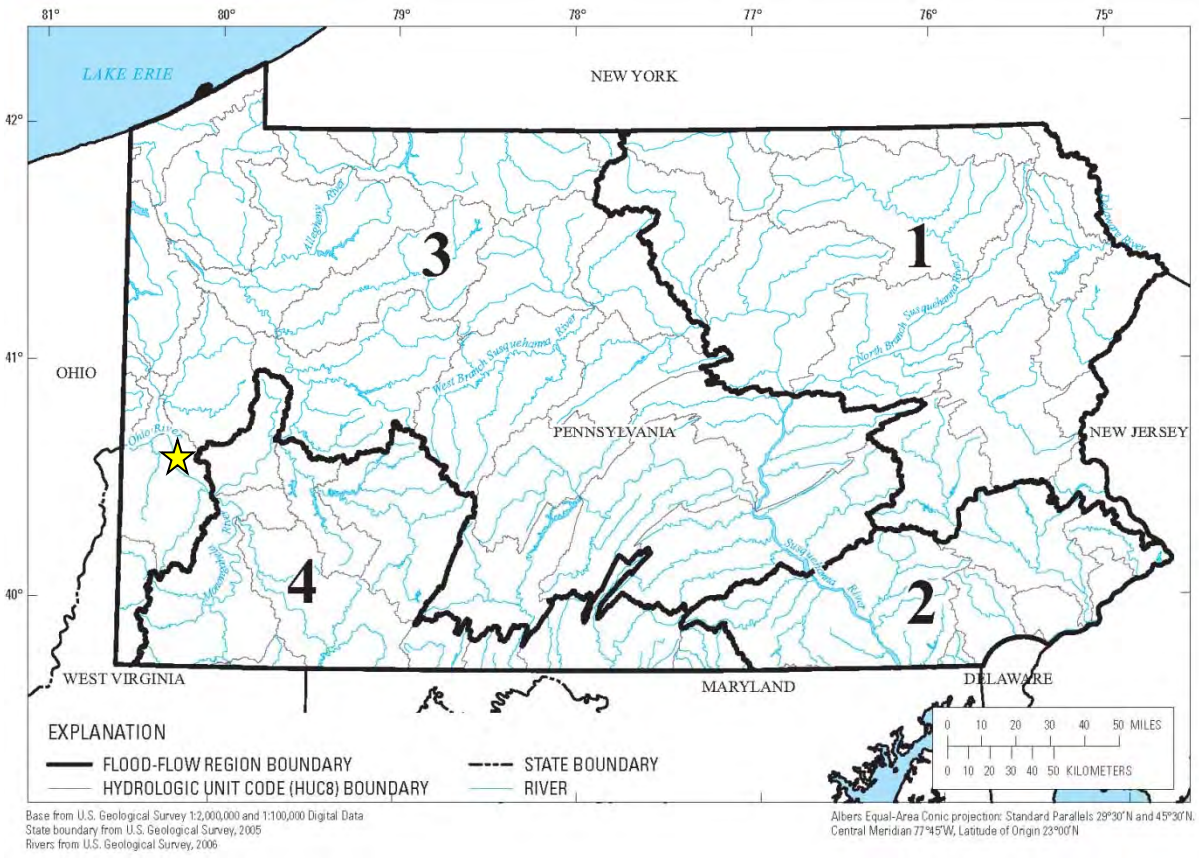
10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
335	**474**	**597**	**740**	**1,159**

TECHNICAL APPENDIX A.2

USGS SIR 2008-5102



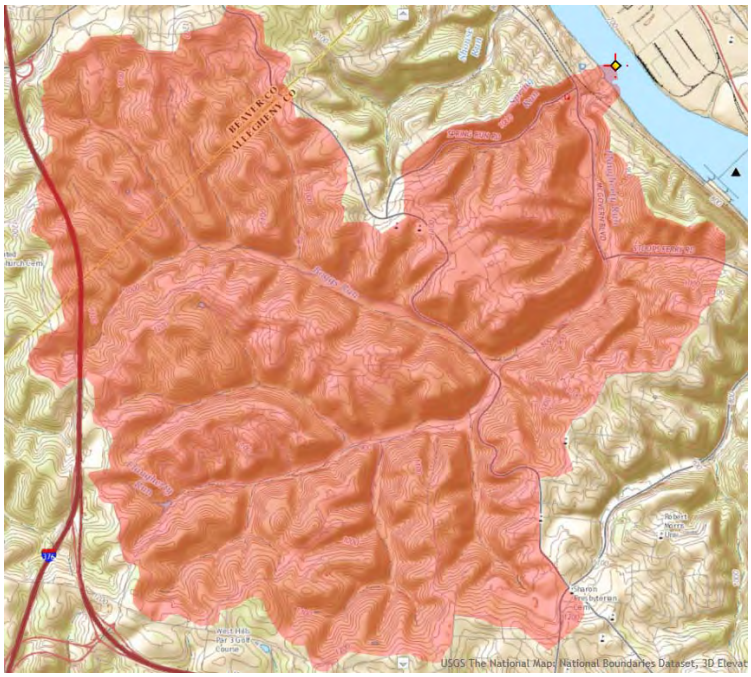
USGS SIR 2008-5102 Regional Map



☆ - Indicates project location

NEWELL TERESKA & MACKAY ENGINEERING

USGS SIR 2008-5102 (PA Stream Stats)
POI#1 Calculations



Peak Flow Statistics

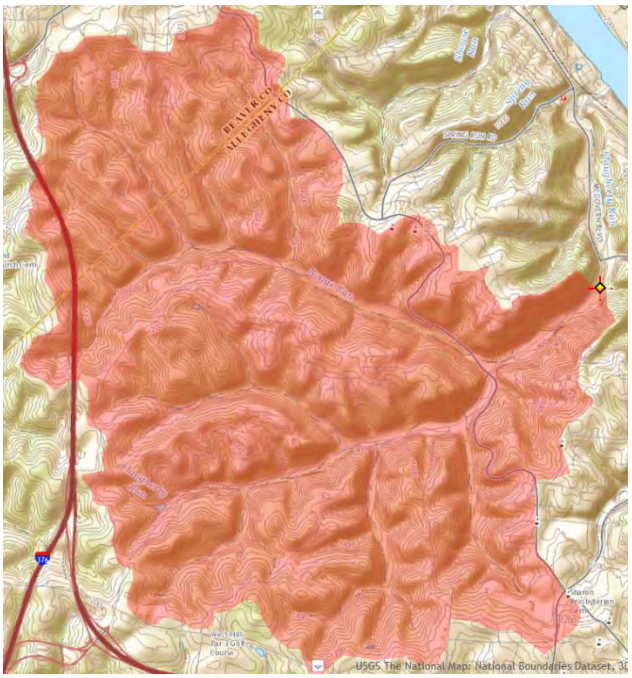
Statistic	Value	Unit
PK2	488	ft3/s
PK5	839	ft3/s
PK10	1120	ft3/s
PK50	1840	ft3/s
PK100	2190	ft3/s
PK500	3140	ft3/s

Basin Characteristics

Label	Value	Units	Definition
DRNAREA	8.85	square miles	Area that drains to a point on a stream
STRMTOT	20.1	miles	Total length of mapped streams in basin
STRDEN	2.27	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	11.1	degrees	Mean basin slope measured in degrees
CENTROIDX	-190145.9	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	173043.1	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-187705	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	175335	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.21676	degrees	Longitude of Basin Outlet
BSLOPDRAW	11.35	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	66	percent	Percentage of area covered by forest
PRECIP	37	inches	Mean Annual Precipitation
URBAN	27	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	3.9	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1047.8	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.4	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	8	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

NEWELL TERESKA & MACKAY ENGINEERING

USGS SIR 2008-5102 (PA Stream Stats)
POI#2 Calculations



Peak Flow Statistics

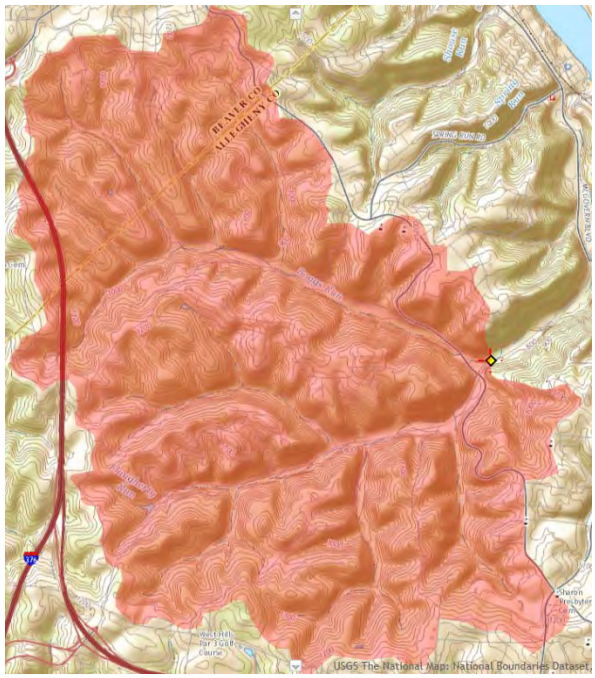
Statistic	Value	Unit
PK2	413	ft3/s
PK5	713	ft3/s
PK10	953	ft3/s
PK50	1570	ft3/s
PK100	1870	ft3/s
PK500	2690	ft3/s

Basin Characteristics

Label	Value	Units	Definition
DRNAREA	7.31	square miles	Area that drains to a point on a stream
STRMTOT	17.06	miles	Total length of mapped streams in basin
STRDEN	2.33	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	10.8	degrees	Mean basin slope measured in degrees
CENTROIDX	-190568.5	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	172833.4	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-187845	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	173435	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.21784	degrees	Longitude of Basin Outlet
BSLOPDRAW	11.03	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	69	percent	Percentage of area covered by forest
PRECIP	37	inches	Mean Annual Precipitation
URBAN	24	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	3.9	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1068.7	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.4	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	7	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

NEWELL TERESKA & MACKAY ENGINEERING

USGS SIR 2008-5102 (PA Stream Stats)
POI#3 Calculations



Peak Flow Statistics

Statistic	Value	Unit
PK2	400	ft3/s
PK5	690	ft3/s
PK10	922	ft3/s
PK50	1520	ft3/s
PK100	1810	ft3/s
PK500	2610	ft3/s

Basin Characteristics

Label	Value	Units	Definition
DRNAREA	7.04	square miles	Area that drains to a point on a stream
STRMTOT	16.35	miles	Total length of mapped streams in basin
STRDEN	2.32	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	10.6	degrees	Mean basin slope measured in degrees
CENTROIDX	-190657	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	172824.3	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-188725	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	172835	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.22804	degrees	Longitude of Basin Outlet
BSLOPDRAW	10.86	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	69	percent	Percentage of area covered by forest
PRECIP	37	inches	Mean Annual Precipitation
URBAN	24	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	3.9	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1074.7	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.4	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	7	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

NEWELL TERESKA & MACKAY ENGINEERING

USGS SIR 2008-5102 (PA Stream Stats)
POI#4 Calculations

Peak Flow Statistics

Statistic	Value	Unit
PK2	233	ft3/s
PK5	409	ft3/s
PK10	551	ft3/s
PK50	921	ft3/s
PK100	1100	ft3/s
PK500	1600	ft3/s

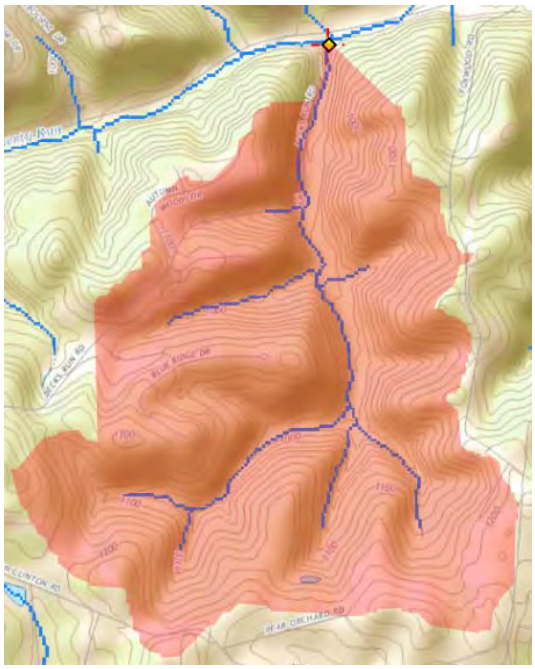


Basin Characteristics

Label	Value	Units	Definition
DRNAREA	3.65	square miles	Area that drains to a point on a stream
STRMTOT	8.88	miles	Total length of mapped streams in basin
STRDEN	2.43	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	10.9	degrees	Mean basin slope measured in degrees
CENTROIDX	-190410.9	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	171706.8	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-189045	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	172405	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.23169	degrees	Longitude of Basin Outlet
BSLOPDRAW	11.15	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	73	percent	Percentage of area covered by forest
PRECIP	37	inches	Mean Annual Precipitation
URBAN	23	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	3.9	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1079.1	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.4	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	8	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

NEWELL TERESKA & MACKAY ENGINEERING

USGS SIR 2008-5102 (PA Stream Stats)
POI#5 Calculations



Peak Flow Statistics

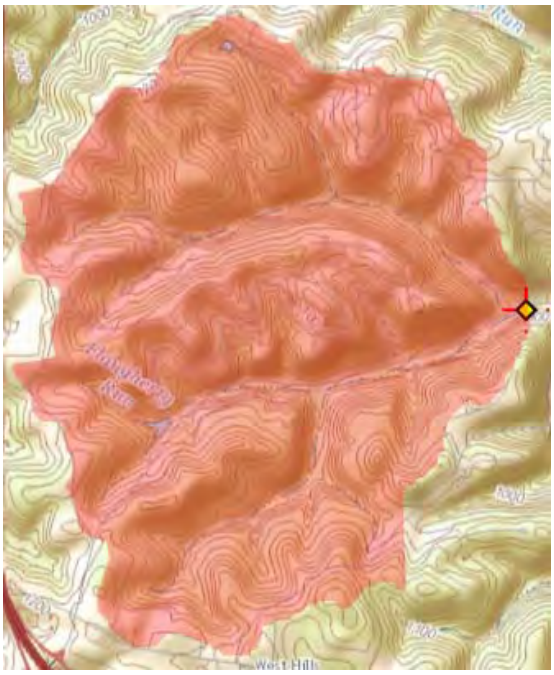
Statistic	Value	Unit
PK2	65.2	ft3/s
PK5	119	ft3/s
PK10	164	ft3/s
PK50	284	ft3/s
PK100	345	ft3/s
PK500	513	ft3/s

Basin Characteristics

Label	Value	Units	Definition
DRNAREA	0.78	square miles	Area that drains to a point on a stream
STRMTOT	1.65	miles	Total length of mapped streams in basin
STRDEN	2.13	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	11.6	degrees	Mean basin slope measured in degrees
CENTROIDX	-190000	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	170968.3	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-189825	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	172115	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.24081	degrees	Longitude of Basin Outlet
BSLOPDRAW	11.82	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	78	percent	Percentage of area covered by forest
PRECIP	37	inches	Mean Annual Precipitation
URBAN	16	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	3.8	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1088.8	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.3	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	2	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

NEWELL TERESKA & MACKAY ENGINEERING

USGS SIR 2008-5102 (PA Stream Stats)
POI#6 Calculations



Peak Flow Statistics

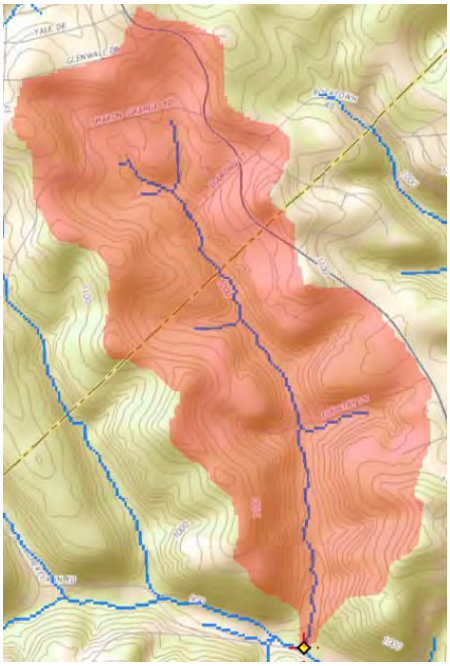
Statistic	Value	Unit
PK2	134	ft3/s
PK5	240	ft3/s
PK10	326	ft3/s
PK50	553	ft3/s
PK100	666	ft3/s
PK500	977	ft3/s

Basin Characteristics

Label	Value	Units	Definition
DRNAREA	1.88	square miles	Area that drains to a point on a stream
STRMTOT	5.39	miles	Total length of mapped streams in basin
STRDEN	2.87	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	10.3	degrees	Mean basin slope measured in degrees
CENTROIDX	-191263.7	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	172058.6	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-190105	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	172095	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.2441	degrees	Longitude of Basin Outlet
BSLOPDRAW	10.53	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	75	percent	Percentage of area covered by forest
PRECIP	37	inches	Mean Annual Precipitation
URBAN	21	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	3.9	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1091.6	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.4	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	8	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

NEWELL TERESKA & MACKAY ENGINEERING

USGS SIR 2008-5102 (PA Stream Stats)
POI#7 Calculations



Peak Flow Statistics

Statistic	Value	Unit
PK2	55.6	ft3/s
PK5	102	ft3/s
PK10	141	ft3/s
PK50	246	ft3/s
PK100	299	ft3/s
PK500	446	ft3/s

Basin Characteristics

Label	Value	Units	Definition
DRNAREA	0.64	square miles	Area that drains to a point on a stream
STRMTOT	1.32	miles	Total length of mapped streams in basin
STRDEN	2.07	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	8.2	degrees	Mean basin slope measured in degrees
CENTROIDX	-190765.2	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	174903.9	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-190545	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	173695	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.24978	degrees	Longitude of Basin Outlet
BSLOPDRAW	8.41	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	43	percent	Percentage of area covered by forest
PRECIP	37	inches	Mean Annual Precipitation
URBAN	50	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	3.8	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1081.2	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.4	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	7	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

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USGS SIR 2008-5102 (PA Stream Stats)
POI#8 Calculations



Peak Flow Statistics

Statistic	Value	Unit
PK2	116	ft3/s
PK5	208	ft3/s
PK10	283	ft3/s
PK50	481	ft3/s
PK100	580	ft3/s
PK500	853	ft3/s

Basin Characteristics

Label	Value	Units	Definition
DRNAREA	1.59	square miles	Area that drains to a point on a stream
STRMTOT	4.14	miles	Total length of mapped streams in basin
STRDEN	2.61	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	10	degrees	Mean basin slope measured in degrees
CENTROIDX	-191991.6	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	174300	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-191055	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	173885	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.25586	degrees	Longitude of Basin Outlet
BSLOPDRAW	10.27	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	75	percent	Percentage of area covered by forest
PRECIP	37	inches	Mean Annual Precipitation
URBAN	20	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	3.7	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1113	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.3	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	5	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

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TECHNICAL APPENDIX A.2

1998 Act 167 Information

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Table 5.3

DESIGN STORM PRECIPITATION

Return Period	24-Hour Rainfall (inches)
2-Year	2.6
5-Year	3.3
10-Year	3.8
25-Year	4.4
50-Year	4.7
100-Year	5.0

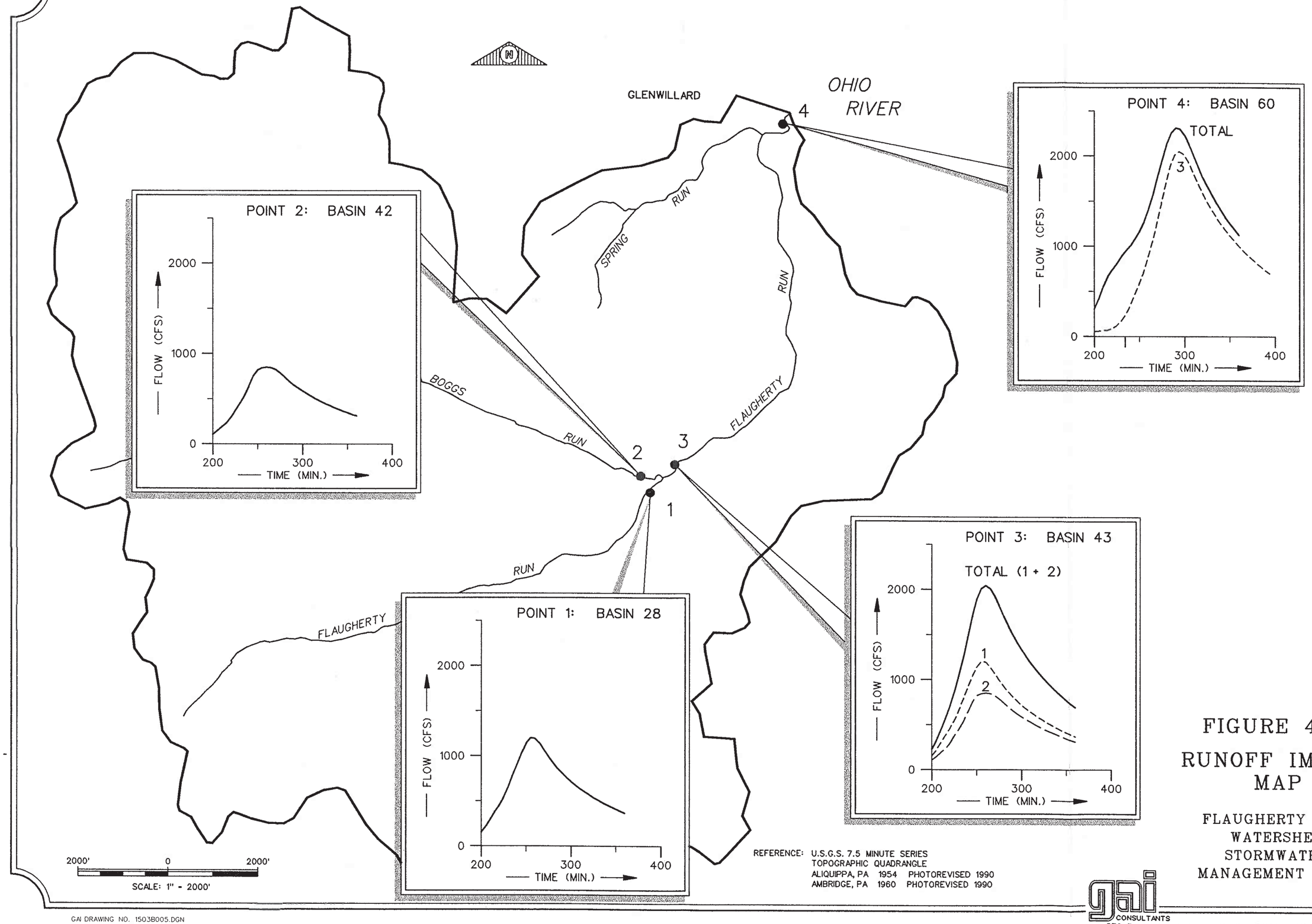
stormwater ordinances. More recent precipitation data has been developed by the PaDEP (Reference 22) with values differing slightly from the values presented in Table 5.3. For consistency with existing township stormwater management plans, however, the values in Table 5.3 were used in performing the stormwater management analyses in this plan.

Hydraulic Data and Analyses. The capacities of the various stream channels, culverts, and bridges to convey storm flows were estimated using representative stream cross sections obtained during the obstruction surveys. Manning's equation was used to estimate flow capacities of the channels. The Federal Highway Administration's "Hydraulic Design of Highway Culverts" (Reference 23) was used to estimate the hydraulic capacities of the obstructions, which are presented in Appendix B. In general, the flow capacities of the obstructions were significantly less than the flow capacities of the stream channels. Table 5.4 presents a summary of the representative flow capabilities at selected locations in the watershed.

Table 5.4

STREAM CHANNEL CAPACITIES

Channel Description	Bank Full Capacity cubic feet per second (cfs)
Flaugherty Run - Downstream of Boggs Run	950
Flaugherty Run - Upstream of Becks Run	800
Becks Run - Near Confluence with Flaugherty Run	350
Boggs Run - Near Confluence with Flaugherty Run	800
Boggs Run - 8000 Feet Upstream of Flaugherty Run	250
Spring Run - Near Confluence with Flaugherty Run	500



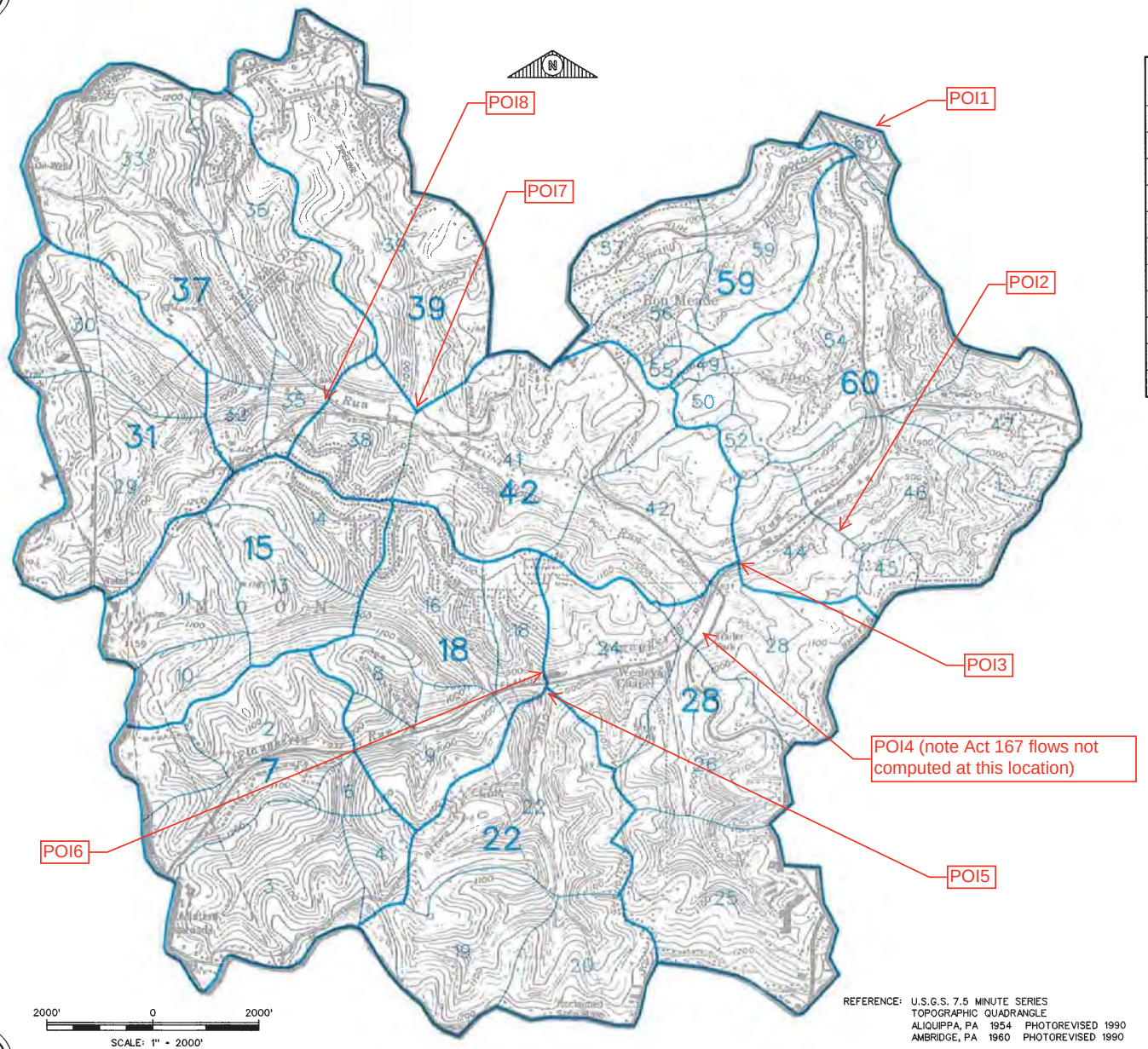
REFERENCE: U.S.G.S. 7.5 MINUTE SERIES
TOPOGRAPHIC QUADRANGLE
ALIQUIPPA, PA 1954 PHOTOREVISED 1990
AMBRIDGE, PA 1960 PHOTOREVISED 1990

FIGURE 4-2
RUNOFF IMPACT MAP

FLAUGHERTY RUN
WATERSHED
STORMWATER
MANAGEMENT PLAN

GAI DRAWING NO. 1503B005.DGN

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REGION	RELEASE RATE
7	80
15	60
18	70
22	70
28	85
31	70
37	85
39	70
42	85
59	95
60	100

LEGEND

REGION BOUNDARY

60 REGION IDENTIFICATION NUMBER

WATERSHED BOUNDARY

REFERENCE: U.S.G.S. 7.5 MINUTE SERIES
TOPOGRAPHIC QUADRANGLE
ALIQUIPPA, PA 1954 PHOTOREVISED 1990
AMBRIDGE, PA 1960 PHOTOREVISED 1990

GAI DRAWING NO. 1503B019.DGN

FIGURE 7-8

REGIONAL RELEASE RATE MAP

FLAUGHERTY RUN
WATERSHED
STORMWATER
MANAGEMENT PLAN

gai CONSULTANTS
570 Beatty Road, Monroeville, PA 15146 412/856-6400

6.0 PSRM MODELLING

Introduction

The PSRM hydrologic models for the Flaugherty Run watershed under existing conditions and under projected future conditions were developed incorporating the foregoing data and analyses, and the six design storm events were modelled. For each basin, the models predicted the generation and the movement of the runoff flows downstream.

Existing Condition PSRM

Table 6.1 presents the results of the PSRM calculations under existing conditions. The peak runoff flows from the individual basins are presented in Table 6.1 under the heading "Basin." This heading allows for the comparison of the relative flows occurring in the basins. From the tables, it can be seen that basins "25", "33", "39", "41", and "54" produce the greatest runoff flows. In general, due to the relative homogeneity of the watershed, the flows are fairly proportional to basin drainage area. The computed ranges of runoff flows/drainage area for the six design storm events are shown in Table 6.2 for selected basins. The effects of urbanization on runoff flows can be seen in basin 60, which contains the village of Glenwillard. The values of peak flow/area in basin 60 are several times greater than the values for the other basins.

Table 6.1 also presents the cumulative peak flows at the outlet of selected basins (column heading "Total"). For example, the total peak flow shown for Basin "2" is computed as the greatest sum of the runoff flow from Basin "2" plus the upstream flow from Basin "1". As one moves downstream in the watershed, the runoff hydrographs of more basins would contribute to the cumulative flow. Thus, at Basin "60", the most downstream basin, all 59 upstream basins plus Basin "60" contribute to the total flow. The amount of flow that an upstream basin would actually contribute to the peak flow of a downstream basin's total flow hydrograph is dependent upon the timing of the individual basin and total flow hydrographs and the travel time between the basins. Flow from an upstream basin takes a certain period of time to travel to the downstream basin. Depending upon the length of this travel time, the flow from an upstream basin may occur at the beginning, the middle, or at the end of the total flow hydrograph at the downstream basin. This is shown pictorially on Figure 6-1 for a hypothetical watershed. Basins "A" and "D" in Figure 6-1 contribute very little to the total peak flow: Basin "A" because its peak flow occurs well before the time of the total peak flow, and Basin "D" because its peak flow arrives well past the total peak flow. Only Basins "B" and "C" would contribute significantly to the total peak flow. In the Flaugherty Run watershed, the individual runoff hydrographs for most of the basins, especially in the upper Flaugherty Run and Boggs Run watersheds, were determined to have significant overlap; i.e., to most closely resemble Basins "B" and "C". This finding is attributed primarily to the small size and compact shape of the watershed. The Spring Run watershed, on the other hand, would correspond to Basin "A". This can be seen on Figure 4-2, the Runoff Impact Map.

Table 6.1

EXISTING CONDITIONS - PEAK RUNOFF FLOWS AND TOTAL FLOWS FROM THE INDIVIDUAL BASINS (cubic feet per second)

	Storm											
	2-Year		5-Year		10-Year		25-Year		50-Year		100-Year	
Basin	Basin	Total	Basin	Total	Basin	Total	Basin	Total	Basin	Total	Basin	Total
1	13	13	28	28	42	42	60	60	70	70	80	80
2	33	44	77	101	119	156	178	233	211	275	245	319
3	34	34	75	75	114	114	170	170	200	200	232	232
4	7	7	18	18	28	28	42	42	50	50	58	58
5	0	41	1	93	1	142	1	211	2	250	2	290
6	5	45	11	101	18	152	26	228	31	269	37	309
7	0	88	1	199	1	297	1	425	2	496	2	566
8	27	14	46	19	62	28	83	45	93	53	104	60
9	15	114	37	247	59	368	92	527	110	609	129	690
10	26	19	46	27	64	38	87	55	100	75	113	95
11	38	38	71	71	100	100	141	141	162	162	185	185
12	0	55	1	95	1	130	1	186	2	219	2	267
13	21	72	45	133	68	182	100	254	118	291	138	343
14	26	26	51	51	76	76	110	110	129	129	148	148
15	0	96	1	182	1	244	1	324	2	367	2	421
16	27	115	56	224	84	304	124	395	146	446	170	498
17	0	226	1	467	1	666	1	919	2	1048	2	1179
POI6 18	17	235	32	488	46	688	67	944	79	1082	91	1215
19	48	48	87	87	122	122	173	173	200	200	230	230
20	18	18	43	43	67	67	101	101	120	120	140	140
21	0	63	1	124	1	183	1	268	2	314	2	363
POI5 22	29	89	73	184	117	264	181	368	217	427	255	481
23	0	317	1	663	1	942	1	1311	2	1499	2	1677
24	39	334	67	669	94	987	134	1364	156	1562	180	1748
25	81	81	127	127	169	169	230	230	264	264	300	300
26	16	94	41	157	67	216	106	291	129	340	153	371
27	0	383	1	753	1	1005	1	1387	2	1587	2	1792
28	26	415	62	862	97	1199	146	1657	173	1889	202	2128
29	49	49	100	100	149	149	218	218	257	257	297	297
30	22	22	53	53	84	84	129	129	154	154	180	180
31	0	71	1	153	1	232	1	345	2	409	2	476
32	6	74	14	158	22	248	33	356	39	424	45	495

Table 6.1 (Continued)

		Storm											
		2-Year		5-Year		10-Year		25-Year		50-Year		100-Year	
	Basin	Basin	Total	Basin	Total	Basin	Total	Basin	Total	Basin	Total	Basin	Total
	33	42	42	106	106	170	170	264	264	317	317	372	372
	34	0	115	1	255	1	391	1	565	2	665	2	769
POI8	35	4	117	11	264	17	402	27	581	32	681	37	788
	36	42	42	85	85	128	128	190	190	224	224	261	261
	37	0	149	1	330	1	495	1	713	2	831	2	954
	38	26	165	49	361	71	536	103	771	121	896	139	1027
POI7	39	103	103	184	184	261	261	371	371	432	432	497	497
	40	0	235	1	485	1	707	1	1008	2	1173	2	1347
	41	37	267	88	556	140	808	216	1153	259	1342	306	1540
	42	30	287	61	596	92	861	138	1225	163	1425	191	1635
POI3	43	0	699	1	1451	1	2042	1	2822	2	3222	2	3630
POI2	44	24	712	47	1475	69	2072	101	2859	118	3261	137	3671
	45	9	7	17	15	24	22	34	30	39	31	44	33
	46	38	741	81	1524	123	2134	181	2917	213	3336	247	3751
	47	39	39	71	71	101	101	144	144	168	168	193	193
	48	0	753	1	1543	1	2154	1	2956	2	3367	2	3779
	49	7	3	11	6	15	13	19	18	21	20	23	22
	50	13	12	21	19	27	26	36	34	41	39	46	43
	51	0	14	1	25	1	38	1	52	2	58	2	65
	52	9	2	15	2	19	2	26	2	29	3	32	3
	53	0	15	1	27	1	39	1	54	2	61	2	68
	54	68	803	144	1620	217	2244	318	3052	373	3477	433	3890
	55	9	5	15	8	20	12	26	17	30	19	33	21
	56	32	35	54	59	73	80	98	108	112	123	126	139
	57	23	23	42	42	60	60	85	85	99	99	114	114
	58	0	57	1	98	1	136	1	188	2	215	2	243
	59	29	79	60	149	91	208	136	288	161	332	188	377
POI1	60	26	846	42	1683	54	2318	69	3135	77	3562	84	3995

Evaluation of the information presented in Table 6.1 allows for predicting the relative significance of an upstream basin to a downstream basin. Table 6.3 presents, for selected locations, a comparison of the Table 6.1 total peak flows (predicted by PSRM) with a "peak" flow obtained by a direct addition of the peak flows applicable to each basin. The differences in flow is due to the difference in timing between the runoff hydrographs from the contributing basins.

Table 6.2

SUMMARY OF PEAK RUNOFF FLOWS/AREA RATIOS
EXISTING CONDITIONS
(cubic feet per second per acre)

	Storm					
Basin	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
2	0.2	0.4	0.6	0.9	1.1	1.3
13	0.2	0.4	0.6	0.9	1.1	1.3
18	0.3	0.4	0.8	1.1	1.2	1.4
22	0.1	0.3	0.5	0.8	1.0	1.1
28	0.2	0.4	0.6	0.9	1.1	1.2
29	0.2	0.4	0.6	0.9	1.0	1.2
33	0.1	0.3	0.5	0.8	0.9	1.1
39	0.2	0.4	0.6	0.9	1.1	1.2
42	0.2	0.3	0.5	0.8	0.9	1.0
54	0.2	0.4	0.7	1.0	1.1	1.3
59	0.2	0.4	0.6	0.9	1.1	1.3
60	1.0	1.3	1.6	2.3	2.6	2.6

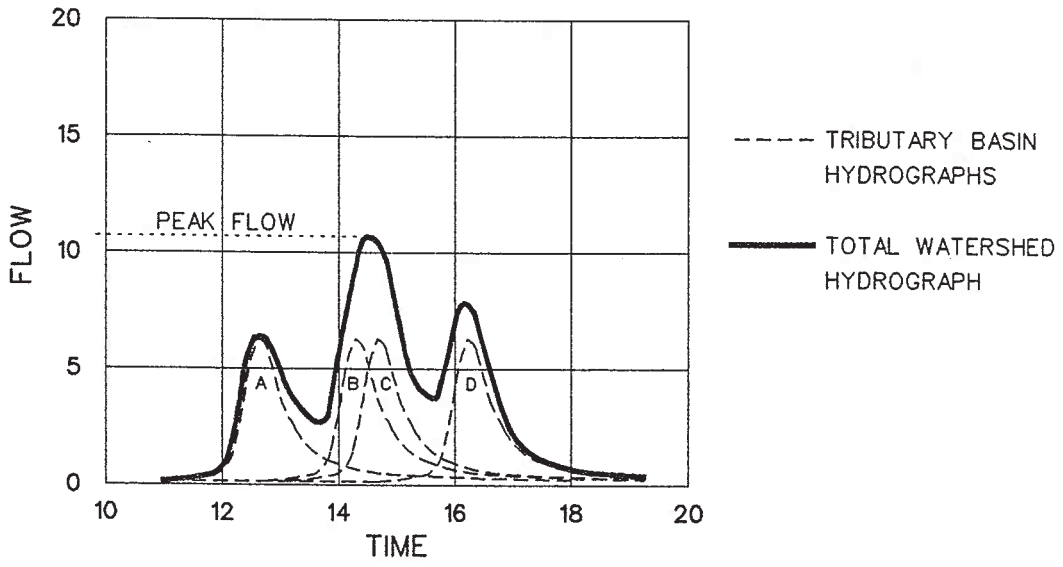
Table 6.3

SIGNIFICANCE OF TIMING - 10-YEAR STORM
EXISTING CONDITIONS AT SELECTED LOCATIONS

Basin	Predicted Total Basin Flow (cfs)	Sum of Individual Contributory Peak Flows (cfs)
Upper Flaugherty Run	987	1220
Boggs Run	861	1134
Confluence, Upper Flaugherty Run and Boggs Run	2042	2687
Spring Run	208	243
Mouth of Flaugherty Run	2318	3557

FIGURE 6-1

EXAMPLE BASIN HYDROGRAPH



The times at which the peak flows from each upstream basin occur do not usually coincide in downstream basins. Each basin hydrograph is delayed by differing amounts, and thus the timing element is required to determine the actual contribution of upstream basin runoff flows to downstream total flows. The significance of this timing element is shown in Table 6.2. As can be seen for the 10-year storm, the PSRM-predicted actual peak flow at the mouth of Flaugherty Run is 2,318 cfs, which accounts for the different timing of the individual basin hydrographs. The total sum of the individual basin peak flows would be 3,557 cfs. Without the consideration of timing, it can be seen how a gross overestimate of the peak flows can be made.

Similarly, stormwater management without the consideration of timing can result in gross underestimates of peak flows downstream. This occurs precisely because the timing element in a stormwater management philosophy such as "no increase in peak flow from the site" is ignored. This philosophy presumes that the proportion of a downstream basin's peak flow is equal to a ratio of the individual basin peak flows.

The objective of Act 167 stormwater management is to preserve the effects of the timing in the watershed, which will help maintain existing downstream peak flows, while still

allowing the generation of increased runoff volumes as would be created by development. This is the basis for the concept of release rates, which is discussed in Section 7.

Model Calibration and Validation

Limited data was available to calibrate the PSRM for existing conditions. Two methods were used to provide reasonable validation of the PSRM analyses (see Appendix F). In the first method, two high water marks, at the Flaugherty House and at a residence near Boggs Run (see Figure 4.3) were identified by residents. The specific events causing the flooding were not known, however. Therefore, the events were assigned a range of probable return periods, and corresponding flow ranges from the PSRM were determined. A flow estimate based on the hydraulic capacity of the channel and flood plain at each location was then made. The flow estimates were compared to the probable range of flows predicted by the PSRM, and reasonable agreement was obtained at each site.

The second method used empirical equations developed by the Soil Conservation Service (SCS), the U.S. Geological Survey, and the U.S. Army Corps of Engineers (USACE). The equations developed by the U.S. Army Corps of Engineers were specifically for streams in the Ohio River Basin, and use parameters different from the parameters in the PSRM. The equations were applied at three locations: the mouth of Boggs Run, Flaugherty Run just upstream of Boggs Run, and at the mouth of Flaugherty Run. The USACE and USGS equation predicted lower flows, and the SCS equations predicted higher flows than the PSRM flows. The variance in flows can be understood by the absence of a significant watershed slope or timing factor in the USACE and USGS equation. Considering all equation and methodologies, reasonable calibration of the PSRM flows was obtained.

Projected Future Conditions

The results of the PSRM Modelling under the projected future conditions are presented in Table 6.4. Column "Basin" in Table 6.4 presents the peak runoff flows for the individual basins (similar to Table 6.1), and Column "Total" presents the peak total flows for the outlet of each basin (similar to Table 6.1). Table 6.5 provides a direct comparison of the predicted flood flows between existing conditions and projected future conditions. Ratios of the total peak flows for selected basins are presented in Table 6.5. The peak flows can be seen to increase from 10% (1.1) to 60% (1.6).

It is noted that the imposition of a "no increase in peak flows from a site above existing peak flows" philosophy, as currently exists in the watershed, would also increase the peak flood flows under projected future development conditions. This occurs because:

- Development generally produces a greater volume of runoff than existing conditions, which, under the "no increase in peak flow" philosophy, is discharged from a detention facility at or near the peak flow rate for an extended period of time, and

TECHNICAL APPENDIX A.2

Regional Gage Analysis

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USGS Stream Gages in Allegheny, Armstrong, Beaver, Butler, Washington, and Westmoreland Counties (1/3)

Agency	Site Number	Site Name	Drainage	Peak-flow data count
USGS	03031500	Allegheny River at Parker, PA	7671	83
USGS	03032500	Redbank Creek at St. Charles, PA	528	105
USGS	03035000	Mahoning Creek near Dayton, PA	321.00	24
USGS	03036000	Mahoning Creek at Mahoning Creek Dam, PA	344	60
USGS	03036500	Allegheny River at Kittanning, PA	8973	130
USGS	03038000	Crooked Creek at Idaho, PA	191	79
USGS	03039000	Crooked Creek at Crooked Creek Dam near Ford City	278	87
USGS	03041500	Conemaugh River at Seward, PA	715	77
USGS	03044810	Linn Run at Linn Run State Park near Rector, PA	8.0	8
USGS	03045000	Loyalhanna Creek at Kingston, PA	172	75
USGS	03045500	Loyalhanna Creek at New Alexandria, PA	265.00	20
USGS	03047000	Loyalhanna Creek at Loyalhanna Dam, PA	290	57
USGS	03047500	Kiskiminetas River at Avonmore, PA	1723.00	48
USGS	03048500	Kiskiminetas River at Vandergrift, PA	1825	78
USGS	03049000	Buffalo Creek near Freeport, PA	137	74
USGS	03049100	Little Buffalo Creek at Cabot, PA	4.66	22
USGS	03049500	Allegheny River at Natrona, PA	11410	77
USGS	03049646	Deer Creek near Dorseyville, PA	27.0	5

Highlighted gages were used in the regional analysis

USGS Stream Gages in Allegheny, Armstrong, Beaver, Butler, Washington, and Westmoreland Counties (2/3)

Agency	Site Number	Site Name	Drainage	Peak-flow data count
USGS	03049658	Plum Creek at Milltown, PA	17.4	2
USGS	03049800	Little Pine Creek near Etna, PA	5.78	52
USGS	03049807	Pine Creek at Grant Avenue at Etna, PA	57.3	8
USGS	03049819	Girtys Run above Grant Avenue at Millvale, PA	13.4	7
USGS	03072818	Daniels Run near West Zollarsville, PA	8.47	2
USGS	03075000	Monongahela River at Charleroi, PA	5213.00	45
USGS	03075070	Monongahela River at Elizabeth, PA	5340	37
USGS	03082020	Indian Creek near Jones Mills, PA	17.38	1
USGS	03083500	Youghiogheny River at Sutersville, PA	1715	94
USGS	03083600	Gillespie Run near Sutersville, PA	4.04	23
USGS	03084000	Abers Creek near Murrysville, PA	4.39	45
USGS	03084500	Turtle Creek at Trafford, PA.	55.90	38
USGS	03084698	Turtle Creek at Wilmerding, PA	123	10
USGS	03084800	Thompson Run at Turtle Creek, PA	18.0	10
USGS	03085000	Monongahela River at Braddock, PA	7337	67
USGS	03085049	Nine Mile Run near Swissvale, PA	5.31	1
USGS	03085213	Sawmill Run at Duquesne Heights nr Pittsburgh, PA	18.1	10
USGS	03085217	Chartiers Creek at Lagonda, PA	3.97	2

Highlighted gages were used in the regional analysis

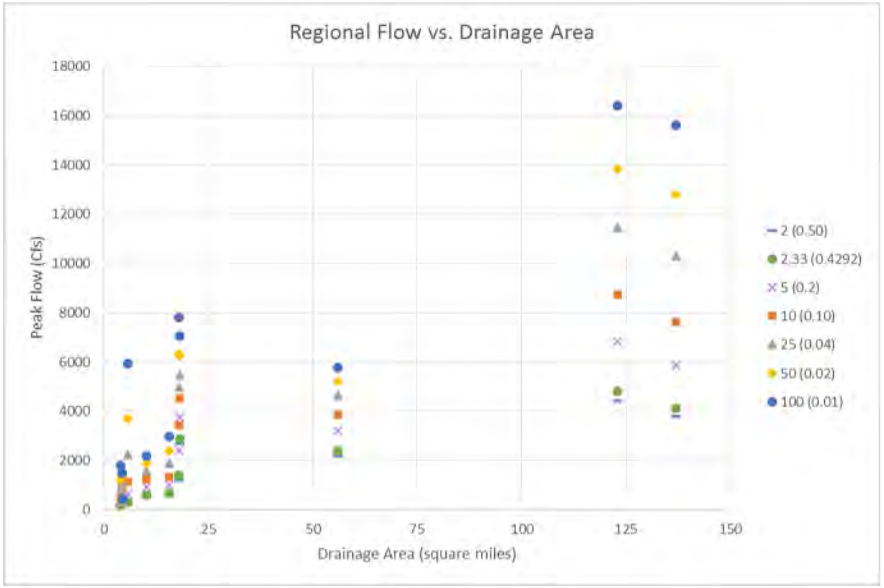
USGS Stream Gages in Allegheny, Armstrong, Beaver, Butler, Washington, and Westmoreland Counties (3/3)

Agency	Site Number	Site Name	Drainage	Peak-flow data count
USGS	03085219	Unn Trib 2 to Chartiers Creek at Lagonda, PA	0.37	2
USGS	03085500	Chartiers Creek at Carnegie, PA	257	93
USGS	03085550	Chartiers Creek at Crafton, PA	270.00	4
USGS	03085956	Montour Run at Scott Station near Imperial, PA	25.4	9
USGS	03086000	Ohio River at Sewickley, PA	19500	81
USGS	03086100	Big Sewickley Creek near Ambridge, PA	15.60	16
USGS	03106000	Connoquenessing Creek near Zelienople, PA	356	99
USGS	03106300	Muddy Creek near Portersville, PA	51.2	51
USGS	03107500	Beaver River at Beaver Falls, PA	3106	80
USGS	03108000	Raccoon Creek at Moffatts Mill, PA	178	90
USGS	03108500	Ohio River at Montgomery Lock & Dam, Lower Pool	22960	10
USGS	03111150	Brush Run near Buffalo, PA	10.30	21
USGS	03111585	Enlow Fork near West Finley, PA	38.10	6

Note: Gage 03106300 Muddy Creek near Portersville, PA, meets the criteria for inclusion in the gage analysis (drainage area <150 square miles and 10 or more years of recorded data, but flow at the gage is affected by upstream regulation and is; therefore, not applicable for this analysis.

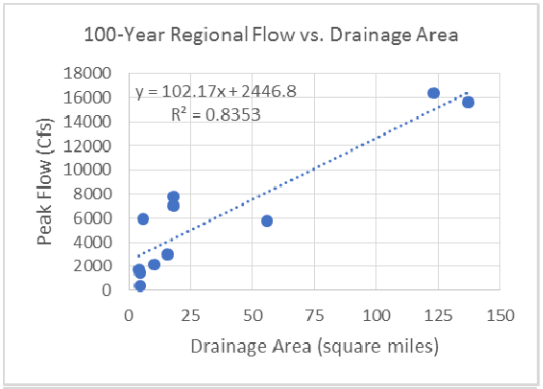
Highlighted gages were used in the regional analysis

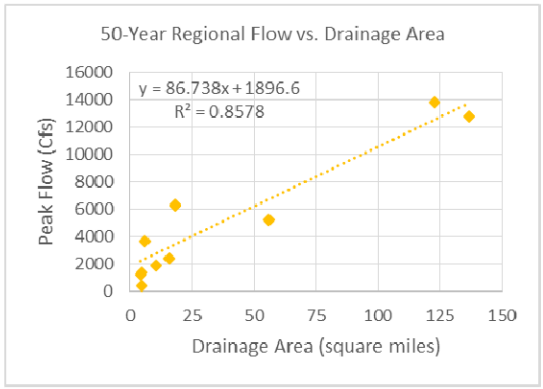
Regional Gage Analysis

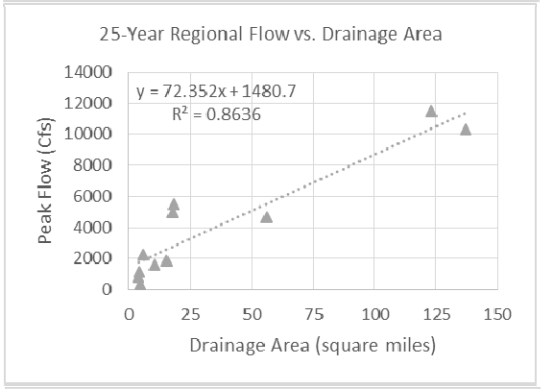


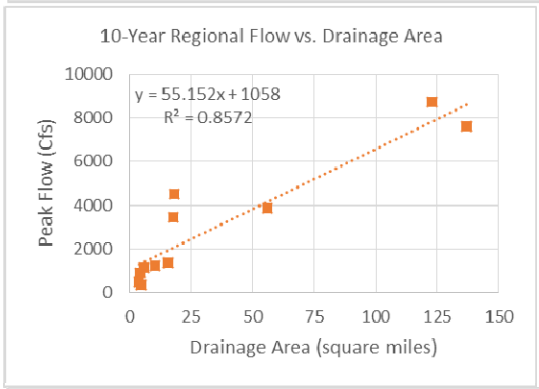
Gage #		3083600	3084000	3049100	3049800	3111150	3086100	3084800	3085213	3084500	3084698	3049000
Stream Name		Gillespie Run	Abers Creek	Little Buffalo Creek	Little Pine Creek	Brush Run	Big Sewickley Creek	Thompson Run	Sawmill Run	Turtle Creek	Turtle Creek	Buffalo Creek
Drainage Area		4.04	4.39	4.66	5.78	10.3	15.6	18	18.1	55.9	123	137
Years of Record Used		22	45	22	51	21	16	10	10	38	10	74
% Forest		66	44	32	64	27	76	17	7	60	52	67
% Urban		12	45	3	26	1	14	70	89	22	26	2
Slope		9.3	8.1	3.3	10.4	7.6	9.2	7.7	8.8	8.7	8.1	7.5
Systematic	2 (0.50)	166.1	427.6	260.2	267.4	543	604.1	1193	2691	2190	4405	3793
	2.33 (0.4292)	186.3	475.9	270.3	314.9	611.8	667	1386	2885	2382	4816	4132
	5 (0.2)	312.3	697.9	311.4	640.4	936.4	996.5	2399	3760	3207	6820	5864
	10 (0.10)	479.1	887.7	341.7	1127	1223	1339	3427	4505	3858	8719	7614
	25 (0.04)	818.5	1134	377	2245	1603	1886	4982	5489	4650	11480	10330
	50 (0.02)	1210	1320	401.6	3681	1897	2388	6322	6252	5216	13820	12770
	100 (0.01)	1775	1507	425	5940	2196	2983	7815	7041	5761	16410	15600
	500 (0.002)	4222	1948	476.3	17310	2913	4825	11920	9000	6972	23570	24140

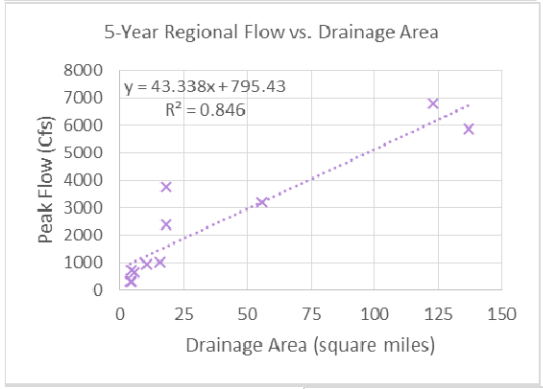
Regional Gage Analysis

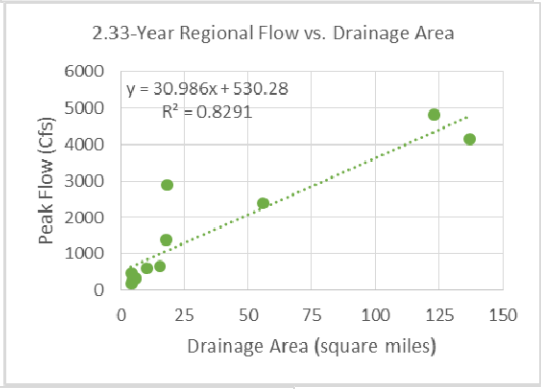


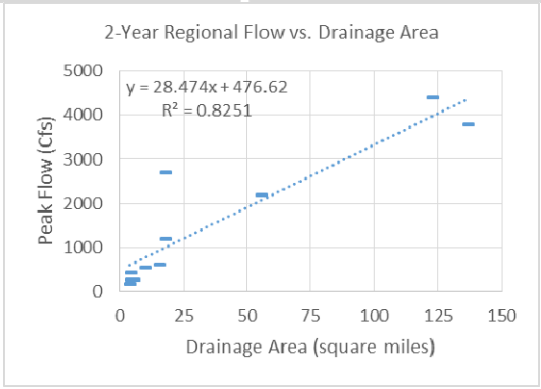












Program PeakFq U. S. GEOLOGICAL SURVEY Seq.000.000
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 12/17/2015 16:00

Station - 03049000 Buffalo Creek near Freeport, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	74
Peaks not used in analysis	=	0
Systematic peaks in analysis	=	74
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.070
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF162I-SYSTEMATIC PEAKS EXCEEDED HIGH-OUTLIER CRITERION. 1 16267.6
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 988.9

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.6032	0.2088	0.703
BULL.17B ESTIMATE	0.0	1.0000	3.6032	0.2088	0.526

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	1473.0	1591.0	1438.0	1223.0	1708.0
0.9900	1582.0	1685.0	1550.0	1326.0	1822.0
0.9500	1967.0	2024.0	1945.0	1694.0	2222.0
0.9000	2240.0	2271.0	2222.0	1958.0	2505.0
0.8000	2657.0	2656.0	2645.0	2364.0	2940.0
0.6667	3160.0	3131.0	3154.0	2850.0	3471.0
0.5000	3846.0	3793.0	3846.0	3502.0	4217.0
0.4292	4191.0	4132.0	4194.0	3822.0	4604.0
0.2000	5910.0	5864.0	5944.0	5348.0	6627.0
0.1000	7583.0	7614.0	7675.0	6752.0	8724.0
0.0400	10090.0	10330.0	10330.0	8763.0	12020.0
0.0200	12260.0	12770.0	12690.0	10450.0	15000.0
0.0100	14720.0	15600.0	15430.0	12320.0	18480.0
0.0050	17510.0	18910.0	18630.0	14380.0	22540.0
0.0020	21790.0	24140.0	23720.0	17470.0	28950.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1941	1880.0		1978	3980.0	
1942	3390.0		1979	3720.0	
1943	5610.0		1980	2540.0	
1944	2060.0		1981	2240.0	
1945	6210.0		1982	2290.0	
1946	3630.0		1983	4750.0	
1947	2180.0		1984	6060.0	
1948	4110.0		1985	5540.0	
1949	2960.0		1986	5100.0	
1950	3750.0		1987	4000.0	
1951	4760.0		1988	2800.0	
1952	7170.0		1989	3370.0	
1953	3920.0		1990	8540.0	
1954	3810.0		1991	8170.0	
1955	14000.0		1992	2110.0	
1956	7020.0		1993	2320.0	
1957	7020.0		1994	5210.0	
1958	3190.0		1995	2480.0	
1959	4590.0		1996	7800.0	
1960	4830.0		1997	3990.0	
1961	3290.0		1998	2970.0	
1962	4830.0		1999	2710.0	
1963	5230.0		2000	2500.0	
1964	7440.0		2001	2320.0	
1965	3130.0		2002	3020.0	
1966	5670.0		2003	2920.0	
1967	2320.0		2004	16700.0	
1968	3470.0		2005	7110.0	
1969	2930.0		2006	5520.0	
1970	3990.0		2007	2790.0	
1971	2150.0		2008	2930.0	
1972	9980.0		2009	1720.0	
1973	2800.0		2010	3480.0	
1974	3850.0		2011	5550.0	
1975	5660.0		2012	3530.0	
1976	2620.0		2013	11600.0	

1977 3170.0 2014 3880.0

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
  -8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 74

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03049000 USGS Buffalo Creek near Freeport,

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.000.000
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 12/07/2015 15:37

Station - 03049100 Little Buffalo Creek at Cabot, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	22
Peaks not used in analysis	=	0
Systematic peaks in analysis	=	22
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.053
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 154.2
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 437.7

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	2.4146	0.0933	-0.046
BULL.17B ESTIMATE	0.0	1.0000	2.4146	0.0933	-0.003

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	149.3	148.0	139.4	121.3	170.2
0.9900	157.5	156.5	149.3	130.2	178.0
0.9500	182.4	181.9	178.0	157.4	201.5
0.9000	197.3	197.0	194.2	173.8	215.6
0.8000	216.8	216.9	215.1	195.3	234.8
0.6667	236.9	237.1	236.1	216.9	255.4
0.5000	259.8	260.2	259.8	240.4	280.9
0.4292	270.0	270.3	270.3	250.2	292.8
0.2000	311.3	311.4	313.7	287.5	345.6
0.1000	342.1	341.7	347.4	313.0	388.4
0.0400	378.3	377.0	389.1	341.5	441.4
0.0200	403.7	401.6	420.1	360.8	480.0
0.0100	428.0	425.0	451.4	378.9	517.9
0.0050	451.5	447.5	483.5	396.1	555.3
0.0020	481.7	476.3	527.7	417.8	604.6

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1959	297.0		1970	217.0	
1960	278.0		1971	180.0	
1961	323.0		1972	404.0	
1962	326.0		1973	282.0	
1963	199.0		1974	229.0	
1964	302.0		1975	298.0	
1965	221.0		1976	195.0	
1966	320.0		1977	230.0	
1967	201.0		1978	284.0	
1968	199.0		1979	296.0	
1969	301.0		1980	259.0	

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
-8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 22

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)

(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03049100   USGS Little Buffalo Creek at Cabot

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

Program PeakFq Ver. 5.2 11/01/2007 — U. S. GEOLOGICAL SURVEY, Annual peak flow frequency analysis following Bulletin 17-B Guidelines — Seq.000.000, Run Date / Time 12/29/2015 13:24

Station - 03049800 Little Pine Creek near Etna, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	52
Peaks not used in analysis	=	1
Systematic peaks in analysis	=	51
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.062
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

**WCF109W-PEAKS WITH MINUS-FLAGGED DISCHARGES WERE BYPASSED. 1
**WCF113W-NUMBER OF SYSTEMATIC PEAKS HAS BEEN REDUCED TO NSYS = 51
WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF162I-SYSTEMATIC PEAKS EXCEEDED HIGH-OUTLIER CRITERION. 1 4357.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 23.2
WCF002J-CALCS COMPLETED. RETURN CODE = 2

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE	LOGARITHMIC		
	EXCEEDANCE		STANDARD	
	DISCHARGE PROBABILITY	MEAN	DEVIATION	SKEW
SYSTEMATIC RECORD	0.0 1.0000	2.5025	0.4096	1.127
BULL.17B ESTIMATE	0.0 1.0000	2.5025	0.4096	0.668

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	'EXPECTED SYSTEMATIC PROBABILITY' RECORD	EXPECTED ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	50.3	73.1	47.5	32.6	70.0
0.9900	56.6	77.3	53.9	37.4	77.8
0.9500	82.2	96.0	79.9	57.6	108.8
0.9000	103.6	112.5	101.6	75.1	134.3
0.8000	141.7	143.1	140.1	106.9	179.6
0.6667	196.3	188.6	195.3	153.1	245.0
0.5000	286.6	267.4	286.6	229.1	356.4
0.4292	339.0	314.9	339.7	272.4	423.4
0.2000	672.0	640.4	683.5	532.2	884.6
0.1000	1117.0	1127.0	1158.0	851.6	1570.0
0.0400	2016.0	2245.0	2165.0	1448.0	3110.0
0.0200	3035.0	3681.0	3374.0	2080.0	5020.0
0.0100	4468.0	5940.0	5179.0	2922.0	7914.0
0.0050	6467.0	9473.0	7871.0	4037.0	12250.0
0.0020	10330.0	17310.0	13570.0	6073.0	21340.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1963	360.0		1989	193.0	
1964	284.0		1990	-240.0	G
1965	185.0		1991	149.0	
1966	320.0		1992	1430.0	
1967	160.0		1993	257.0	
1968	160.0		1994	228.0	
1969	62.0		1995	477.0	
1970	187.0		1996	519.0	
1971	248.0		1997	222.0	
1972	357.0		1998	408.0	
1973	314.0		1999	174.0	
1974	2040.0		2000	169.0	
1975	960.0		2001	230.0	
1976	89.0		2002	164.0	
1977	315.0		2003	216.0	
1978	233.0		2004	3700.0	
1979	426.0		2005	580.0	
1980	84.0		2006	206.0	
1981	74.0		2007	1020.0	
1982	305.0		2008	360.0	
1983	361.0		2009	238.0	
1984	135.0		2010	531.0	
1985	240.0		2011	1070.0	
1986	7190.0		2012	261.0	
1987	1380.0		2013	329.0	
1988	78.0		2014	372.0	

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization

```
          H        7    Historic peak

          -  Minus-flagged discharge -- Not used in computation
                -8888.0 -- No discharge value given
          -  Minus-flagged water year -- Historic peak used in computation

 End PeakFQ analysis.
   Stations processed :       1
   Number of errors   :       0
   Stations skipped   :       0
   Station years      :      52


Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4,  or *.)
(2, 4, and * records are ignored.)

 For the station below, the following records were ignored:

 FINISHED PROCESSING STATION:  03049800       USGS Little Pine Creek near Etna,


 For the station below, the following records were ignored:

 FINISHED PROCESSING STATION:
```

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.000.000
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 02/11/2016 13:19

Station - 03083600 Gillespie Run near Sutersville, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	23
Peaks not used in analysis	=	1
Systematic peaks in analysis	=	22
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.120
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

**WCF109W-PEAKS WITH MINUS-FLAGGED DISCHARGES WERE BYPASSED. 1
**WCF113W-NUMBER OF SYSTEMATIC PEAKS HAS BEEN REDUCED TO NSYS = 22
WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF162I-SYSTEMATIC PEAKS EXCEEDED HIGH-OUTLIER CRITERION. 1 1005.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 37.2
WCF002J-CALCS COMPLETED. RETURN CODE = 2

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE	LOGARITHMIC		
	EXCEEDANCE		STANDARD	
	DISCHARGE PROBABILITY	MEAN	DEVIATION	SKEW
SYSTEMATIC RECORD	0.0 1.0000	2.2865	0.2946	1.393
BULL.17B ESTIMATE	0.0 1.0000	2.2865	0.2946	0.599

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	49.2	77.1	44.1	28.7	69.9
0.9900	54.0	78.8	49.2	32.3	75.6
0.9500	71.9	87.4	68.3	46.7	96.7
0.9000	85.7	95.3	82.7	58.2	112.7
0.8000	108.1	109.9	106.0	77.6	139.2
0.6667	137.4	131.2	136.1	103.2	174.5
0.5000	180.8	166.1	180.8	140.6	230.3
0.4292	204.1	186.3	204.9	160.1	262.1
0.2000	332.7	312.3	342.4	259.3	460.1
0.1000	476.4	479.1	506.3	358.3	717.0
0.0400	720.7	818.5	813.6	511.5	1217.0
0.0200	958.4	1210.0	1149.0	649.6	1763.0
0.0100	1254.0	1775.0	1617.0	811.4	2505.0
0.0050	1619.0	2586.0	2279.0	1001.0	3507.0
0.0020	2236.0	4222.0	3615.0	1304.0	5374.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1959	259.0		1971	195.0	
1960	318.0		1972	586.0	
1961	163.0		1973	139.0	
1962	179.0		1974	65.0	
1963	289.0		1975	1520.0	
1964	122.0		1976	138.0	
1965	-8888.0		1977	165.0	
1966	163.0		1978	120.0	
1967	93.0		1979	233.0	
1968	96.0		1980	175.0	
1969	394.0		1981	185.0	
1970	128.0				

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

\- Minus-flagged discharge -- Not used in computation
-8888.0 -- No discharge value given
\- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 23

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)

(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03083600   USGS Gillespie Run near Sutersvill

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.000.000
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 11/17/2015 13:22

Station - 03084000 Abers Creek near Murrysville, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	45
Peaks not used in analysis	=	0
Systematic peaks in analysis	=	45
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.107
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 79.1
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 2182.9

Station - 03084000 Abers Creek near Murrysville, PA

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	2.6186	0.2642	-0.281
BULL.17B ESTIMATE	0.0	1.0000	2.6186	0.2642	-0.162

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	79.1	73.9	71.4	53.6	105.0
0.9900	93.9	89.2	86.8	65.8	122.0
0.9500	148.7	145.9	143.4	113.2	182.9
0.9000	188.7	187.6	184.6	149.5	226.7
0.8000	250.4	251.6	247.6	206.4	294.2
0.6667	324.2	327.6	322.7	274.6	376.7
0.5000	422.5	427.6	422.5	363.2	491.8
0.4292	470.6	475.9	471.3	405.3	550.6
0.2000	696.3	697.9	703.4	592.4	845.7
0.1000	895.9	887.7	913.4	747.4	1128.0
0.0400	1164.0	1134.0	1204.0	946.1	1530.0
0.0200	1374.0	1320.0	1440.0	1096.0	1858.0
0.0100	1591.0	1507.0	1691.0	1247.0	2210.0
0.0050	1815.0	1696.0	1960.0	1399.0	2585.0
0.0020	2124.0	1948.0	2346.0	1605.0	3117.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1949	135.0		1972	720.0	
1950	1600.0		1973	373.0	
1951	490.0		1974	640.0	
1952	1000.0		1975	317.0	
1953	308.0		1976	1230.0	
1954	226.0		1977	602.0	
1955	950.0		1978	508.0	
1956	500.0		1979	399.0	
1957	322.0		1980	806.0	
1958	320.0		1981	422.0	
1959	1100.0		1982	210.0	
1960	108.0		1983	498.0	
1961	310.0		1984	212.0	
1962	590.0		1985	500.0	
1963	569.0		1986	396.0	
1964	449.0		1987	439.0	
1965	160.0		1988	103.0	
1966	711.0		1989	302.0	
1967	156.0		1990	371.0	
1968	608.0		1991	479.0	
1969	449.0		1992	436.0	
1970	528.0		1993	391.0	
1971	267.0				

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
-8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

```
 End PeakFQ analysis.
   Stations processed :       1
   Number of errors   :       0
   Stations skipped   :       0
   Station years      :      45

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4,  or *.)
(2, 4, and * records are ignored.)

 For the station below, the following records were ignored:

 FINISHED PROCESSING STATION:  03084000       USGS Abers Creek near Murrysville,


 For the station below, the following records were ignored:

 FINISHED PROCESSING STATION:
```

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.000.000
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 12/07/2015 15:47

Station - 03084500 Turtle Creek at Trafford, PA.

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	38
Peaks not used in analysis	=	1
Systematic peaks in analysis	=	37
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.108
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

**WCF109W-PEAKS WITH MINUS-FLAGGED DISCHARGES WERE BYPASSED. 1
**WCF113W-NUMBER OF SYSTEMATIC PEAKS HAS BEEN REDUCED TO NSYS = 37
WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 601.1
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 7566.7
WCF002J-CALCS COMPLETED. RETURN CODE = 2

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	EXCEEDANCE			STANDARD	
	DISCHARGE	PROBABILITY	MEAN	DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.3289	0.2075	-0.333
BULL.17B ESTIMATE	0.0	1.0000	3.3289	0.2075	-0.179

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	'EXPECTED SYSTEMATIC RECORD	PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	574.9	536.8	520.0	406.6	733.7
0.9900	659.2	625.2	610.2	480.3	825.4
0.9500	949.1	931.2	916.5	745.7	1134.0
0.9000	1146.0	1139.0	1122.0	932.9	1342.0
0.8000	1433.0	1440.0	1418.0	1209.0	1646.0
0.6667	1757.0	1776.0	1749.0	1520.0	2000.0
0.5000	2163.0	2190.0	2163.0	1897.0	2469.0
0.4292	2354.0	2382.0	2358.0	2069.0	2700.0
0.2000	3200.0	3207.0	3231.0	2784.0	3796.0
0.1000	3896.0	3858.0	3968.0	3335.0	4771.0
0.0400	4777.0	4650.0	4934.0	4000.0	6077.0
0.0200	5433.0	5216.0	5680.0	4478.0	7091.0
0.0100	6086.0	5761.0	6450.0	4943.0	8133.0
0.0050	6740.0	6291.0	7250.0	5400.0	9204.0
0.0020	7611.0	6972.0	8364.0	5996.0	10670.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1917	1530.0		1936	3700.0	
1918	1590.0		1937	2510.0	
1919	3280.0		1938	1530.0	
1920	2930.0		1939	1360.0	
1921	860.0		1940	2380.0	
1922	1710.0		1941	2110.0	
1923	1950.0		1942	2570.0	
1924	2650.0		1943	4040.0	
1925	800.0		1944	1260.0	
1926	2090.0		1945	2480.0	
1927	1830.0		1946	5200.0	
1928	2790.0		1947	1520.0	
1929	3070.0		1948	2580.0	
1930	1830.0		1949	1040.0	
1931	2090.0		1950	4430.0	
1932	1090.0		1951	3140.0	
1933	4420.0		1952	2670.0	
1934	2510.0		1953	860.0	
1935	3220.0		1955	-7360.0	H

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
-8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.

```
   Stations processed :       1
   Number of errors   :       0
   Stations skipped   :       0
   Station years      :      38
```

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03084500   USGS Turtle Creek at Trafford, PA.

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

Program PeakFq — U. S. GEOLOGICAL SURVEY — Seq.000.000
Ver. 5.2 — Annual peak flow frequency analysis — Run Date / Time
11/01/2007 — following Bulletin 17-B Guidelines — 11/17/2015 13:42

Station - 03084698 Turtle Creek at Wilmerding, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	10
Peaks not used in analysis	=	0
Systematic peaks in analysis	=	10
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.100
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 1648.5
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 12487.2

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.6568	0.2160	0.357
BULL.17B ESTIMATE	0.0	1.0000	3.6568	0.2160	0.197

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	1382.0	1489.0	988.1	607.8	2062.0
0.9900	1534.0	1628.0	1181.0	716.8	2237.0
0.9500	2061.0	2113.0	1824.0	1135.0	2829.0
0.9000	2426.0	2452.0	2248.0	1455.0	3242.0
0.8000	2973.0	2967.0	2858.0	1963.0	3879.0
0.6667	3615.0	3580.0	3554.0	2575.0	4684.0
0.5000	4464.0	4405.0	4464.0	3361.0	5894.0
0.4292	4880.0	4816.0	4913.0	3726.0	6557.0
0.2000	6857.0	6820.0	7170.0	5261.0	10350.0
0.1000	8663.0	8719.0	9495.0	6464.0	14600.0
0.0400	11200.0	11480.0	13390.0	7978.0	21630.0
0.0200	13270.0	13820.0	17290.0	9122.0	28210.0
0.0100	15500.0	16410.0	22450.0	10290.0	36050.0
0.0050	17900.0	19280.0	29450.0	11490.0	45350.0
0.0020	21390.0	23570.0	43150.0	13140.0	60240.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
2005	8430.0		2010	2590.0	
2006	2790.0		2011	4280.0	
2007	6180.0		2012	2680.0	
2008	4390.0		2013	6350.0	
2009	10100.0		2014	3040.0	

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
  -8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 10

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03084698 USGS Turtle Creek at Wilmerding, P

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

Program PeakFq — U. S. GEOLOGICAL SURVEY — Seq.000.000
Ver. 5.2 — Annual peak flow frequency analysis — Run Date / Time
11/01/2007 — following Bulletin 17-B Guidelines — 12/17/2015 13:24

Station - 03084800 Thompson Run at Turtle Creek, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	10
Peaks not used in analysis	=	0
Systematic peaks in analysis	=	10
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.095
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 211.1
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 6540.0

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.0700	0.3662	-0.107
BULL.17B ESTIMATE	0.0	1.0000	3.0700	0.3662	0.016

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	135.6	123.0	68.0	31.0	276.5
0.9900	166.9	154.7	98.6	43.1	324.4
0.9500	294.7	286.3	233.6	104.7	508.6
0.9000	399.4	395.1	346.6	166.3	654.4
0.8000	577.5	580.6	537.8	286.3	905.8
0.6667	815.5	827.3	791.3	461.7	1266.0
0.5000	1172.0	1193.0	1172.0	728.0	1886.0
0.4292	1363.0	1386.0	1379.0	864.9	2262.0
0.2000	2387.0	2399.0	2565.0	1522.0	4812.0
0.1000	3467.0	3427.0	4003.0	2115.0	8335.0
0.0400	5166.0	4982.0	6778.0	2937.0	15340.0
0.0200	6687.0	6322.0	9925.0	3606.0	22950.0
0.0100	8439.0	7815.0	14510.0	4323.0	33110.0
0.0050	10440.0	9471.0	21330.0	5093.0	46410.0
0.0020	13530.0	11920.0	36160.0	6201.0	70090.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
2005	1030.0		2010	1470.0	
2006	260.0		2011	2160.0	
2007	1640.0		2012	862.0	
2008	469.0		2013	1980.0	
2009	5280.0		2014	851.0	

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
  -8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 10

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03084800 USGS Thompson Run at Turtle Creek,

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.000.000
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 12/18/2015 09:44
Station - 03085213 Sawmill Run at Duquesne Heights nr Pittsburgh, P

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	10
Peaks not used in analysis	=	0
Systematic peaks in analysis	=	10
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.061
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 1232.2
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 6002.8

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.4345	0.1689	0.164
BULL.17B ESTIMATE	0.0	1.0000	3.4345	0.1689	0.100

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	1036.0	1061.0	773.8	534.1	1429.0
0.9900	1133.0	1154.0	904.8	614.9	1531.0
0.9500	1451.0	1462.0	1311.0	904.7	1863.0
0.9000	1660.0	1665.0	1559.0	1110.0	2083.0
0.8000	1957.0	1955.0	1896.0	1415.0	2409.0
0.6667	2288.0	2281.0	2257.0	1758.0	2802.0
0.5000	2702.0	2691.0	2702.0	2167.0	3361.0
0.4292	2897.0	2885.0	2912.0	2348.0	3655.0
0.2000	3765.0	3760.0	3895.0	3060.0	5198.0
0.1000	4495.0	4505.0	4815.0	3576.0	6747.0
0.0400	5444.0	5489.0	6212.0	4187.0	9050.0
0.0200	6171.0	6252.0	7490.0	4624.0	11010.0
0.0100	6915.0	7041.0	9044.0	5052.0	13170.0
0.0050	7681.0	7861.0	10980.0	5476.0	15560.0
0.0020	8734.0	9000.0	14360.0	6036.0	19100.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
2005	1930.0		2010	4300.0	
2006	2390.0		2011	1620.0	
2007	1920.0		2012	4110.0	
2008	1950.0		2013	4600.0	
2009	2750.0		2014	3540.0	

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
  -8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 10

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03085213 USGS Sawmill Run at Duquesne Heigh

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

1

Program PeakFq — U. S. GEOLOGICAL SURVEY — Seq.000.000
Ver. 5.2 — Annual peak flow frequency analysis — Run Date / Time
11/01/2007 — following Bulletin 17-B Guidelines — 11/17/2015 13:57
Station - 03086100 Big Sewickley Creek near Ambridge, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	16
Peaks not used in analysis	=	0
Systematic peaks in analysis	=	16
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.024
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF162I-SYSTEMATIC PEAKS EXCEEDED HIGH-OUTLIER CRITERION. 1 2270.6
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 180.2

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	2.8059	0.2414	0.622
BULL.17B ESTIMATE	0.0	1.0000	2.8059	0.2414	0.296

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	178.3	210.8	147.6	96.7	255.1
0.9900	198.2	226.9	170.5	112.0	278.2
0.9500	269.2	285.6	249.7	170.2	358.8
0.9000	320.0	328.9	304.9	214.5	416.1
0.8000	398.2	397.2	388.0	285.3	505.8
0.6667	492.8	482.6	487.2	372.3	619.6
0.5000	622.4	604.1	622.4	488.3	789.0
0.4292	687.6	667.0	690.8	544.3	881.2
0.2000	1011.0	996.5	1043.0	797.1	1405.0
0.1000	1324.0	1339.0	1411.0	1014.0	1998.0
0.0400	1787.0	1886.0	2019.0	1306.0	2997.0
0.0200	2183.0	2388.0	2612.0	1540.0	3949.0
0.0100	2627.0	2983.0	3368.0	1789.0	5105.0
0.0050	3123.0	3689.0	4345.0	2055.0	6499.0
0.0020	3870.0	4825.0	6121.0	2437.0	8781.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1963	990.0		1971	485.0	
1964	868.0		1972	800.0	
1965	485.0		1973	287.0	
1966	810.0		1974	844.0	
1967	527.0		1975	2540.0	
1968	476.0		1976	788.0	
1969	302.0		1977	300.0	
1970	574.0		1978	948.0	

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
  -8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 16

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03086100 USGS Big Sewickley Creek near Ambr

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

Program PeakFq — U. S. GEOLOGICAL SURVEY — Seq.000.000
Ver. 5.2 — Annual peak flow frequency analysis — Run Date / Time
11/01/2007 — following Bulletin 17-B Guidelines — 12/07/2015 15:49
Station - 03111150 Brush Run near Buffalo, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	21
Peaks not used in analysis	=	0
Systematic peaks in analysis	=	21
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.048
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********
WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 102.7
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 2687.1

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	2.7205	0.2944	-0.292
BULL.17B ESTIMATE	0.0	1.0000	2.7205	0.2944	-0.135

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	84.1	76.2	65.1	41.7	130.2
0.9900	101.5	94.0	83.4	53.4	152.1
0.9500	168.0	163.3	153.8	103.0	232.0
0.9000	218.4	216.4	206.9	144.2	291.2
0.8000	298.4	300.5	290.5	212.8	385.6
0.6667	397.3	403.5	392.9	299.1	506.9
0.5000	533.4	543.0	533.4	415.0	687.1
0.4292	601.6	611.8	604.2	470.9	784.0
0.2000	933.1	936.4	956.7	721.7	1312.0
0.1000	1239.0	1223.0	1300.0	931.7	1867.0
0.0400	1667.0	1603.0	1816.0	1204.0	2728.0
0.0200	2011.0	1897.0	2267.0	1412.0	3482.0
0.0100	2376.0	2196.0	2783.0	1623.0	4331.0
0.0050	2763.0	2500.0	3377.0	1840.0	5280.0
0.0020	3308.0	2913.0	4305.0	2134.0	6699.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1961	966.0		1972	581.0	
1962	1010.0		1973	233.0	
1963	1110.0		1974	268.0	
1964	508.0		1975	790.0	
1965	182.0		1976	792.0	
1966	1180.0		1977	834.0	
1967	253.0		1978	1700.0	
1968	290.0		1983	502.0	
1969	829.0		1984	138.0	
1970	397.0		1985	473.0	
1971	448.0				

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
-8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 21

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03111150 USGS Brush Run near Buffalo, PA

For the station below, the following records were ignored:

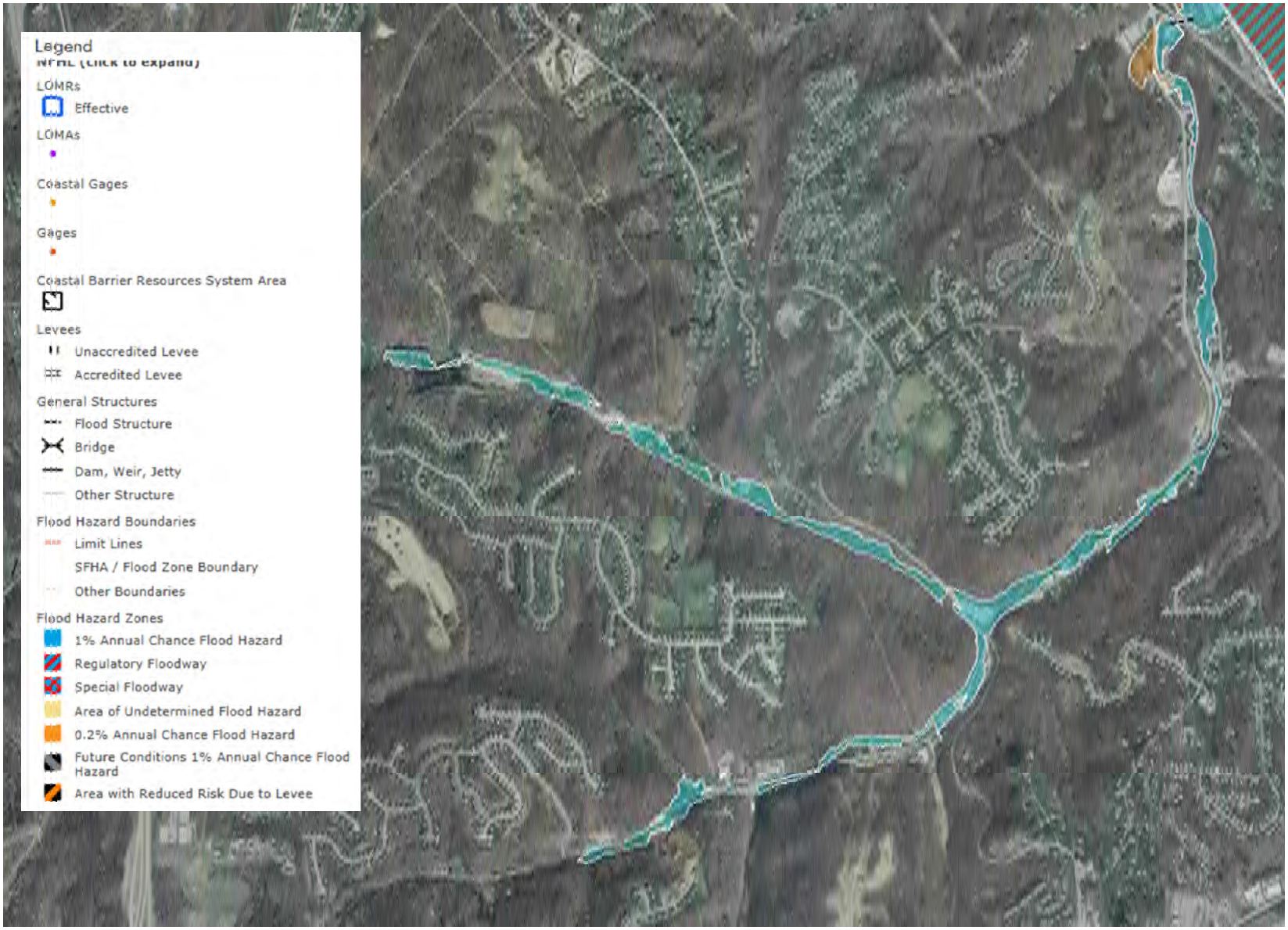
FINISHED PROCESSING STATION:

TECHNICAL APPENDIX A.2

FEMA FIS Information

NEWELL TERESKA & MACKAY ENGINEERING

FEMA National Flood Hazard Layer – Flaugherty Run Watershed



Flaugherty Run Watershed

TECHNICAL APPENDIX A.3

HEC-HMS Model Calibration

Allegheny County
PennDOT District 11-0

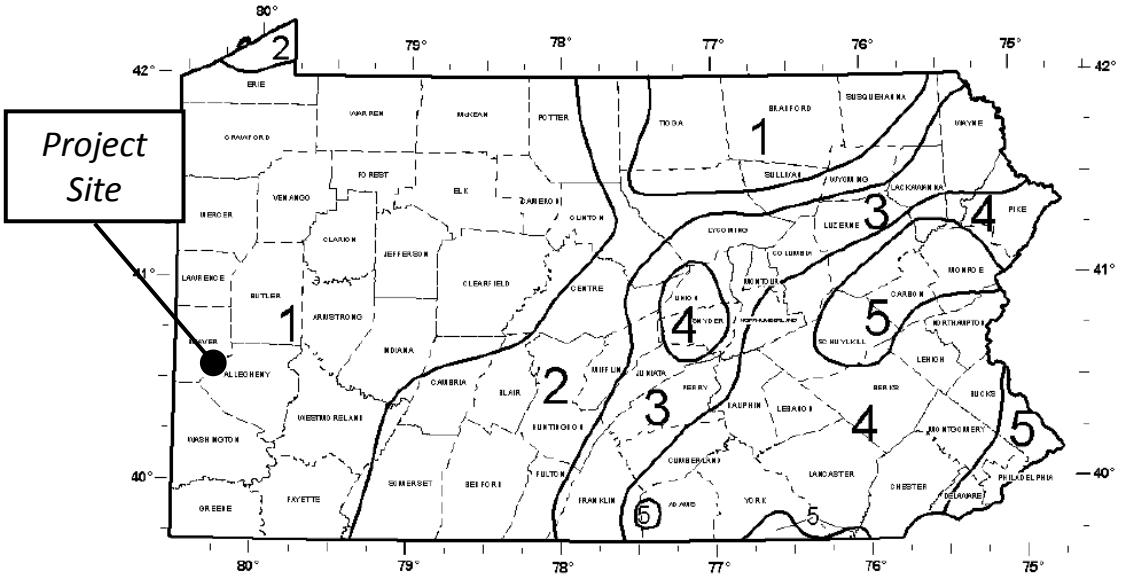
NEWELL TERESKA & MACKAY ENGINEERING

PDT-IDF Curves
24-Hour Precipitation Depths

Table 7A.1 Appropriate Rainfall Region Map for each Storm Duration and Frequency

	Frequency							
Duration	**1 year**	**2 year**	**5 year**	**10 year**	**25 year**	**50 year**	**100 year**	**500 year**
5 min	C	C	C	C	B	B	B	-
10 min	C	C	C	C	C	C	C	-
15 min	A	A	A	A	C	C	C	-
30 min	A	A	A	A	A	C	C	-
60 min	A	A	A	A	A	C	C	-
2 hr	E	E	E	E	E	E	E	-
3 hr	E	E	E	E	E	E	E	-
6 hr	D	D	D	D	D	D	D	-
12 hr	F	F	F	F	F	F	F	-
24 hr	F	F	F	F	F	F	F	F

MAP F

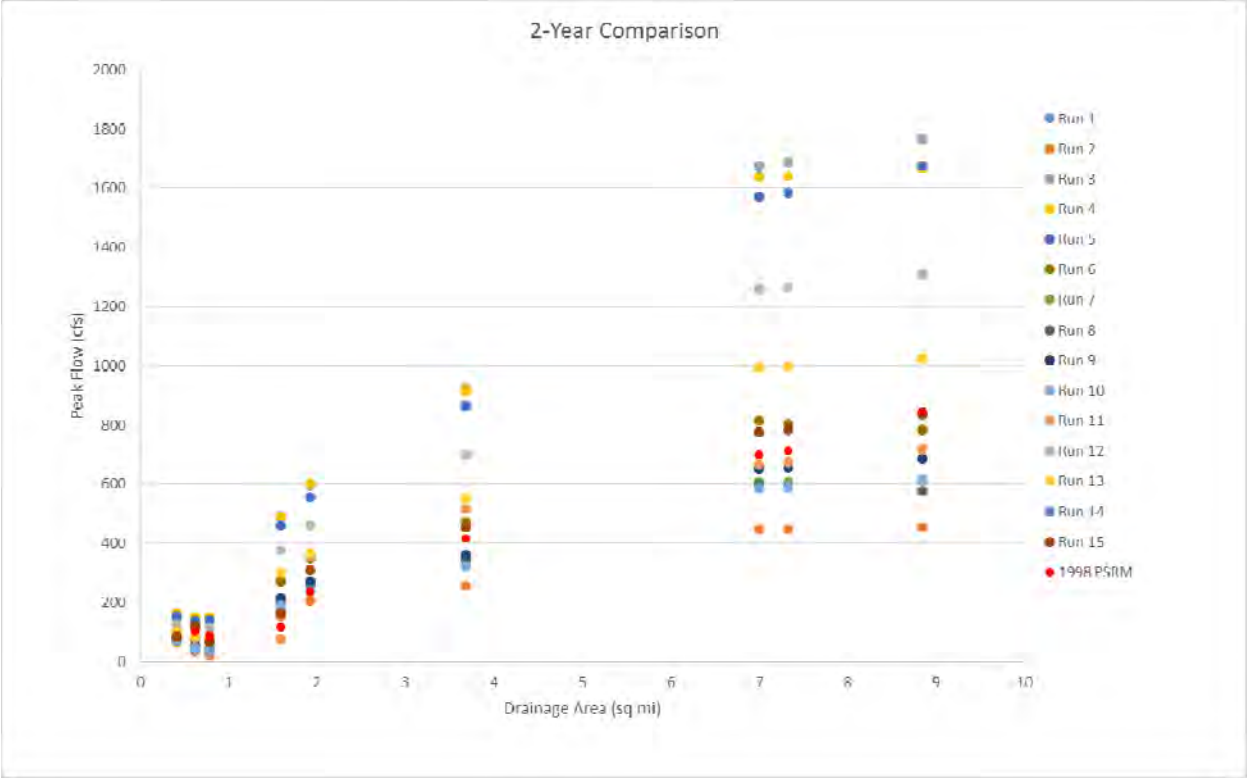


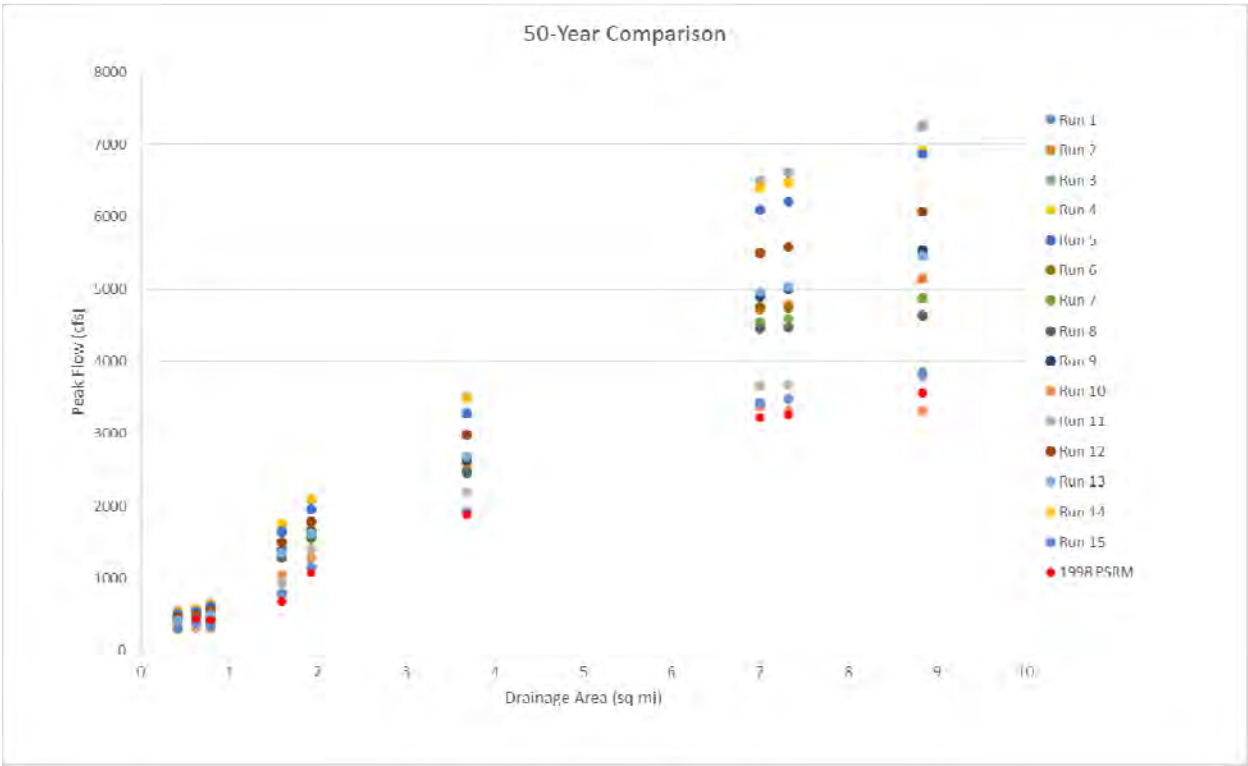
Region 4								
Rainfall Total								
	1-Yr Storm	2-Yr Storm	5-Yr Storm	10-Yr Storm	25-Yr Storm	50-Yr Storm	100-Yr Storm	500-Yr Storm
Duration (Min)	in	in	in	in	in	in	in	in
5	0.35	0.42	0.49	0.55	0.63	0.70	0.77	
10	0.54	0.65	0.76	0.85	0.97	1.07	1.16	
15	0.67	0.79	0.94	1.05	1.21	1.32	1.44	
30	0.88	1.07	1.29	1.47	1.71	1.90	2.09	
60	1.09	1.32	1.65	1.90	2.23	2.51	2.80	
120	1.29	1.57	1.96	2.28	2.72	3.09	3.58	
180	1.42	1.72	2.16	2.51	3.01	3.45	3.98	
360	1.77	2.14	2.70	3.15	3.80	4.33	4.89	
720	2.20	2.65	3.29	3.87	4.74	5.46	6.26	
1440	2.64	3.16	3.91	4.57	5.60	6.53	7.63	10.98

Calibration Target Flows

1998 PSRM									
POI\Event	Drainage Area (sq mi)	1	2	2.33	5	10	25	50	100
1	8.8	375	846	1063	1683	2318	3135	3562	3995
2	7.3	252	712	901	1475	2072	2859	3261	3671
3	7.0	241	699	884	1451	2042	2822	3222	3630
4	3.7	151	415	526	862	1199	1657	1889	2128
5	0.8	27	89	110	184	264	368	427	481
6	1.9	83	235	298	488	688	944	1082	1215
7	0.6	24	103	114	184	261	371	432	497
8	1.6	0	117	144	264	402	581	681	788

Calibration Results





Run Parameters (Run 1)

Flaugherty HEC-HMS Parameters (Run 1)											
Subbasin	Drainage Area (mi^2)	Initial Abstraction (in)	Curve Number	Lag Time (min)	Reach	Length (ft)	Slope (ft/ft)	Manning's n	Shape	Width (ft)	Side Slope (xH:1V)
W940	0.41268		79.152	21.441	R10	366.56	0.001	0.045	Trapezoid	5	2
W930	0.328		80.727	16.621	R60	2889.6	0.012012	0.045	Trapezoid	5	2
W920	0.78813		73.673	30.512	R110	1418.3	0.014214	0.045	Trapezoid	5	2
W1070	0.0611573		69.525	10.511	R160	1944.1	0.013112	0.045	Trapezoid	5	2
W900	0.32087		74.565	22.641	R180	2508.9	0.008765	0.045	Trapezoid	5	2
W860	0.62583		75.898	30.115	R210	577.37	0.010825	0.045	Trapezoid	5	2
W810	0.86195		77.243	33.334	R240	3565.9	0.011251	0.045	Trapezoid	5	2
W800	0.19978		74.454	16.741	R270	3893.7	0.010227	0.045	Trapezoid	5	2
W770	0.74512		70.294	29.922	R290	487.39	0.007694	0.045	Trapezoid	5	2
W1020	0.1079		63.318	12.265	R310	957.51	0.017086	0.045	Trapezoid	5	2
W700	0.59227		73.255	24.318	R390	1032.9	0.005383	0.045	Trapezoid	5	2
W690	0.70591		77.996	25.127	R400	546.92	0.026128	0.045	Trapezoid	5	2
W670	0.30011		77.456	18.177	R410	3977.6	0.015316	0.045	Trapezoid	5	2
W650	0.15356		78.798	11.434	R280	2074.1	0.008394	0.045	Trapezoid	5	2
W640	0.0421496		78.302	48.179	R1050	2077.9	0.008672	0.045	Trapezoid	5	2
W1030	0.2213		70.653	21.455	R1090	1135	0.014635	0.045	Trapezoid	5	2
W590	0.31676		77.584	23.094	R360	1468.8	0.008211	0.045	Trapezoid	5	2
W580	0.49791		70.474	27.559							
W1080	0.28336		69.77	24.278							
W560	0.52942		77.34	25.685							
W540	0.62082		75.896	29.824							
W530	0.11406		78.173	10.706							
W510	0.0117025		80.838	3.4845							

Run Parameters (Run 15 Low Flow)

Flaugherty Run HEC-HMS Parameters (Run 15 LF) IA Ratio = 0.2*S, Decrease CN 9% (13% in POI8 and 3% in POI7), Vary Lag Time in POI8 (+10% in W690, -15% in W640, W590, and W560), Increase Manning's n to 0.05 (0.03 downstream of confluence with Boggs Run), LiDAR Channel Widths; CORRECTED TLAG AT W640											
Subbasin	Drainage Area (mi2)	Initial Abstraction (in)	Curve Number	Lag Time (min)	Reach	Length (ft)	Slope (ft/ft)	Manning's n	Shape	Width (ft)	Side Slope (xH:1V)
W940	0.41268	1.008076083	66.48768	21.441	R10	366.56	0.001	0.03	Trapezoid	20	2
W930	0.328	0.949387914	67.81068	16.621	R60	2889.6	0.012012	0.03	Trapezoid	20	2
W920	0.78813	1.23178421	61.88532	30.512	R110	1418.3	0.014214	0.05	Trapezoid	12	2
W1070	0.0611573	1.424598894	58.401	10.511	R160	1944.1	0.013112	0.05	Trapezoid	12	2
W900	0.32087	1.19312329	62.6346	22.641	R180	2508.9	0.008765	0.03	Trapezoid	20	2
W860	0.62583	1.137042321	63.75432	30.115	R210	577.37	0.010825	0.03	Trapezoid	15	2
W810	0.86195	1.082418317	64.88412	33.334	R240	3565.9	0.011251	0.05	Trapezoid	15	2
W800	0.19978	1.197883768	62.54136	16.741	R270	3893.7	0.010227	0.05	Trapezoid	15	2
W770	0.74512	1.387134579	59.04696	29.922	R290	487.39	0.007694	0.05	Trapezoid	10	2
W1020	0.1079	1.760308887	53.18712	12.265	R310	957.51	0.017086	0.05	Trapezoid	10	2
W700	0.59227	1.250225078	61.5342	24.318	R390	1032.9	0.005383	0.05	Trapezoid	10	2
W690	0.70591	1.205292579	62.3968	27.6397	R400	546.92	0.026128	0.05	Trapezoid	5	2
W670	0.30011	1.073941826	65.06304	18.177	R410	3977.6	0.015316	0.05	Trapezoid	5	2
W650	0.15356	1.021589864	66.19032	11.434	R280	2074.1	0.008394	0.03	Trapezoid	15	2
W640	0.0421496	1.192766468	62.6416	5.7171	R1050	2077.9	0.008672	0.03	Trapezoid	15	2
W1030	0.2213	1.369923968	59.34852	21.455	R1090	1135	0.014635	0.05	Trapezoid	10	2
W590	0.31676	1.222313879	62.0672	19.6299	R360	1468.8	0.008211	0.05	Trapezoid	10	2
W580	0.49791	1.378483385	59.19816	27.559							
W1080	0.28336	1.412573285	58.6068	24.278							
W560	0.52942	1.232479959	61.872	21.83225							
W540	0.62082	0.927983322	68.3064	29.824							
W530	0.11406	1.04574774	65.66532	10.706							
W510	0.0117025	0.94533806	67.90392	3.4845							

Run Parameters (Run 15 High Flow)

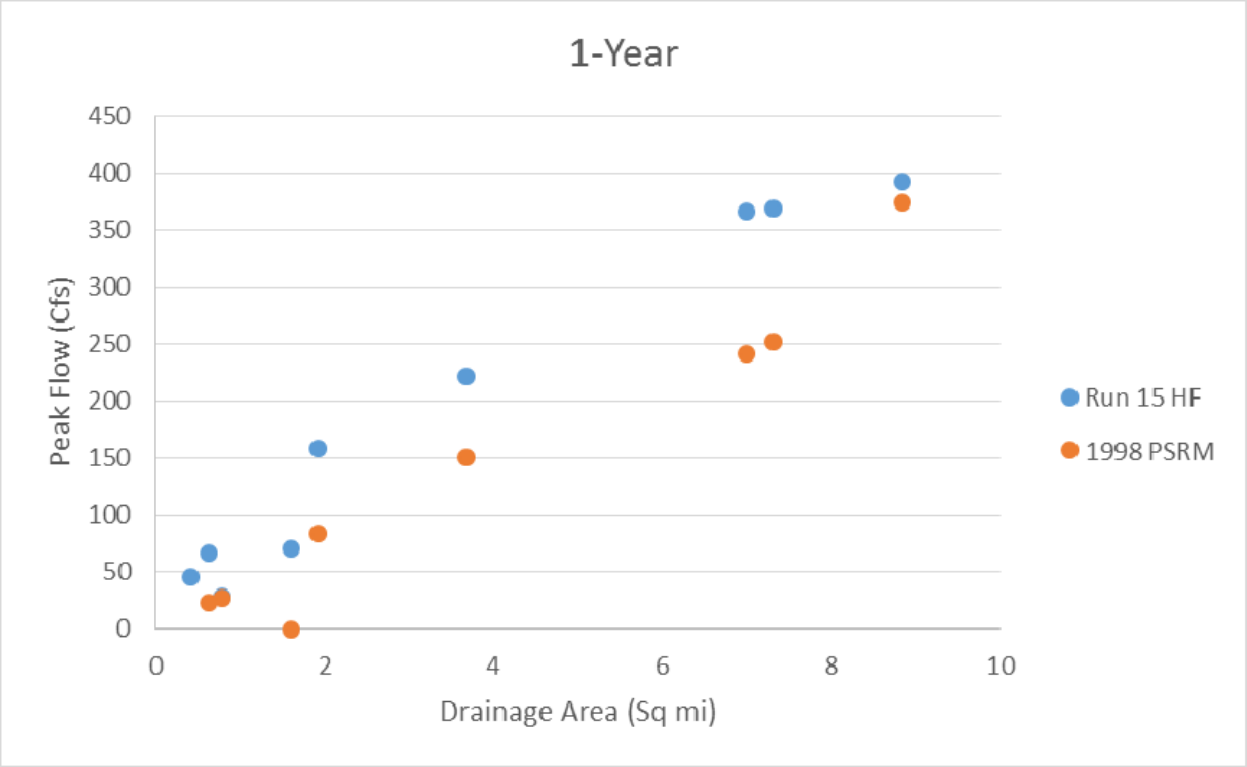
Flaugherty Run HEC-HMS Parameters (Run 15 HF) IA Ratio = 0.2*S, Decrease CN 16% (20% in POI8 and 10% in POI7), Vary Lag Time in POI8 (+10% in W690, -15% in W640, W590, and W560), Increase Manning's n to 0.05 (0.03 downstream of confluence with Boggs Run), LiDAR Channel Widths; CORRECTED TLAG AT W640											
Subbasin	Drainage Area (mi2)	Initial Abstraction (in)	Curve Number	Lag Time (min)	Reach	Length (ft)	Slope (ft/ft)	Manning's n	Shape	Width (ft)	Side Slope (xH:1V)
W940	0.41268	0.776685615	72.02832	21.441	R10	366.56	0.001	0.03	Trapezoid	20	2
W930	0.328	0.72251192	73.46157	16.621	R60	2889.6	0.012012	0.03	Trapezoid	20	2
W920	0.78813	0.983185425	67.04243	30.512	R110	1418.3	0.014214	0.05	Trapezoid	12	2
W1070	0.0611573	1.16116821	63.26775	10.511	R160	1944.1	0.013112	0.05	Trapezoid	12	2
W900	0.32087	0.947498421	67.85415	22.641	R180	2508.9	0.008765	0.03	Trapezoid	20	2
W860	0.62583	0.895731373	69.06718	30.115	R210	577.37	0.010825	0.03	Trapezoid	15	2
W810	0.86195	0.845309216	70.29113	33.334	R240	3565.9	0.011251	0.05	Trapezoid	15	2
W800	0.19978	0.951892709	67.75314	16.741	R270	3893.7	0.010227	0.05	Trapezoid	15	2
W770	0.74512	1.126585765	63.96754	29.922	R290	487.39	0.007694	0.05	Trapezoid	10	2
W1020	0.1079	1.471054357	57.61938	12.265	R310	957.51	0.017086	0.05	Trapezoid	10	2
W700	0.59227	1.000207764	66.66205	24.318	R390	1032.9	0.005383	0.05	Trapezoid	10	2
W690	0.70591	0.947395475	67.85652	27.6397	R400	546.92	0.026128	0.05	Trapezoid	5	2
W670	0.30011	0.837484763	70.48496	18.177	R410	3977.6	0.015316	0.05	Trapezoid	5	2
W650	0.15356	0.789159874	71.70618	11.434	R280	2074.1	0.008394	0.03	Trapezoid	15	2
W640	0.0421496	0.935877212	68.12274	5.7171	R1050	2077.9	0.008672	0.03	Trapezoid	15	2
W1030	0.2213	1.110699047	64.29423	21.455	R1090	1135	0.014635	0.05	Trapezoid	10	2
W590	0.31676	0.963047245	67.49808	19.6299	R360	1468.8	0.008211	0.05	Trapezoid	10	2
W580	0.49791	1.118600048	64.13134	27.559							
W1080	0.28336	1.150067648	63.4907	24.278							
W560	0.52942	0.972395364	67.2858	21.83225							
W540	0.62082	0.716685557	73.61912	29.824							
W530	0.11406	0.811459452	71.13743	10.706							
W510	0.0117025	0.718773594	73.56258	3.4845							

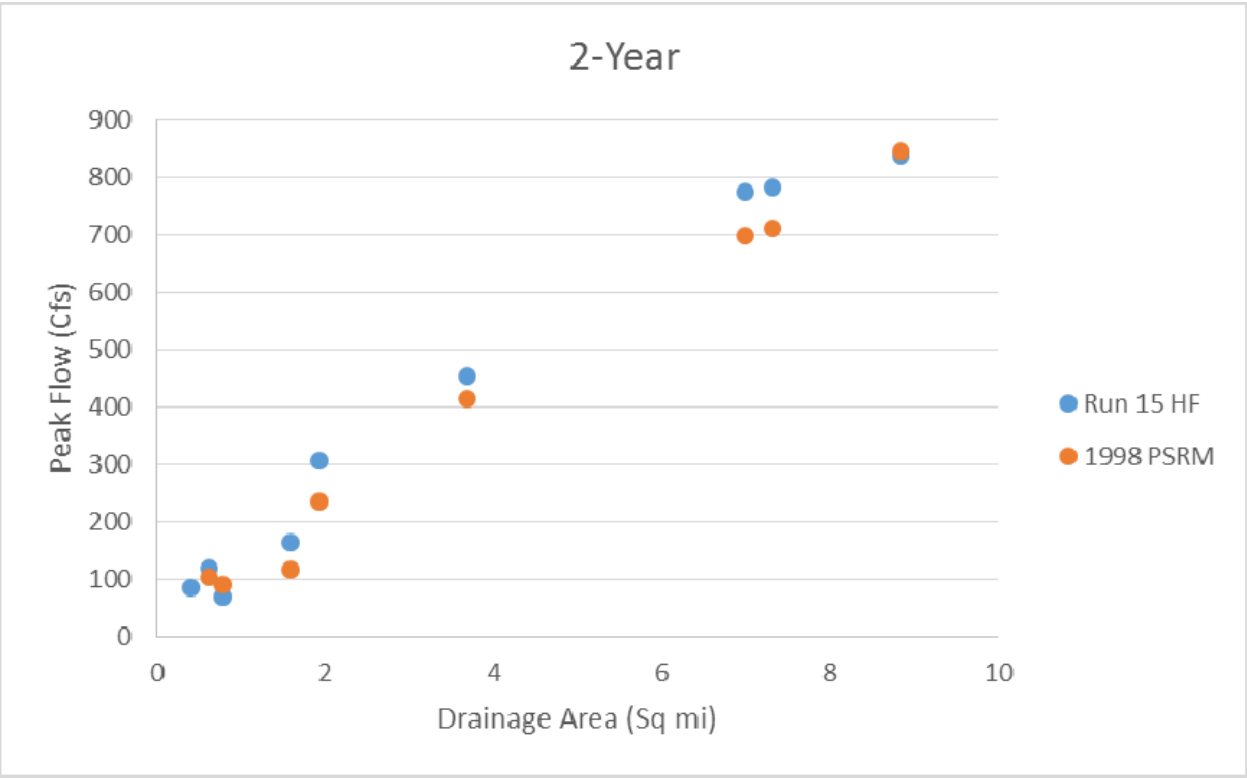
Final Calibrated Results

PEAK FLOW COMPARISON												
Location			Run 15 LF									
POI	Element	DA	1-Year	Difference	2-Year	Difference	2.33-Year	Difference	5-Year	Difference	10-Year	Difference
POI5	W920	0.78813	28.8	7%	67.9	-24%	75.1	-32%	144	-22%	221.2	-16%
POI7	W540	0.62082	67.1	183%	119.2	16%	128	12%	205.7	12%	285	9%
POI1	Outlet1	8.8407494	392.4	5%	838	-1%	918	-14%	1681	0%	2527.9	9%
POI4	J333	3.6819773	222	47%	454.5	10%	495.3	-6%	875.5	2%	1285.7	7%
POI6	J336	1.9235	159.1	91%	307.4	31%	332.9	12%	564.6	16%	808.2	17%
POI3	J343	6.9954969	366.1	52%	776.5	11%	849.1	-4%	1535.8	6%	2284.4	12%
POI2	J348	7.3246969	368.8	46%	784.5	10%	858.4	-5%	1556.3	6%	2320.7	12%
POI8	J362	1.5942396	70.4		164.6	41%	181.8	27%	345.6	31%	527.2	31%

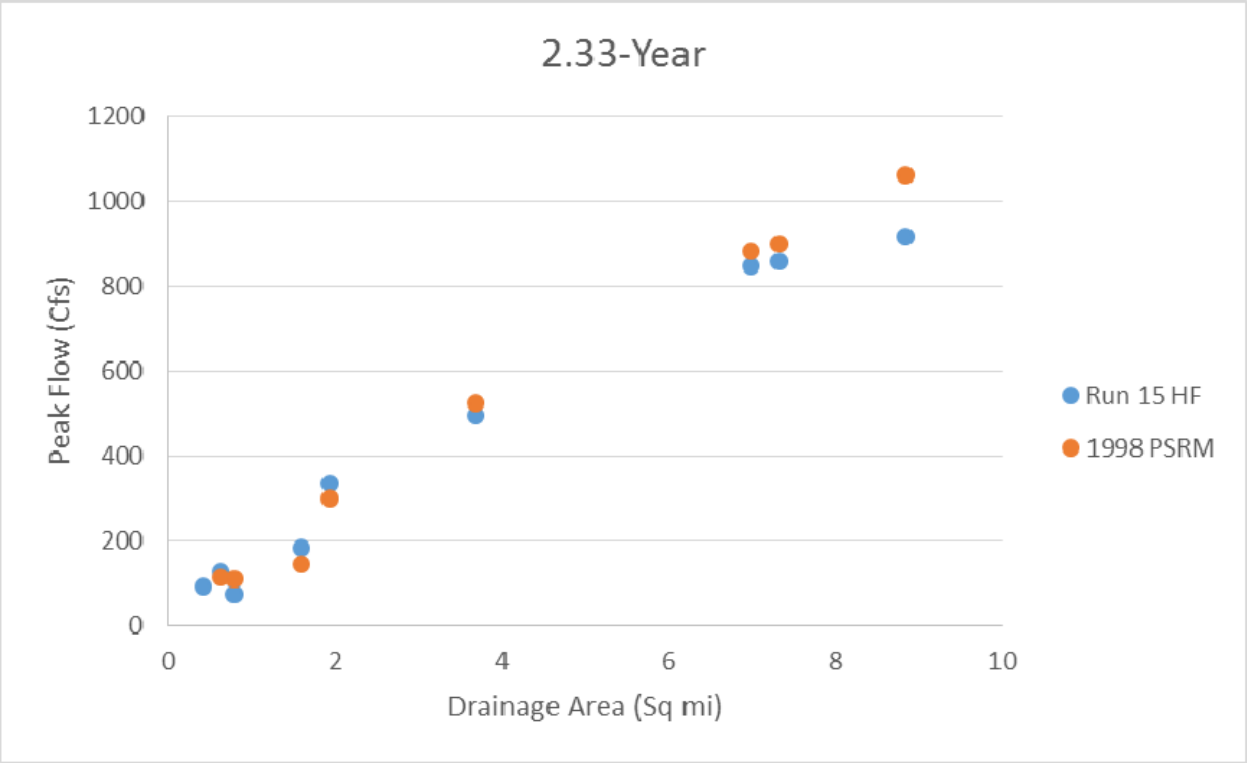
PEAK FLOW COMPARISON										
Location			Run 15 HF							
POI	Element	DA	10-Year*	Difference	25-Year	Difference	50-Year	Difference	100-Year	Difference
POI5	W920	0.78813	134.6	-49%	237.6	-35%	341.8	-20%	462.9	-4%
POI7	W540	0.62082	196.4	-25%	303.9	-18%	405.4	-6%	518.9	4%
POI1	Outlet1	8.8407494	1566.8	-32%	2697.9	-14%	3844.1	8%	5177.5	30%
POI4	J333	3.6819773	815.5	-32%	1363.3	-18%	1904.8	1%	2523.2	19%
POI6	J336	1.9235	525	-24%	851.1	-10%	1165.7	8%	1521.5	25%
POI3	J343	6.9954969	1427.5	-30%	2427.9	-14%	3421.5	6%	4565.9	26%
POI2	J348	7.3246969	1447.8	-30%	2468.7	-14%	3483.6	7%	4659.5	27%
POI8	J362	1.5942396	313.6	-22%	553.8	-5%	795.1	17%	1074.4	36%

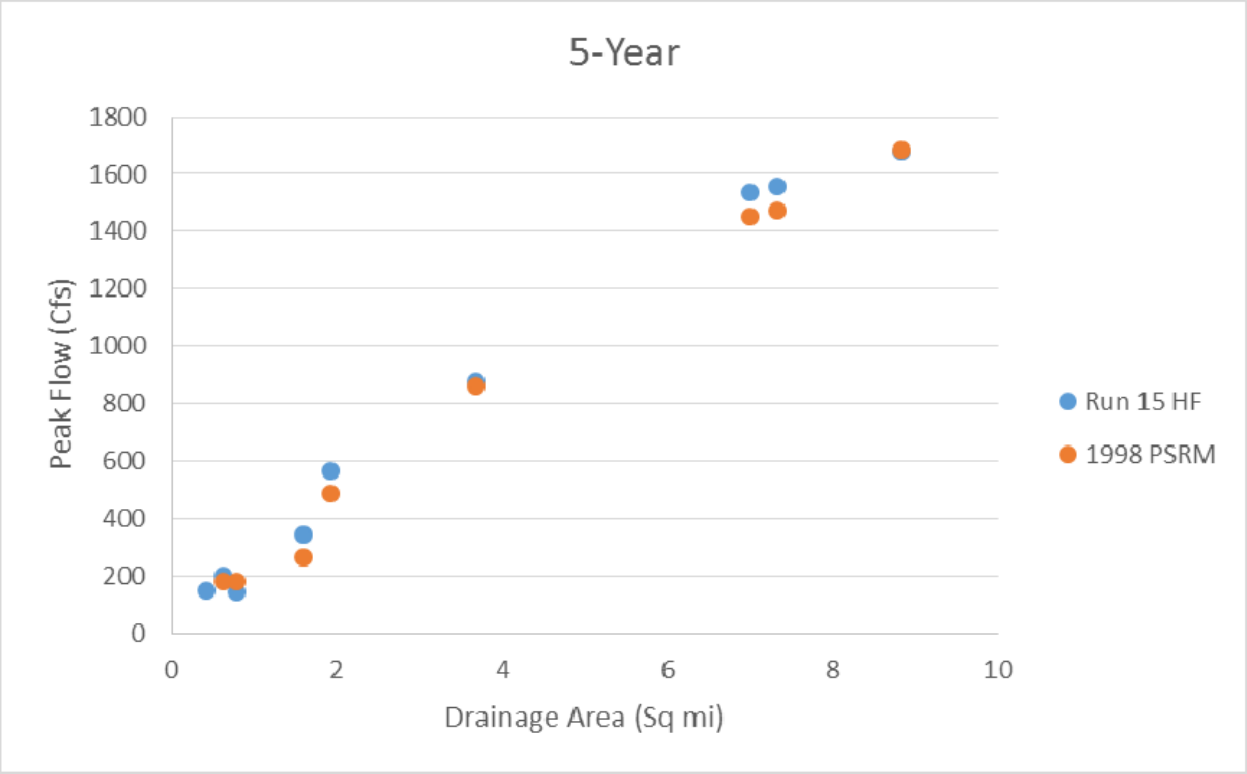
Final Calibrated Results



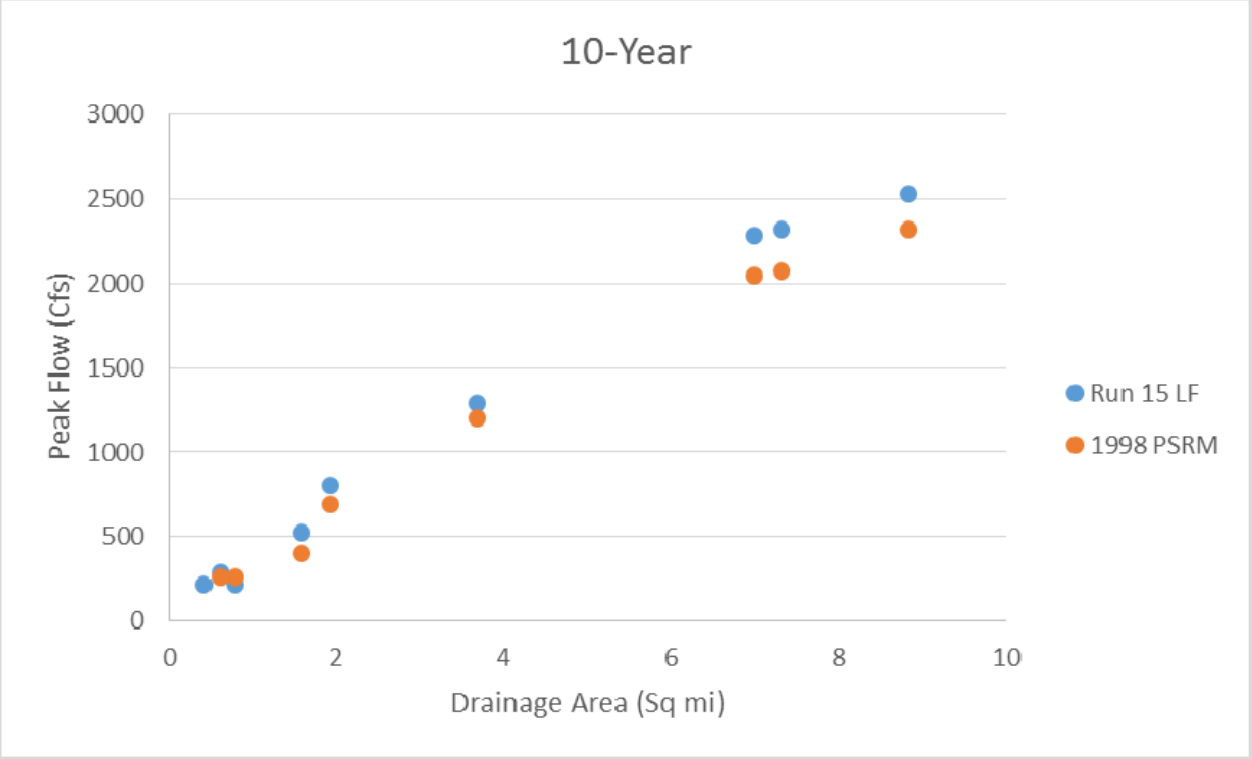


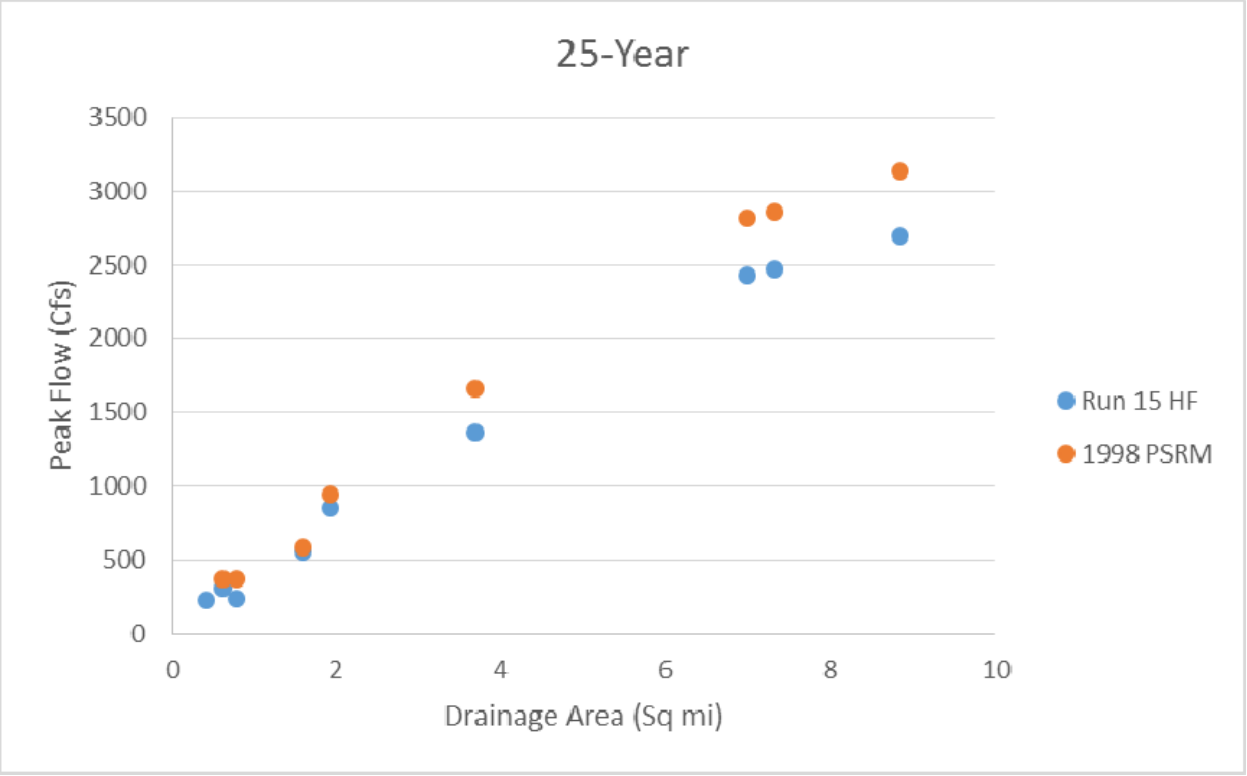
Final Calibrated Results



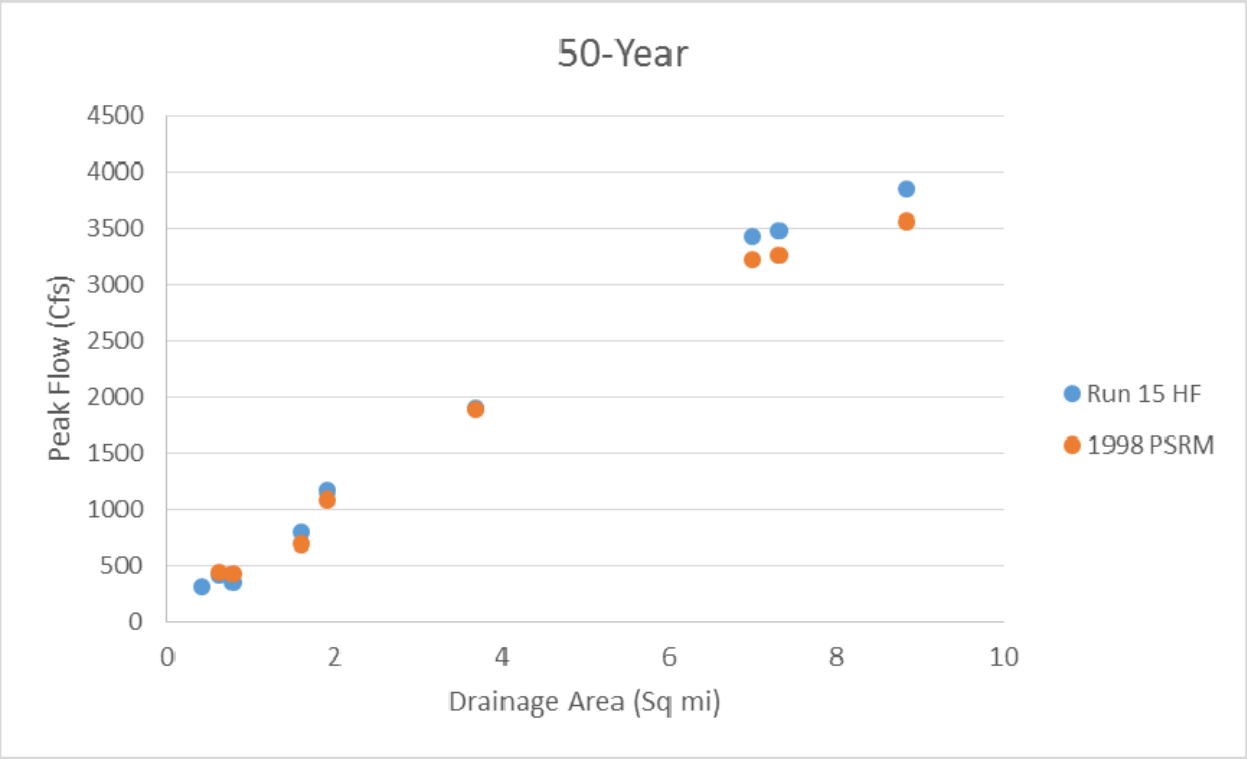


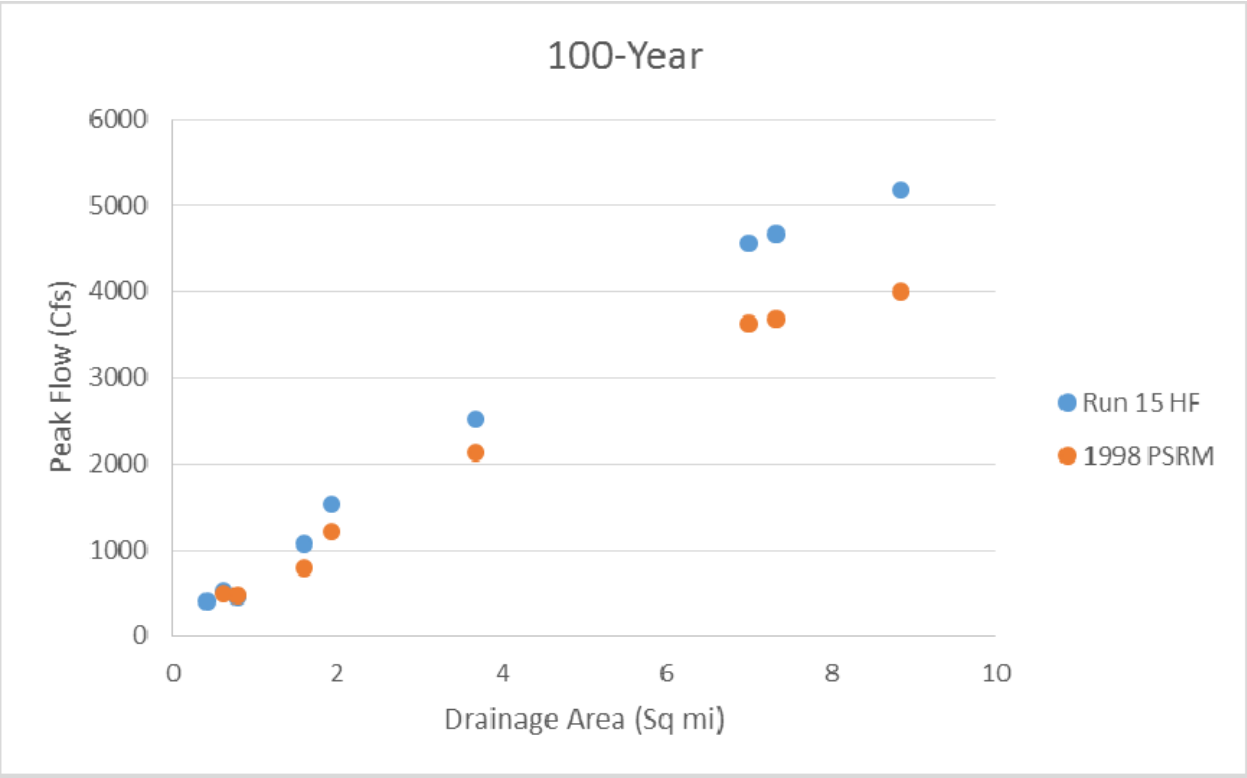
Final Calibrated Results





Final Calibrated Results





Robinson Run Watershed

TECHNICAL APPENDIX B.1

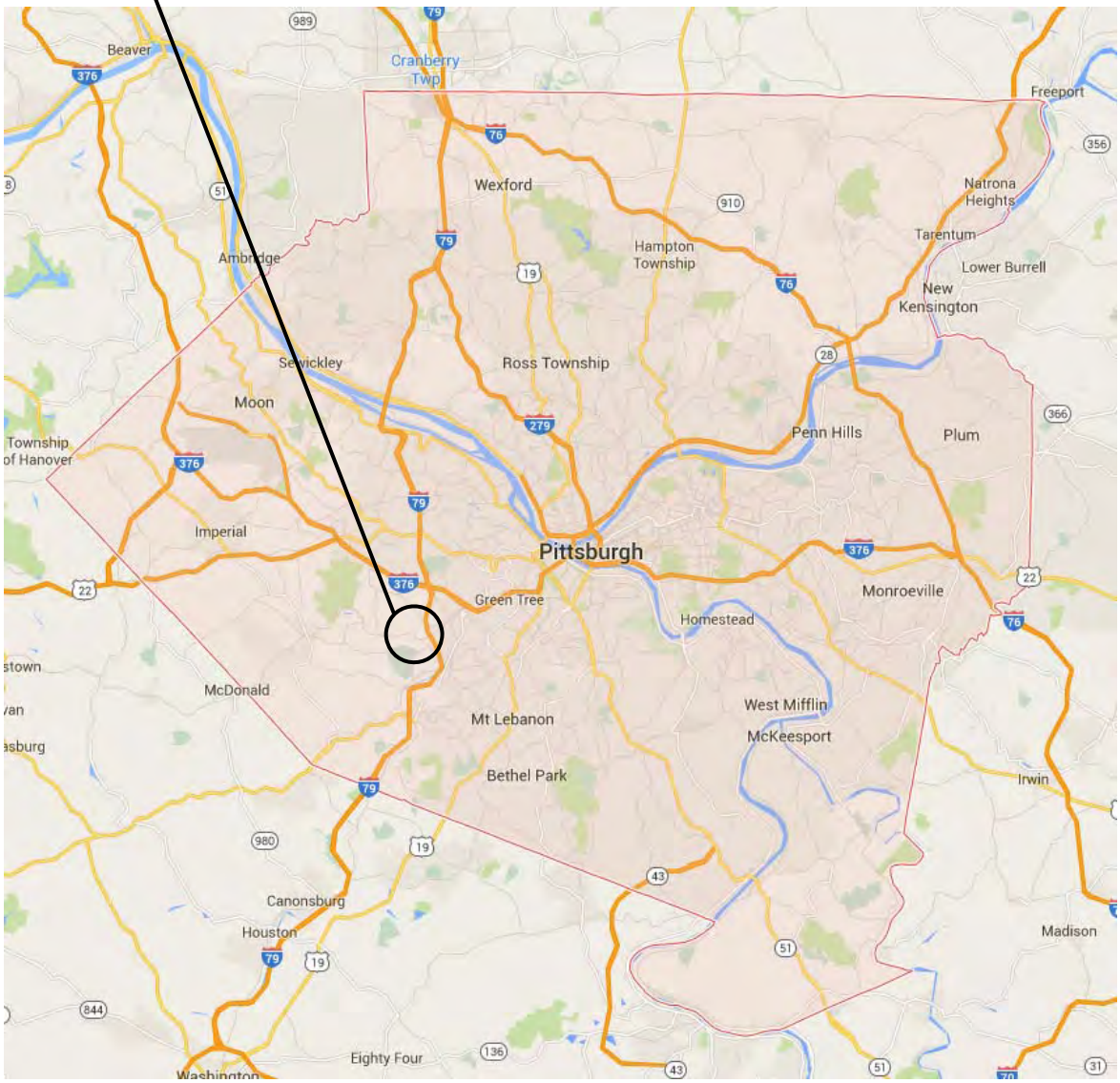
Location Maps

Allegheny County
PennDOT District 11-0

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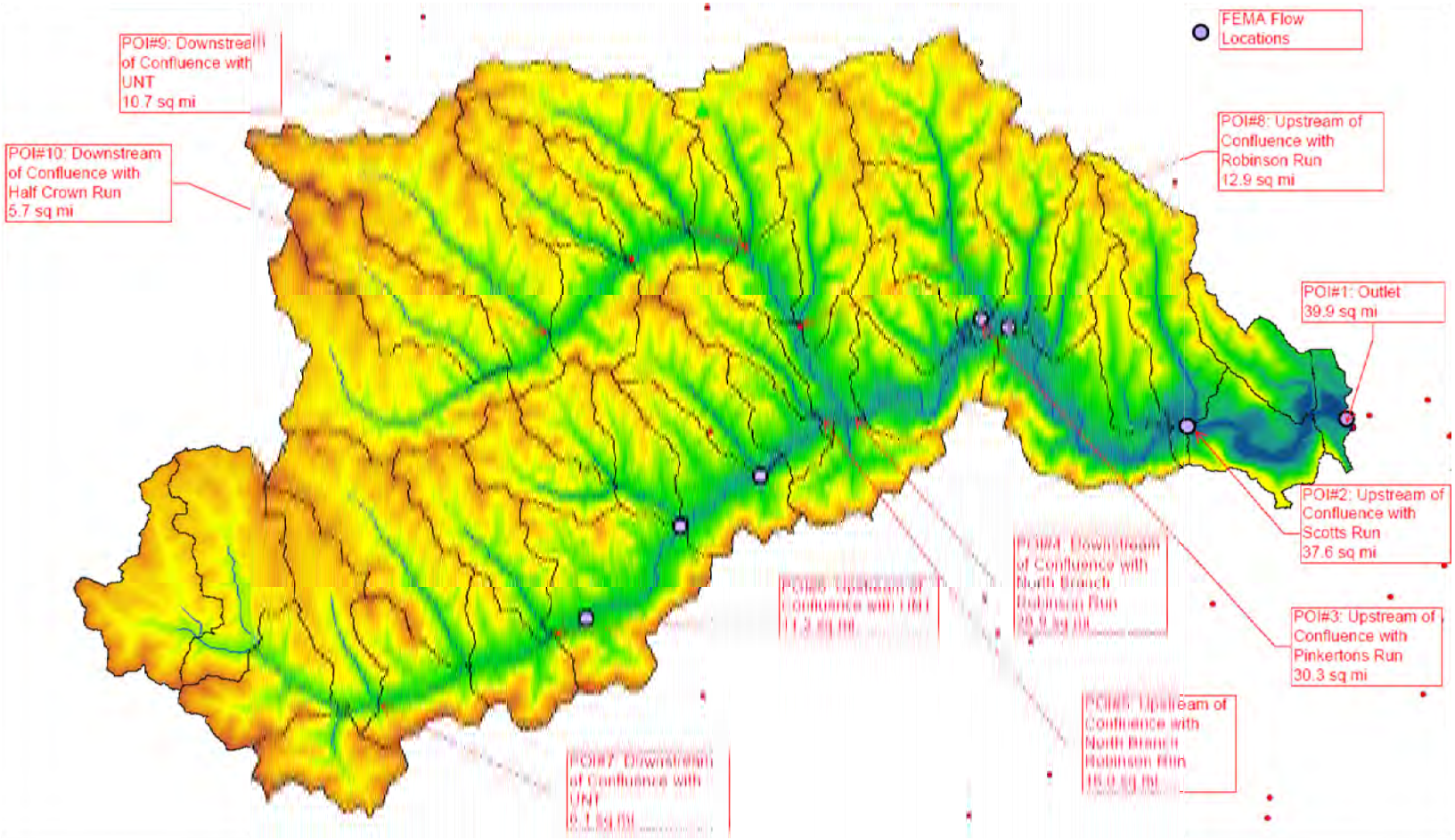
Allegheny County Location Map: Robinson Run Watershed Outlet

Outlet, Drainage Area = 39.9 sq. mi.



Source: Google Maps

Points of Interest (POI) Map



Robinson Run Watershed

TECHNICAL APPENDIX B.2

Hydrology

Allegheny County
PennDOT District 11-0

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TECHNICAL APPENDIX B.2

Peak Flows

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Robinson Run Flows

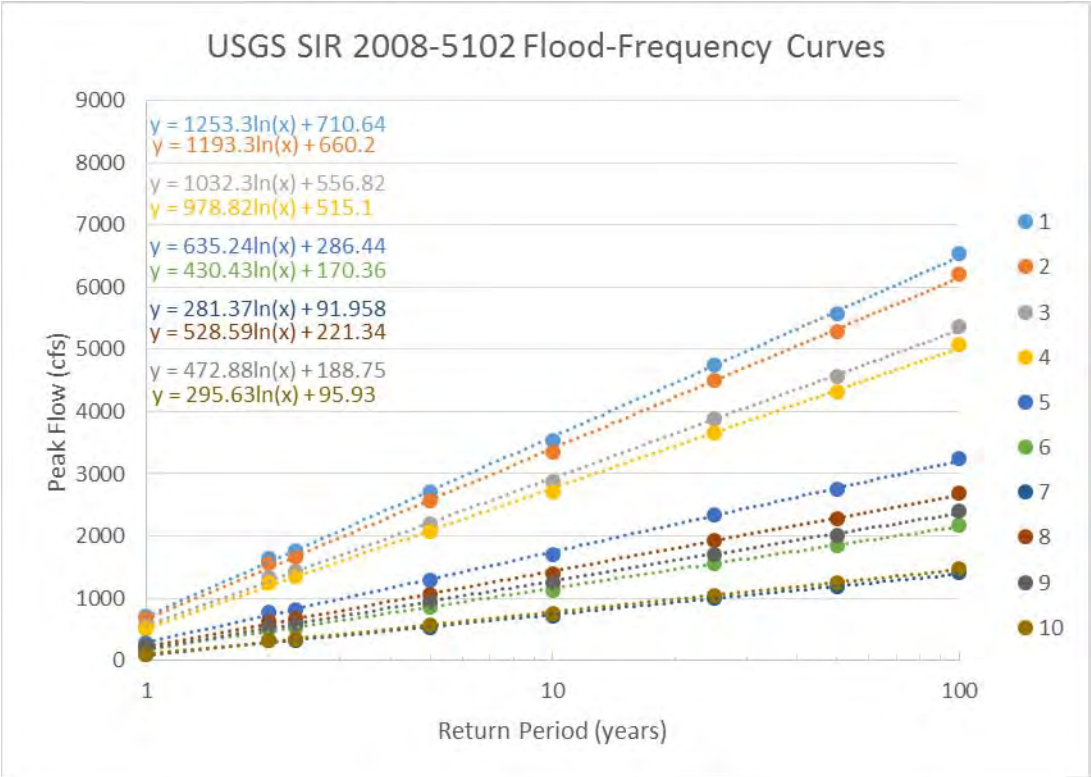
Method		SIR 5102								WRIR 4189							
POI\Event	Drainage Area (sq mi)	1	2	2.33	5	10	25	50	100	1	2	2.33	5	10	25	50	100
1	39.9	711	1640	1771	2710	3530	4745	5570	6550	2366	2897	3029	3785	4584	6142	7477	8974
2	37.4	660	1550	1670	2560	3340	4501	5290	6220	2244	2750	2875	3597	4360	5849	7127	8562
3	31	557	1330	1430	2200	2870	3880	4560	5370	1936	2386	2499	3145	3833	5184	6351	7671
4	28.9	515	1250	1343	2070	2710	3666	4310	5080	1837	2267	2375	2994	3654	4951	6074	7346
5	16	286	768	824	1290	1710	2331	2750	3250	1176	1457	1527	1934	2369	3229	3976	4826
6	9.59	170	499	534	851	1130	1556	1840	2180	788	985	1035	1324	1635	2257	2803	3431
7	5.4	92	310	330	536	716	998	1180	1410	534	675	711	920	1,149	1,611	2,023	2,503
8	12.4	221	623	668	1060	1400	1923	2270	2690	834	1052	1107	1430	1782	2491	3122	3854
9	10.7	189	551	589	938	1240	1711	2020	2400	738	933	983	1273	1589	2229	2799	3462
10	5.69	95.9	325	346	562	752	1048	1240	1480	396	510	539	713	907	1307	1672	2105

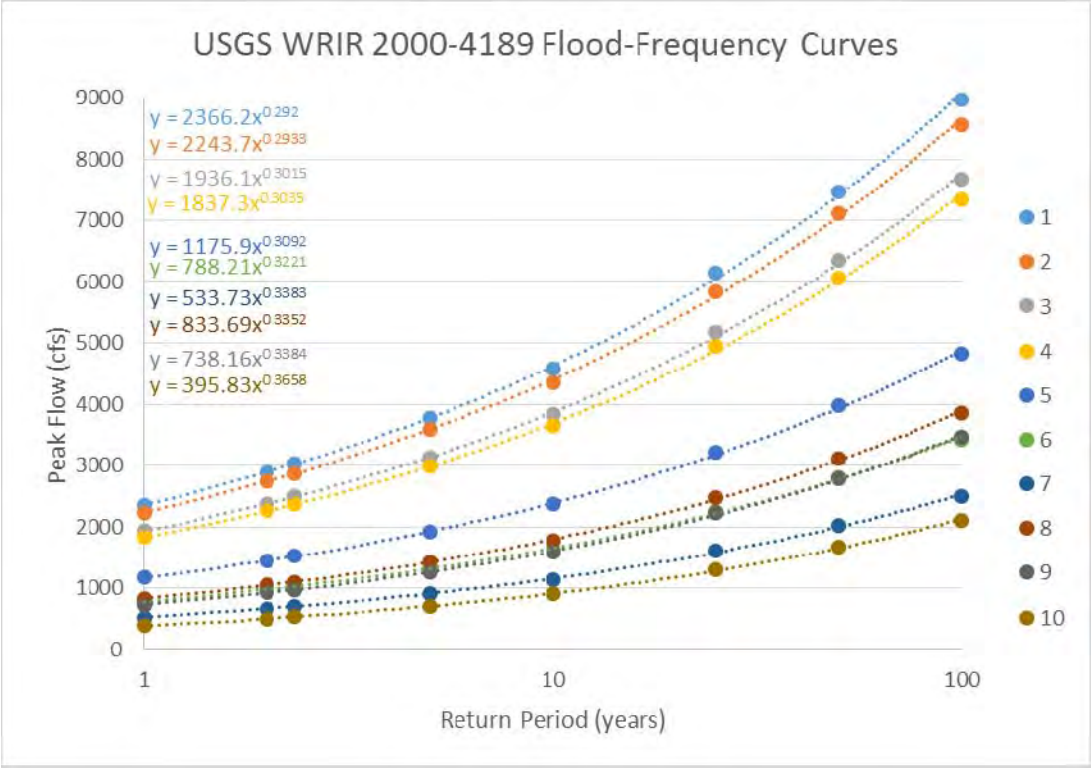
Method		Regional Gage Analysis								FIS			
POI\Event	Drainage Area (sq mi)	1	2	2.33	5	10	25	50	100	10	50	100	500
1	39.9	624.6	1613	1767	2525	3259	4368	5357	6523	3350	6100	7500	11500
2	37.4	589.1	1542	1689	2416	3121	4187	5141	6268	3100	5600	7000	10800
3	31	498.3	1359	1491	2139	2768	3724	4585	5614	2600	4700	5800	8800
4	28.9	468.5	1300	1426	2048	2652	3572	4403	5400	N/A	N/A	N/A	N/A
5	16	285.4	932	1026	1489	1940	2638	3284	4082	N/A	N/A	N/A	N/A
6	9.59	194.5	750	827	1211	1587	2175	2728	3427	N/A	N/A	N/A	N/A
7	5.4	135	630	698	1029	1356	1871	2365	2999	N/A	N/A	N/A	N/A
8	12.4	234.4	830	915	1333	1742	2378	2972	3714	1170	2200	2700	4200
9	10.7	210.2	781	862	1259	1648	2255	2825	3540	N/A	N/A	N/A	N/A
10	5.69	139.2	639	707	1042	1372	1892	2390	3028	N/A	N/A	N/A	N/A

*FIS flows calculated using the LPIII method from WRC Bulletin 17B

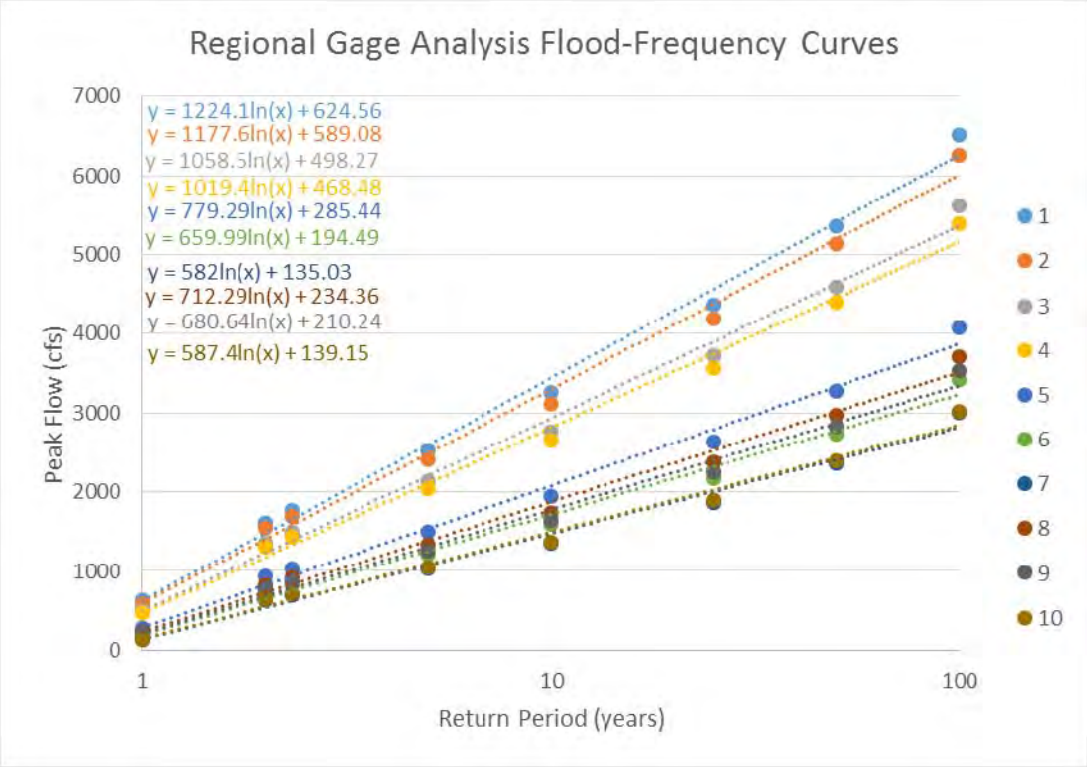
Interpolated/ Extrapolated

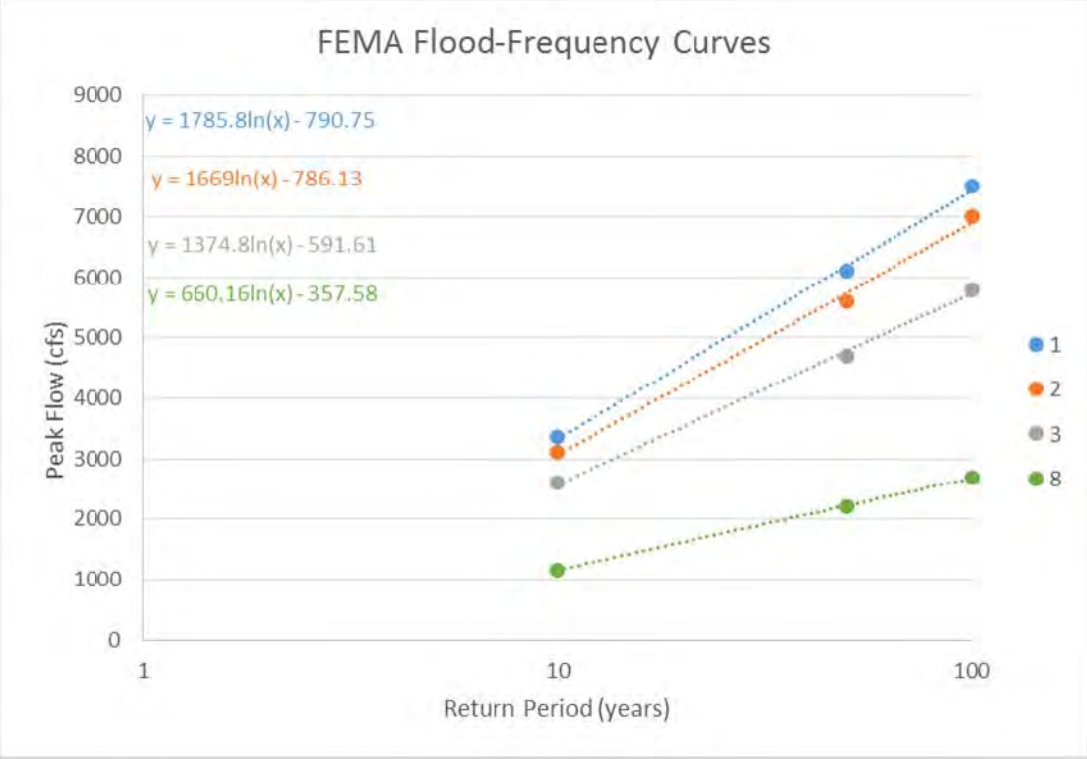
Robinson Run Flood-Frequency Curves



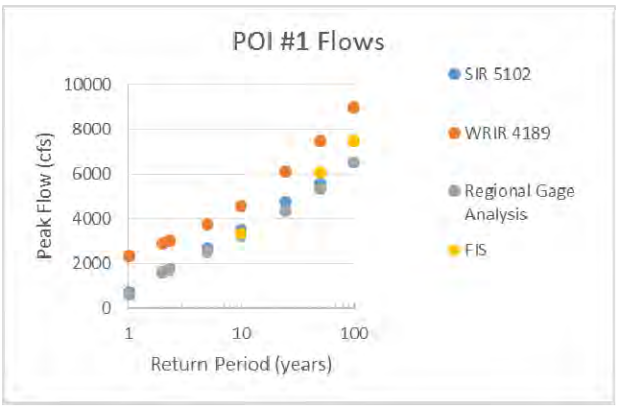


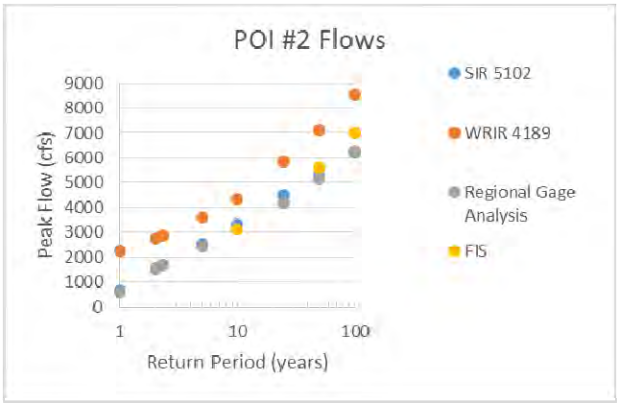
Robinson Run Flood-Frequency Curves

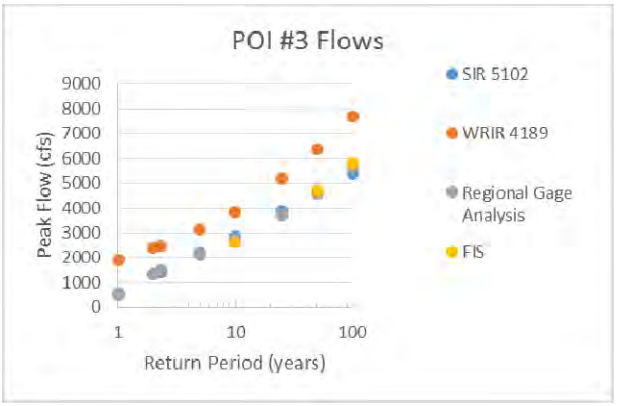


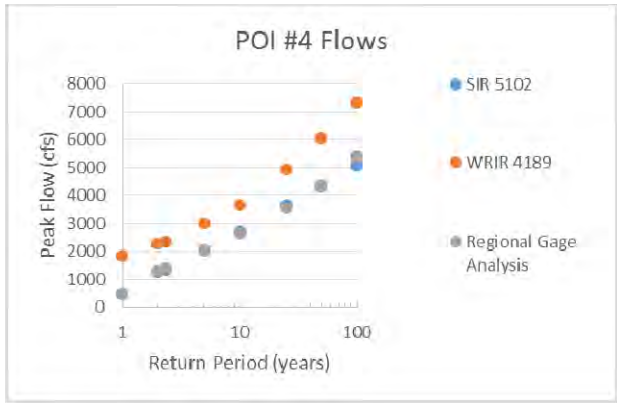


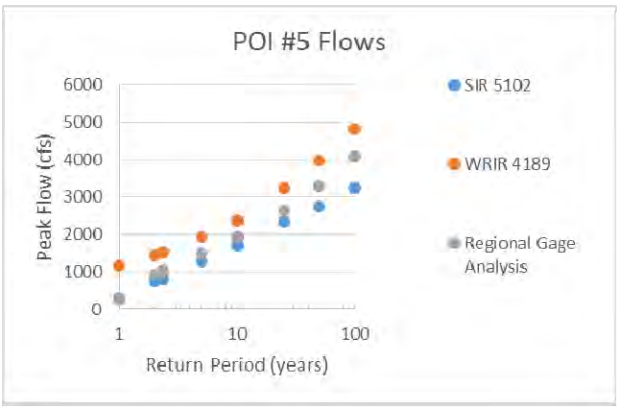
Hydrologic Method Comparison at Points of Interest

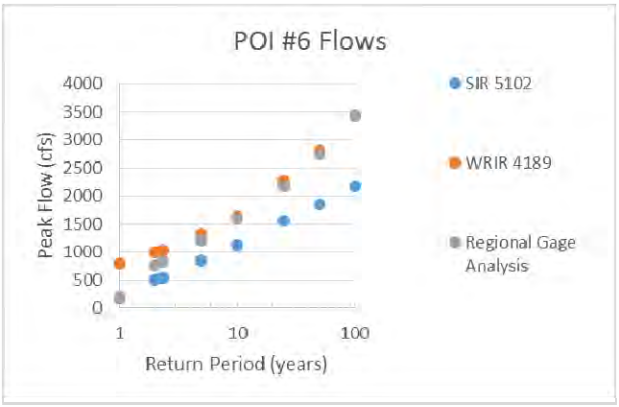




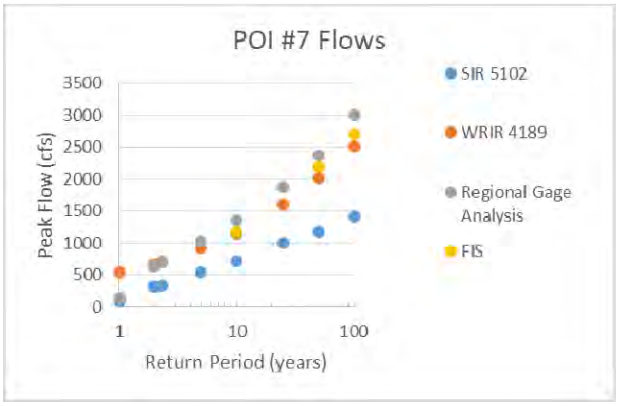


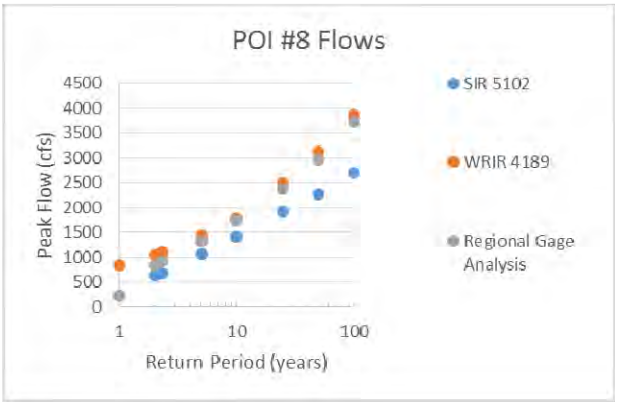


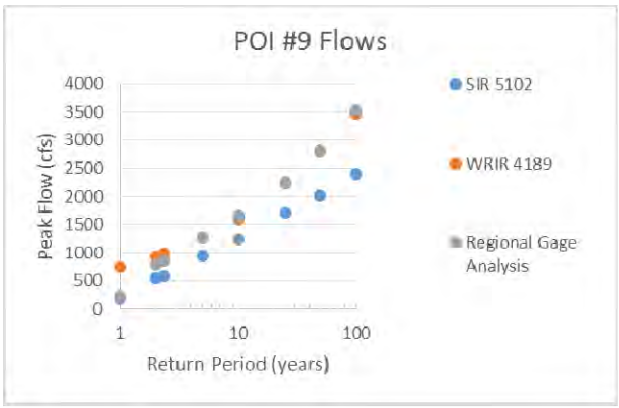


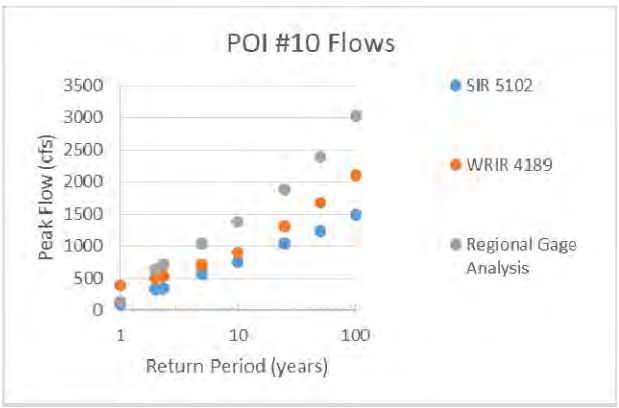


Hydrologic Method Comparison at Points of Interest









TECHNICAL APPENDIX B.2

USGS WRIR 2000-4189



USGS WRIR 2000-4189 Regional Map

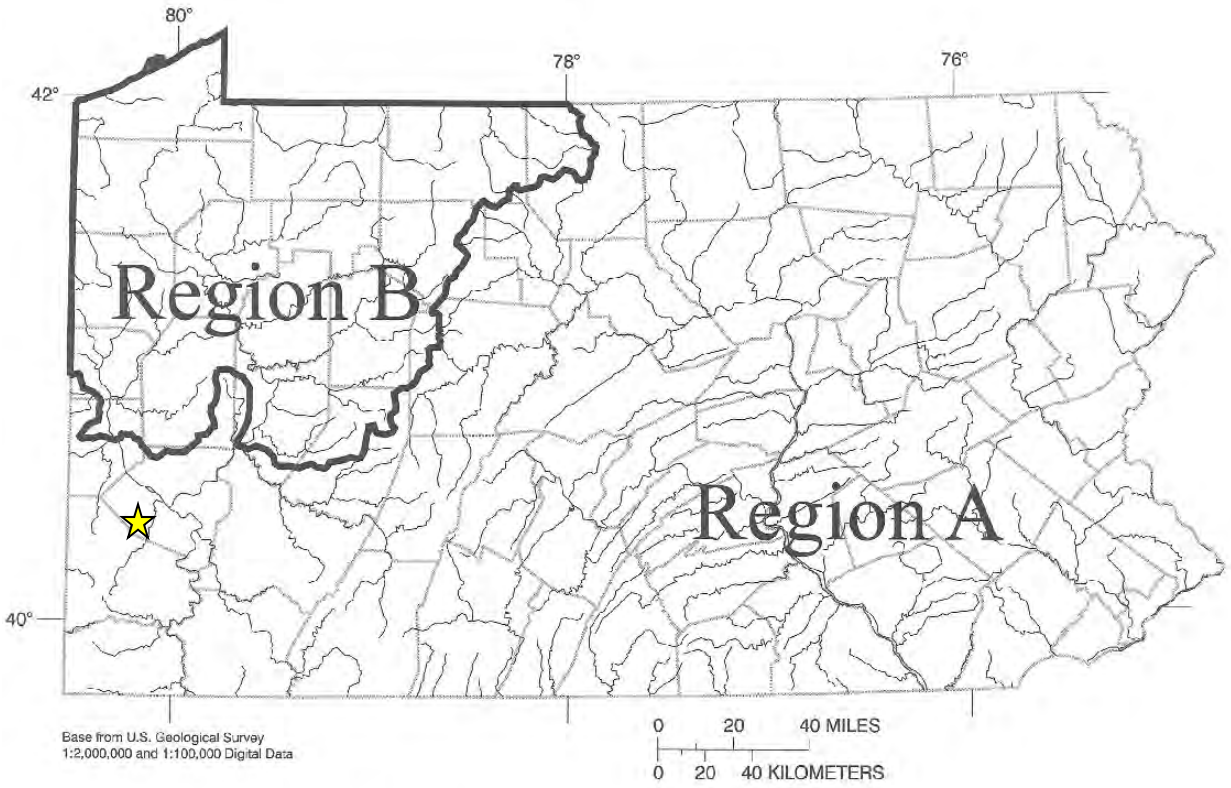


Figure 3. Flood-frequency regions in Pennsylvania.

☆ - Indicates project location

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USGS WRIR 2000-4189 Pennsylvania
Carbonate Coverage Map

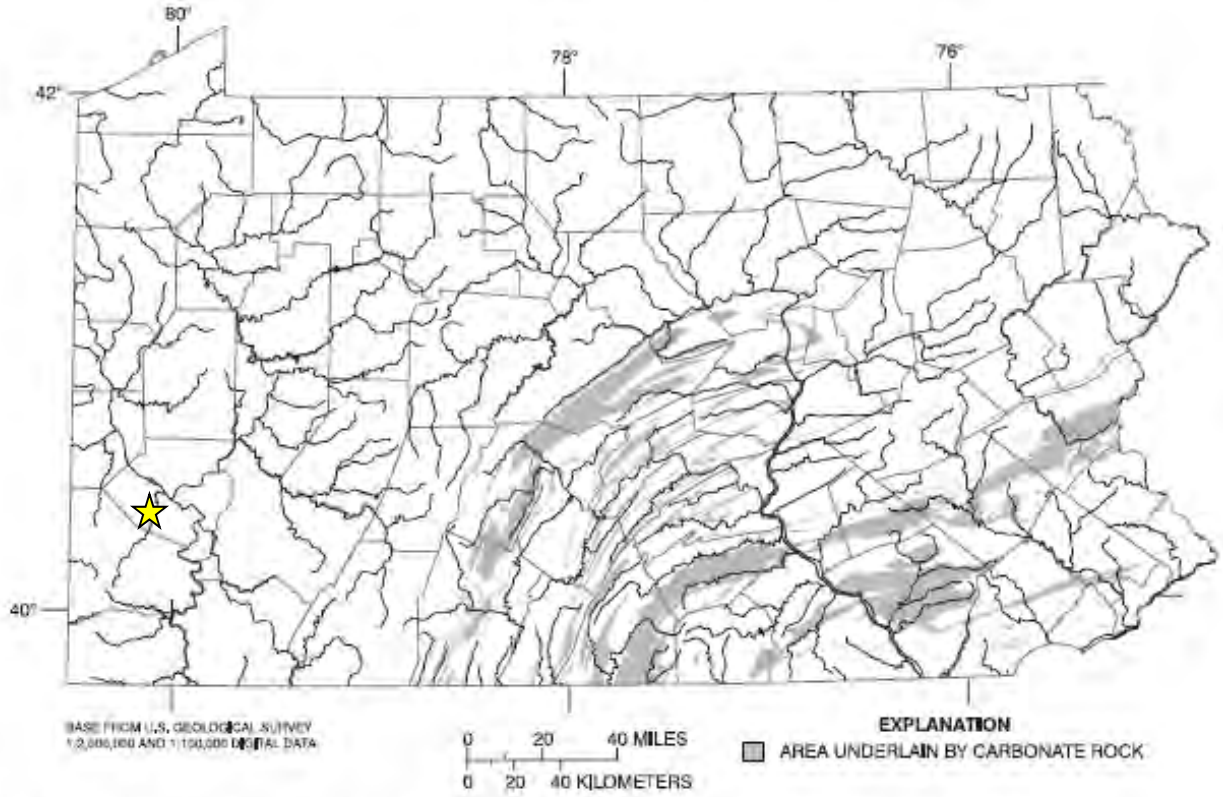


Figure 2. Carbonate regions in Pennsylvania (modified from Environmental Resources Research Institute, 1998).

☆ - Indicates project location

NEWELL TERESKA & MACKAY ENGINEERING

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: BAK Ckd: BBS
Date: 12/16/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Robinson Run POI #1: Confluence with Chartiers Creek

Total drainage area (mi^2) =	39.90
Total forest area in watershed (mi^2) =	20.75
% Forested (F) =	52.0
Total urban area in watershed (mi^2) =	6.78
% Urban Development (U) =	17.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
4,584	**6,142**	**7,477**	**8,974**	**13,190**

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: BAK Ckd: BBS
Date: 12/16/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Robinson Run POI #2: Upstream of Confluence with Scotts Run

Total drainage area (mi^2) =	37.40
Total forest area in watershed (mi^2) =	19.45
% Forested (F) =	52.0
Total urban area in watershed (mi^2) =	6.36
% Urban Development (U) =	17.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
4,360	**5,849**	**7,127**	**8,562**	**12,606**

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: BAK Ckd: PAD
Date: 12/16/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Robinson Run POI #3: Upstream of Confluence with Pinkertons Run

Total drainage area (mi^2) =	31.00
Total forest area in watershed (mi^2) =	14.88
% Forested (F) =	48.0
Total urban area in watershed (mi^2) =	4.96
% Urban Development (U) =	16.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
3,833	**5,184**	**6,351**	**7,671**	**11,433**

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: BAK Ckd: BBS
Date: 12/16/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Robinson Run POI #4: Downstream of Confluence with North Branch Robinson Run

Total drainage area (mi^2) =	28.90
Total forest area in watershed (mi^2) =	13.58
% Forested (F) =	47.0
Total urban area in watershed (mi^2) =	4.62
% Urban Development (U) =	16.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
3,654	**4,951**	**6,074**	**7,346**	**10,980**

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: BAK Ckd: BBS
Date: 12/16/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Robinson Run POI #5: Upstream of Confluence with North Branch Robinson Run

Total drainage area (mi^2) =	16.00
Total forest area in watershed (mi^2) =	7.52
% Forested (F) =	47.0
Total urban area in watershed (mi^2) =	3.04
% Urban Development (U) =	19.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
2,369	**3,229**	**3,976**	**4,826**	**7,265**

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: BAK Ckd: BBS
Date: 12/16/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Robinson Run POI #6: Upstream of Confluence with Unnamed Tributary

Total drainage area (mi^2) =	9.59
Total forest area in watershed (mi^2) =	4.12
% Forested (F) =	43.0
Total urban area in watershed (mi^2) =	1.82
% Urban Development (U) =	19.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
1,635	**2,257**	**2,803**	**3,431**	**5,259**

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: BAK Ckd: BBS
Date: 12/16/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Robinson Run POI #7: Downstream of Confluence with Unnamed Tributary

Total drainage area (mi^2) =	5.40
Total forest area in watershed (mi^2) =	1.67
% Forested (F) =	31.0
Total urban area in watershed (mi^2) =	1.08
% Urban Development (U) =	20.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
1,149	**1,611**	**2,023**	**2,503**	**3,933**

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: BAK Ckd: BBS
Date: 12/16/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Robinson Run POI #8: North Branch Robinson Run Upstream of Confluence with Robinson Run

Total drainage area (mi^2) =	12.40
Total forest area in watershed (mi^2) =	5.95
% Forested (F) =	48.0
Total urban area in watershed (mi^2) =	1.24
% Urban Development (U) =	10.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
1,782	**2,491**	**3,122**	**3,854**	**6,017**

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: BAK Ckd: BBS
Date: 12/16/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Robinson Run POI #9: North Branch Robinson Run Downstream of Confluence with Unnamed Tributary

Total drainage area (mi^2) =	10.70
Total forest area in watershed (mi^2) =	5.14
% Forested (F) =	48.0
Total urban area in watershed (mi^2) =	1.07
% Urban Development (U) =	10.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
1,589	**2,229**	**2,799**	**3,462**	**5,427**

NEWELL TERESKA & MACKAY ENGINEERING

Project: Allegheny Co Act 167
County: Allegheny
By: BAK Ckd: BBS
Date: 12/16/2015 Date: 2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$
$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$
$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$
$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$
$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA = Drainage Area
F = *Percent Forested Area*
U = *Percent Urban Area*
C = *Percent Carbonate Area*
CA = *Percent Controlled Areas*
(areas controlled by lakes, swamps, and reservoirs)

Robinson Run POI #10: North Branch Robinson Run Downstream of Confluence with Half Crown Run

Total drainage area (mi^2) =	5.69
Total forest area in watershed (mi^2) =	2.85
% Forested (F) =	50.0
Total urban area in watershed (mi^2) =	0.23
% Urban Development (U) =	4.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

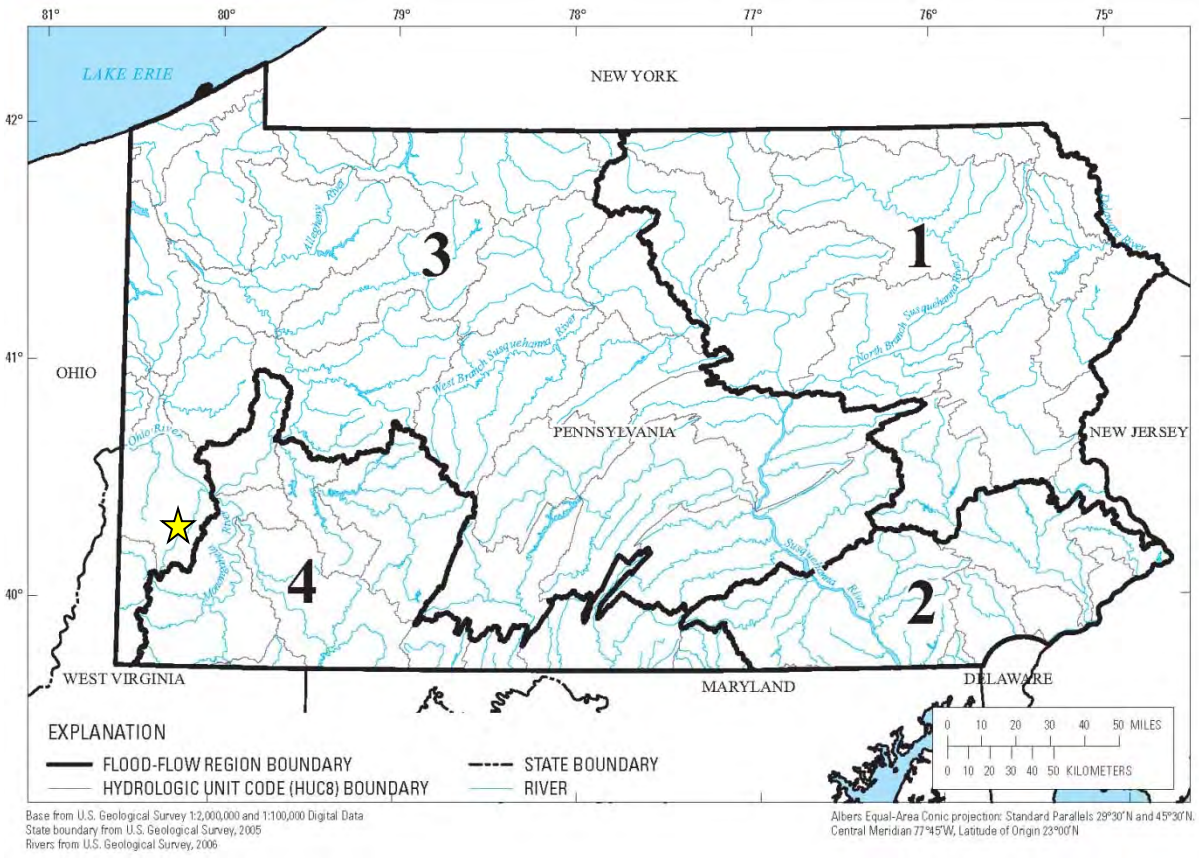
10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
907	**1,307**	**1,672**	**2,105**	**3,427**

TECHNICAL APPENDIX B.2

USGS SIR 2008-5102



USGS SIR 2008-5102 Regional Map



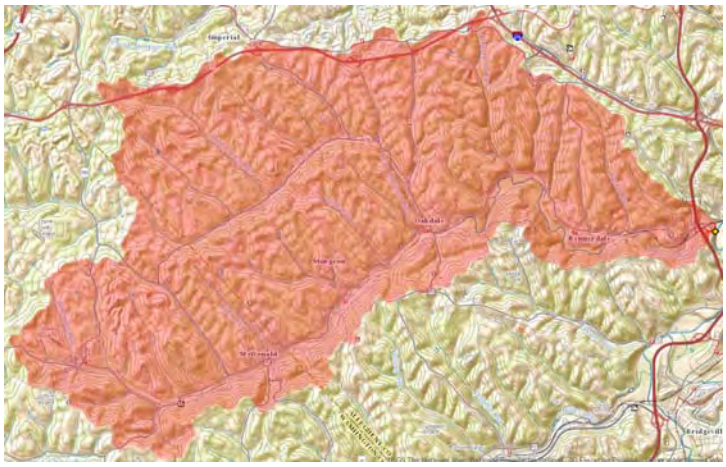
☆ - Indicates project location

NEWELL TERESKA & MACKAY ENGINEERING

USGS SIR 2008-5102 (PA Stream Stats)
POI#1 Calculations

Peak Flow Statistics

Statistic	Value	Unit
PK2	1640	ft3/s
PK5	2710	ft3/s
PK10	3530	ft3/s
PK50	5570	ft3/s
PK100	6550	ft3/s
PK500	9170	ft3/s

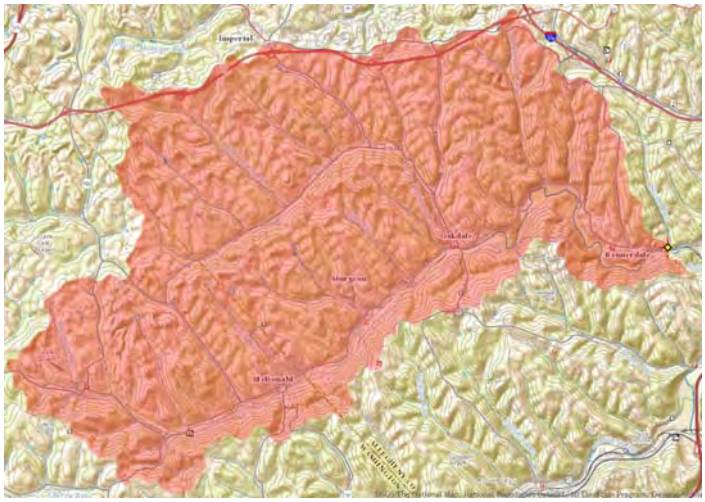


Basin Characteristics

Label	Value	Units	Definition
DRNAREA	39.9	square miles	Area that drains to a point on a stream
STRMTOT	76.26	miles	Total length of mapped streams in basin
STRDEN	1.91	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	8.5	degrees	Mean basin slope measured in degrees
CENTROIDX	-188191.5	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	157941.4	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-178275	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	157335	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.10032	degrees	Longitude of Basin Outlet
BSLOPDRAW	8.71	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	52	percent	Percentage of area covered by forest
PRECIP	37	inches	Mean Annual Precipitation
URBAN	17	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	4.8	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1102.8	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.5	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	5	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

NEWELL TERESKA & MACKAY ENGINEERING

USGS SIR 2008-5102 (PA Stream Stats)
POI#2 Calculations



Peak Flow Statistics

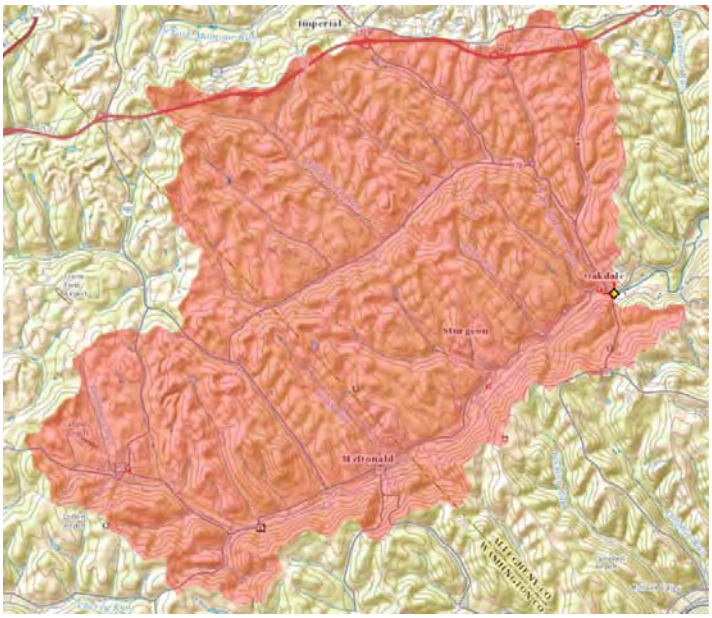
Statistic	Value	Unit
PK2	1550	ft3/s
PK5	2560	ft3/s
PK10	3340	ft3/s
PK50	5290	ft3/s
PK100	6220	ft3/s
PK500	8700	ft3/s

Basin Characteristics

Label	Value	Units	Definition
DRNAREA	37.4	square miles	Area that drains to a point on a stream
STRMTOT	70.31	miles	Total length of mapped streams in basin
STRDEN	1.88	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	8.4	degrees	Mean basin slope measured in degrees
CENTROIDX	-188736	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	157907.4	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-180545	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	157395	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.12707	degrees	Longitude of Basin Outlet
BSLOPDRAW	8.59	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	52	percent	Percentage of area covered by forest
PRECIP	37	inches	Mean Annual Precipitation
URBAN	17	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	4.8	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1109.4	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.5	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	5	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

NEWELL TERESKA & MACKAY
ENGINEERING

USGS SIR 2008-5102 (PA Stream Stats)
POI#3 Calculations



Peak Flow Statistics

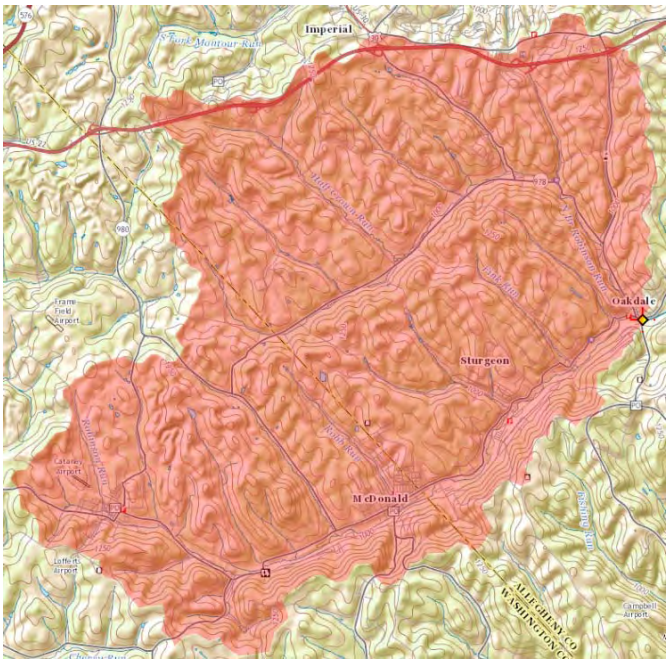
Statistic	Value	Unit
PK2	1330	ft3/s
PK5	2200	ft3/s
PK10	2870	ft3/s
PK50	4560	ft3/s
PK100	5370	ft3/s
PK500	7540	ft3/s

Basin Characteristics

Label	Value	Units	Definition
DRNAREA	31	square miles	Area that drains to a point on a stream
STRMTOT	57.62	miles	Total length of mapped streams in basin
STRDEN	1.86	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	8.1	degrees	Mean basin slope measured in degrees
CENTROIDX	-189890.9	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	157544.5	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-183445	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	158855	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.16165	degrees	Longitude of Basin Outlet
BSLOPDRAW	8.33	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	48	percent	Percentage of area covered by forest
PRECIP	37	inches	Mean Annual Precipitation
URBAN	16	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	4.8	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1118.7	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.5	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	4	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

NEWELL TERESKA & MACKAY ENGINEERING

USGS SIR 2008-5102 (PA Stream Stats)
POI#4 Calculations



Peak Flow Statistics

Statistic	Value	Unit
PK2	1250	ft3/s
PK5	2070	ft3/s
PK10	2710	ft3/s
PK50	4310	ft3/s
PK100	5080	ft3/s
PK500	7140	ft3/s

Basin Characteristics

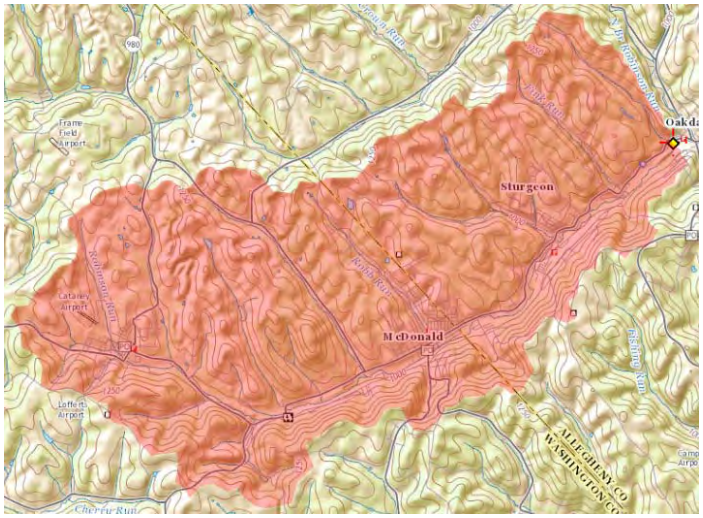
Label	Value	Units	Definition
DRNAREA	28.9	square miles	Area that drains to a point on a stream
STRMTOT	54.1	miles	Total length of mapped streams in basin
STRDEN	1.87	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	8	degrees	Mean basin slope measured in degrees
CENTROIDX	-190276.7	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	157522.2	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-185415	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	157455	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.18444	degrees	Longitude of Basin Outlet
BSLOPDRAW	8.24	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	47	percent	Percentage of area covered by forest
PRECIP	37	inches	Mean Annual Precipitation
URBAN	16	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	4.8	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1124.1	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.5	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	5	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

NEWELL TERESKA & MACKAY ENGINEERING

USGS SIR 2008-5102 (PA Stream Stats)
POI#5 Calculations

Peak Flow Statistics

Statistic	Value	Unit
PK2	768	ft3/s
PK5	1290	ft3/s
PK10	1710	ft3/s
PK50	2750	ft3/s
PK100	3250	ft3/s
PK500	4610	ft3/s



Basin Characteristics

Label	Value	Units	Definition
DRNAREA	16	square miles	Area that drains to a point on a stream
STRMTOT	32.44	miles	Total length of mapped streams in basin
STRDEN	2.03	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	8.1	degrees	Mean basin slope measured in degrees
CENTROIDX	-190912.1	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	155554.3	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-185815	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	157465	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.18916	degrees	Longitude of Basin Outlet
BSLOPDRAW	8.35	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	47	percent	Percentage of area covered by forest
PRECIP	38	inches	Mean Annual Precipitation
URBAN	19	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	4.8	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1127.4	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.5	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	4	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

NEWELL TERESKA & MACKAY ENGINEERING

USGS SIR 2008-5102 (PA Stream Stats)
POI#6 Calculations



Peak Flow Statistics

Statistic	Value	Unit
PK2	499	ft3/s
PK5	851	ft3/s
PK10	1130	ft3/s
PK50	1840	ft3/s
PK100	2180	ft3/s
PK500	3120	ft3/s

Basin Characteristics

Label	Value	Units	Definition
DRNAREA	9.59	square miles	Area that drains to a point on a stream
STRMTOT	22.18	miles	Total length of mapped streams in basin
STRDEN	2.31	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	8.1	degrees	Mean basin slope measured in degrees
CENTROIDX	-192724.5	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	154785.1	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-189595	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	154345	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.23273	degrees	Longitude of Basin Outlet
BSLOPDRAW	8.34	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	43	percent	Percentage of area covered by forest
PRECIP	38	inches	Mean Annual Precipitation
URBAN	19	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	4.8	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1153.3	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.5	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	4	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

NEWELL TERESKA & MACKAY ENGINEERING

USGS SIR 2008-5102 (PA Stream Stats)
POI#7 Calculations



Peak Flow Statistics

Statistic	Value	Unit
PK2	310	ft3/s
PK5	536	ft3/s
PK10	716	ft3/s
PK50	1180	ft3/s
PK100	1410	ft3/s
PK500	2030	ft3/s

Basin Characteristics

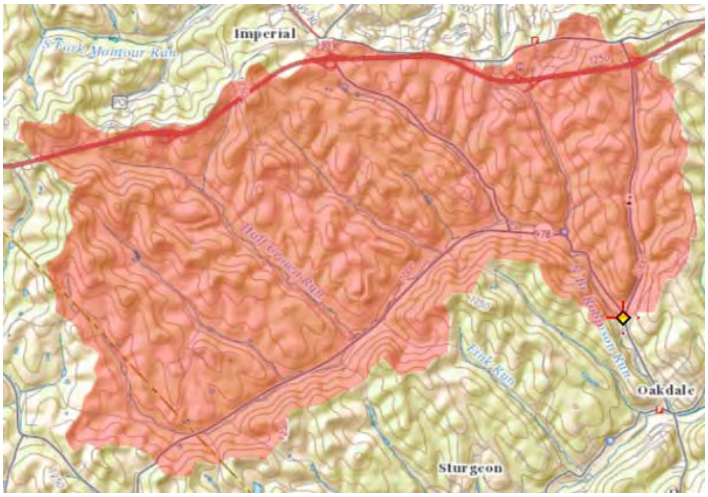
Label	Value	Units	Definition
DRNAREA	5.4	square miles	Area that drains to a point on a stream
STRMTOT	14.33	miles	Total length of mapped streams in basin
STRDEN	2.65	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	8	degrees	Mean basin slope measured in degrees
CENTROIDX	-193870	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	154505.4	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-192025	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	153415	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.26105	degrees	Longitude of Basin Outlet
BSLOPDRAW	8.23	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	31	percent	Percentage of area covered by forest
PRECIP	39	inches	Mean Annual Precipitation
URBAN	20	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	4.9	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1167.3	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.5	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	3	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

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USGS SIR 2008-5102 (PA Stream Stats)
POI#8 Calculations

Peak Flow Statistics

Statistic	Value	Unit
PK2	623	ft3/s
PK5	1060	ft3/s
PK10	1400	ft3/s
PK50	2270	ft3/s
PK100	2690	ft3/s
PK500	3830	ft3/s

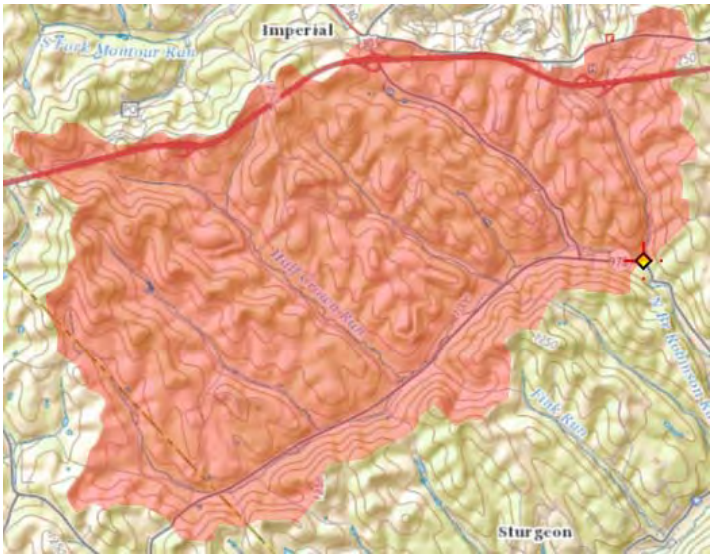


Basin Characteristics

Label	Value	Units	Definition
DRNAREA	12.4	square miles	Area that drains to a point on a stream
STRMTOT	20.36	miles	Total length of mapped streams in basin
STRDEN	1.64	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	7.9	degrees	Mean basin slope measured in degrees
CENTROIDX	-189641	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	160025.5	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-186105	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	158755	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.19295	degrees	Longitude of Basin Outlet
BSLOPDRAW	8.12	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	48	percent	Percentage of area covered by forest
PRECIP	37	inches	Mean Annual Precipitation
URBAN	10	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	4.8	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1125	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.5	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	4	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

NEWELL TERESKA & MACKAY ENGINEERING

USGS SIR 2008-5102 (PA Stream Stats)
POI#9 Calculations



Peak Flow Statistics

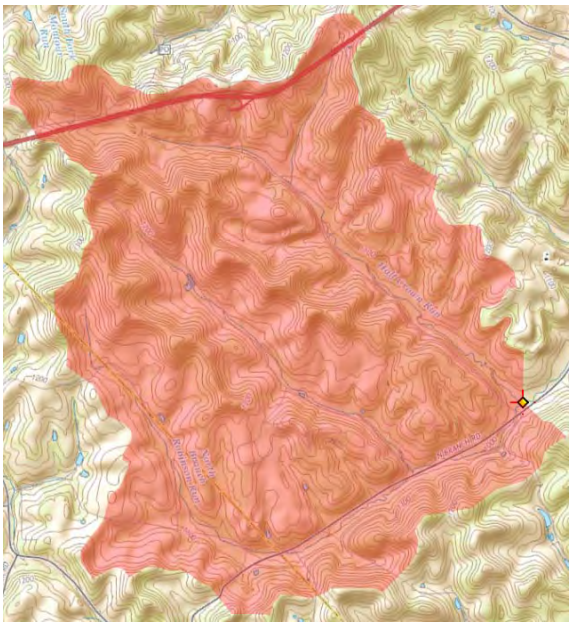
Statistic	Value	Unit
PK2	551	ft3/s
PK5	938	ft3/s
PK10	1240	ft3/s
PK50	2020	ft3/s
PK100	2400	ft3/s
PK500	3420	ft3/s

Basin Characteristics

Label	Value	Units	Definition
DRNAREA	10.7	square miles	Area that drains to a point on a stream
STRMTOT	17.18	miles	Total length of mapped streams in basin
STRDEN	1.6	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	7.8	degrees	Mean basin slope measured in degrees
CENTROIDX	-190205.3	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	159978.3	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-186855	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	159875	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.20212	degrees	Longitude of Basin Outlet
BSLOPDRAW	8	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	48	percent	Percentage of area covered by forest
PRECIP	37	inches	Mean Annual Precipitation
URBAN	10	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	4.8	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1130.4	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.5	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	4	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

NEWELL TERESKA & MACKAY ENGINEERING

USGS SIR 2008-5102 (PA Stream Stats)
POI#10 Calculations



Peak Flow Statistics

Statistic	Value	Unit
PK2	325	ft3/s
PK5	562	ft3/s
PK10	752	ft3/s
PK50	1240	ft3/s
PK100	1480	ft3/s
PK500	2120	ft3/s

Basin Characteristics

Label	Value	Units	Definition
DRNAREA	5.69	square miles	Area that drains to a point on a stream
STRMTOT	9.2	miles	Total length of mapped streams in basin
STRDEN	1.62	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	7.7	degrees	Mean basin slope measured in degrees
CENTROIDX	-191692.8	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	159282.6	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-189605	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	158615	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-80.23414	degrees	Longitude of Basin Outlet
BSLOPDRAW	7.89	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	50	percent	Percentage of area covered by forest
PRECIP	37	inches	Mean Annual Precipitation
URBAN	4	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	4.8	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1151.6	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.5	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	2	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

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TECHNICAL APPENDIX A.2

Regional Gage Analysis

NEWELL TERESKA & MACKAY ENGINEERING

USGS Stream Gages in Allegheny, Armstrong, Beaver, Butler, Washington, and Westmoreland Counties (1/3)

Agency	Site Number	Site Name	Drainage	Peak-flow data count
USGS	03031500	Allegheny River at Parker, PA	7671	83
USGS	03032500	Redbank Creek at St. Charles, PA	528	105
USGS	03035000	Mahoning Creek near Dayton, PA	321.00	24
USGS	03036000	Mahoning Creek at Mahoning Creek Dam, PA	344	60
USGS	03036500	Allegheny River at Kittanning, PA	8973	130
USGS	03038000	Crooked Creek at Idaho, PA	191	79
USGS	03039000	Crooked Creek at Crooked Creek Dam near Ford City	278	87
USGS	03041500	Conemaugh River at Seward, PA	715	77
USGS	03044810	Linn Run at Linn Run State Park near Rector, PA	8.0	8
USGS	03045000	Loyalhanna Creek at Kingston, PA	172	75
USGS	03045500	Loyalhanna Creek at New Alexandria, PA	265.00	20
USGS	03047000	Loyalhanna Creek at Loyalhanna Dam, PA	290	57
USGS	03047500	Kiskiminetas River at Avonmore, PA	1723.00	48
USGS	03048500	Kiskiminetas River at Vandergrift, PA	1825	78
USGS	03049000	Buffalo Creek near Freeport, PA	137	74
USGS	03049100	Little Buffalo Creek at Cabot, PA	4.66	22
USGS	03049500	Allegheny River at Natrona, PA	11410	77
USGS	03049646	Deer Creek near Dorseyville, PA	27.0	5

Highlighted gages were used in the regional analysis

USGS Stream Gages in Allegheny, Armstrong, Beaver, Butler, Washington, and Westmoreland Counties (2/3)

Agency	Site Number	Site Name	Drainage	Peak-flow data count
USGS	03049658	Plum Creek at Milltown, PA	17.4	2
USGS	03049800	Little Pine Creek near Etna, PA	5.78	52
USGS	03049807	Pine Creek at Grant Avenue at Etna, PA	57.3	8
USGS	03049819	Girtys Run above Grant Avenue at Millvale, PA	13.4	7
USGS	03072818	Daniels Run near West Zollarsville, PA	8.47	2
USGS	03075000	Monongahela River at Charleroi, PA	5213.00	45
USGS	03075070	Monongahela River at Elizabeth, PA	5340	37
USGS	03082020	Indian Creek near Jones Mills, PA	17.38	1
USGS	03083500	Youghiogheny River at Sutersville, PA	1715	94
USGS	03083600	Gillespie Run near Sutersville, PA	4.04	23
USGS	03084000	Abers Creek near Murrysville, PA	4.39	45
USGS	03084500	Turtle Creek at Trafford, PA.	55.90	38
USGS	03084698	Turtle Creek at Wilmerding, PA	123	10
USGS	03084800	Thompson Run at Turtle Creek, PA	18.0	10
USGS	03085000	Monongahela River at Braddock, PA	7337	67
USGS	03085049	Nine Mile Run near Swissvale, PA	5.31	1
USGS	03085213	Sawmill Run at Duquesne Heights nr Pittsburgh, PA	18.1	10
USGS	03085217	Chartiers Creek at Lagonda, PA	3.97	2

Highlighted gages were used in the regional analysis

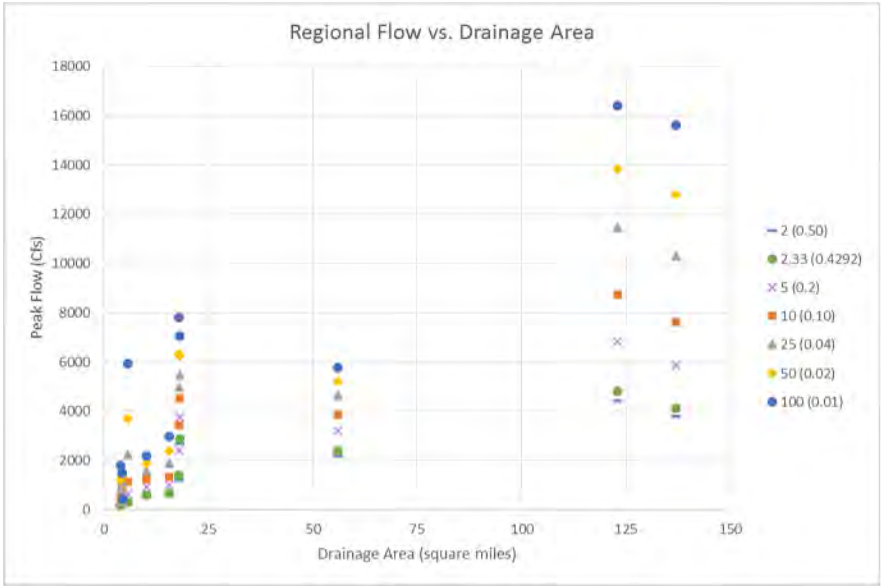
USGS Stream Gages in Allegheny, Armstrong, Beaver, Butler, Washington, and Westmoreland Counties (3/3)

Agency	Site Number	Site Name	Drainage	Peak-flow data count
USGS	03085219	Unn Trib 2 to Chartiers Creek at Lagonda, PA	0.37	2
USGS	03085500	Chartiers Creek at Carnegie, PA	257	93
USGS	03085550	Chartiers Creek at Crafton, PA	270.00	4
USGS	03085956	Montour Run at Scott Station near Imperial, PA	25.4	9
USGS	03086000	Ohio River at Sewickley, PA	19500	81
USGS	03086100	Big Sewickley Creek near Ambridge, PA	15.60	16
USGS	03106000	Connoquenessing Creek near Zelienople, PA	356	99
USGS	03106300	Muddy Creek near Portersville, PA	51.2	51
USGS	03107500	Beaver River at Beaver Falls, PA	3106	80
USGS	03108000	Raccoon Creek at Moffatts Mill, PA	178	90
USGS	03108500	Ohio River at Montgomery Lock & Dam, Lower Pool	22960	10
USGS	03111150	Brush Run near Buffalo, PA	10.30	21
USGS	03111585	Enlow Fork near West Finley, PA	38.10	6

Note: Gage 03106300 Muddy Creek near Portersville, PA, meets the criteria for inclusion in the gage analysis (drainage area <150 square miles and 10 or more years of recorded data, but flow at the gage is affected by upstream regulation and is; therefore, not applicable for this analysis.

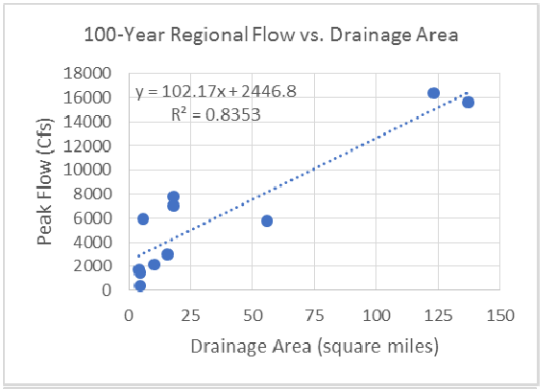
Highlighted gages were used in the regional analysis

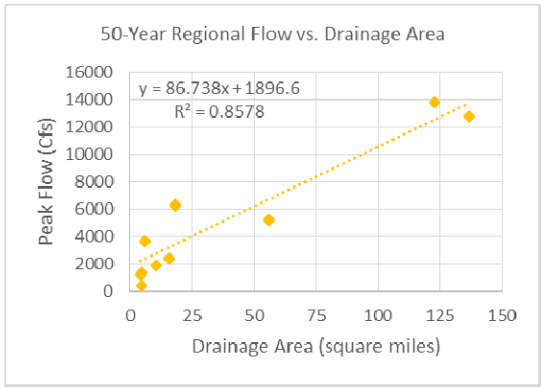
Regional Gage Analysis

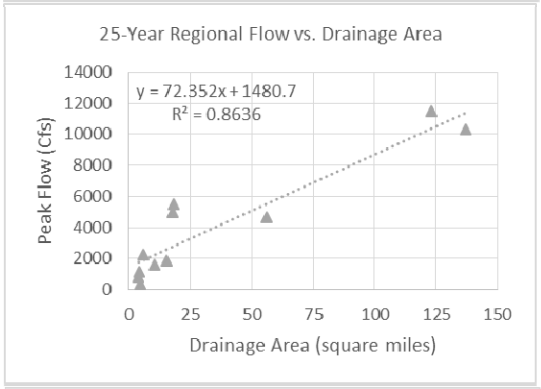


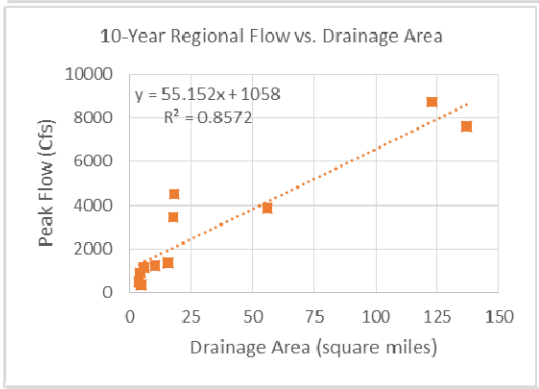
Gage #		3083600	3084000	3049100	3049800	3111150	3086100	3084800	3085213	3084500	3084698	3049000
Stream Name		Gillespie Run	Abers Creek	Little Buffalo Creek	Little Pine Creek	Brush Run	Big Sewickley Creek	Thompson Run	Sawmill Run	Turtle Creek	Turtle Creek	Buffalo Creek
Drainage Area		4.04	4.39	4.66	5.78	10.3	15.6	18	18.1	55.9	123	137
Years of Record Used		22	45	22	51	21	16	10	10	38	10	74
% Forest		66	44	32	64	27	76	17	7	60	52	67
% Urban		12	45	3	26	1	14	70	89	22	26	2
Slope		9.3	8.1	3.3	10.4	7.6	9.2	7.7	8.8	8.7	8.1	7.5
Systematic	2 (0.50)	166.1	427.6	260.2	267.4	543	604.1	1193	2691	2190	4405	3793
	2.33 (0.4292)	186.3	475.9	270.3	314.9	611.8	667	1386	2885	2382	4816	4132
	5 (0.2)	312.3	697.9	311.4	640.4	936.4	996.5	2399	3760	3207	6820	5864
	10 (0.10)	479.1	887.7	341.7	1127	1223	1339	3427	4505	3858	8719	7614
	25 (0.04)	818.5	1134	377	2245	1603	1886	4982	5489	4650	11480	10330
	50 (0.02)	1210	1320	401.6	3681	1897	2388	6322	6252	5216	13820	12770
	100 (0.01)	1775	1507	425	5940	2196	2983	7815	7041	5761	16410	15600
	500 (0.002)	4222	1948	476.3	17310	2913	4825	11920	9000	6972	23570	24140

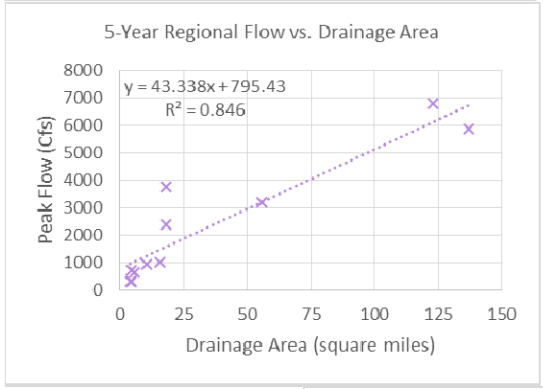
Regional Gage Analysis

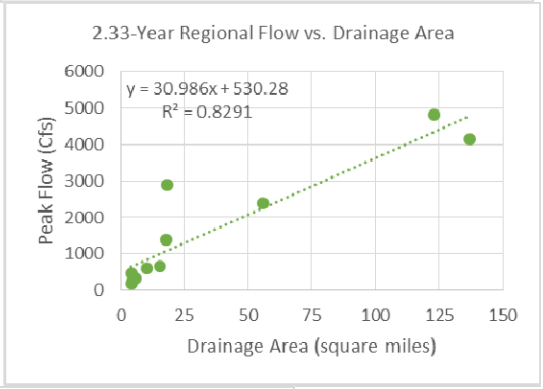


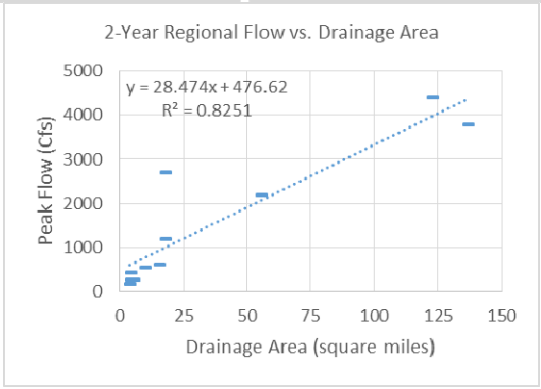












Program PeakFq U. S. GEOLOGICAL SURVEY Seq.000.000
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 12/17/2015 16:00

Station - 03049000 Buffalo Creek near Freeport, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	74
Peaks not used in analysis	=	0
Systematic peaks in analysis	=	74
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.070
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF162I-SYSTEMATIC PEAKS EXCEEDED HIGH-OUTLIER CRITERION. 1 16267.6
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 988.9

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.6032	0.2088	0.703
BULL.17B ESTIMATE	0.0	1.0000	3.6032	0.2088	0.526

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	1473.0	1591.0	1438.0	1223.0	1708.0
0.9900	1582.0	1685.0	1550.0	1326.0	1822.0
0.9500	1967.0	2024.0	1945.0	1694.0	2222.0
0.9000	2240.0	2271.0	2222.0	1958.0	2505.0
0.8000	2657.0	2656.0	2645.0	2364.0	2940.0
0.6667	3160.0	3131.0	3154.0	2850.0	3471.0
0.5000	3846.0	3793.0	3846.0	3502.0	4217.0
0.4292	4191.0	4132.0	4194.0	3822.0	4604.0
0.2000	5910.0	5864.0	5944.0	5348.0	6627.0
0.1000	7583.0	7614.0	7675.0	6752.0	8724.0
0.0400	10090.0	10330.0	10330.0	8763.0	12020.0
0.0200	12260.0	12770.0	12690.0	10450.0	15000.0
0.0100	14720.0	15600.0	15430.0	12320.0	18480.0
0.0050	17510.0	18910.0	18630.0	14380.0	22540.0
0.0020	21790.0	24140.0	23720.0	17470.0	28950.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1941	1880.0		1978	3980.0	
1942	3390.0		1979	3720.0	
1943	5610.0		1980	2540.0	
1944	2060.0		1981	2240.0	
1945	6210.0		1982	2290.0	
1946	3630.0		1983	4750.0	
1947	2180.0		1984	6060.0	
1948	4110.0		1985	5540.0	
1949	2960.0		1986	5100.0	
1950	3750.0		1987	4000.0	
1951	4760.0		1988	2800.0	
1952	7170.0		1989	3370.0	
1953	3920.0		1990	8540.0	
1954	3810.0		1991	8170.0	
1955	14000.0		1992	2110.0	
1956	7020.0		1993	2320.0	
1957	7020.0		1994	5210.0	
1958	3190.0		1995	2480.0	
1959	4590.0		1996	7800.0	
1960	4830.0		1997	3990.0	
1961	3290.0		1998	2970.0	
1962	4830.0		1999	2710.0	
1963	5230.0		2000	2500.0	
1964	7440.0		2001	2320.0	
1965	3130.0		2002	3020.0	
1966	5670.0		2003	2920.0	
1967	2320.0		2004	16700.0	
1968	3470.0		2005	7110.0	
1969	2930.0		2006	5520.0	
1970	3990.0		2007	2790.0	
1971	2150.0		2008	2930.0	
1972	9980.0		2009	1720.0	
1973	2800.0		2010	3480.0	
1974	3850.0		2011	5550.0	
1975	5660.0		2012	3530.0	
1976	2620.0		2013	11600.0	

1977 3170.0 2014 3880.0

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
  -8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 74

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03049000 USGS Buffalo Creek near Freeport,

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.000.000
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 12/07/2015 15:37

Station - 03049100 Little Buffalo Creek at Cabot, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	22
Peaks not used in analysis	=	0
Systematic peaks in analysis	=	22
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.053
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 154.2
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 437.7

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	2.4146	0.0933	-0.046
BULL.17B ESTIMATE	0.0	1.0000	2.4146	0.0933	-0.003

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	149.3	148.0	139.4	121.3	170.2
0.9900	157.5	156.5	149.3	130.2	178.0
0.9500	182.4	181.9	178.0	157.4	201.5
0.9000	197.3	197.0	194.2	173.8	215.6
0.8000	216.8	216.9	215.1	195.3	234.8
0.6667	236.9	237.1	236.1	216.9	255.4
0.5000	259.8	260.2	259.8	240.4	280.9
0.4292	270.0	270.3	270.3	250.2	292.8
0.2000	311.3	311.4	313.7	287.5	345.6
0.1000	342.1	341.7	347.4	313.0	388.4
0.0400	378.3	377.0	389.1	341.5	441.4
0.0200	403.7	401.6	420.1	360.8	480.0
0.0100	428.0	425.0	451.4	378.9	517.9
0.0050	451.5	447.5	483.5	396.1	555.3
0.0020	481.7	476.3	527.7	417.8	604.6

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1959	297.0		1970	217.0	
1960	278.0		1971	180.0	
1961	323.0		1972	404.0	
1962	326.0		1973	282.0	
1963	199.0		1974	229.0	
1964	302.0		1975	298.0	
1965	221.0		1976	195.0	
1966	320.0		1977	230.0	
1967	201.0		1978	284.0	
1968	199.0		1979	296.0	
1969	301.0		1980	259.0	

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
-8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 22

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)

(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03049100   USGS Little Buffalo Creek at Cabot

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

Program PeakFq Ver. 5.2 11/01/2007 — U. S. GEOLOGICAL SURVEY, Annual peak flow frequency analysis following Bulletin 17-B Guidelines — Seq.000.000, Run Date / Time 12/29/2015 13:24

Station - 03049800 Little Pine Creek near Etna, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	52
Peaks not used in analysis	=	1
Systematic peaks in analysis	=	51
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.062
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

**WCF109W-PEAKS WITH MINUS-FLAGGED DISCHARGES WERE BYPASSED. 1
**WCF113W-NUMBER OF SYSTEMATIC PEAKS HAS BEEN REDUCED TO NSYS = 51
WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF162I-SYSTEMATIC PEAKS EXCEEDED HIGH-OUTLIER CRITERION. 1 4357.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 23.2
WCF002J-CALCS COMPLETED. RETURN CODE = 2

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE	LOGARITHMIC		
	EXCEEDANCE		STANDARD	
	DISCHARGE PROBABILITY	MEAN	DEVIATION	SKEW
SYSTEMATIC RECORD	0.0 1.0000	2.5025	0.4096	1.127
BULL.17B ESTIMATE	0.0 1.0000	2.5025	0.4096	0.668

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	'EXPECTED SYSTEMATIC PROBABILITY' RECORD	EXPECTED ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	50.3	73.1	47.5	32.6	70.0
0.9900	56.6	77.3	53.9	37.4	77.8
0.9500	82.2	96.0	79.9	57.6	108.8
0.9000	103.6	112.5	101.6	75.1	134.3
0.8000	141.7	143.1	140.1	106.9	179.6
0.6667	196.3	188.6	195.3	153.1	245.0
0.5000	286.6	267.4	286.6	229.1	356.4
0.4292	339.0	314.9	339.7	272.4	423.4
0.2000	672.0	640.4	683.5	532.2	884.6
0.1000	1117.0	1127.0	1158.0	851.6	1570.0
0.0400	2016.0	2245.0	2165.0	1448.0	3110.0
0.0200	3035.0	3681.0	3374.0	2080.0	5020.0
0.0100	4468.0	5940.0	5179.0	2922.0	7914.0
0.0050	6467.0	9473.0	7871.0	4037.0	12250.0
0.0020	10330.0	17310.0	13570.0	6073.0	21340.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1963	360.0		1989	193.0	
1964	284.0		1990	-240.0	G
1965	185.0		1991	149.0	
1966	320.0		1992	1430.0	
1967	160.0		1993	257.0	
1968	160.0		1994	228.0	
1969	62.0		1995	477.0	
1970	187.0		1996	519.0	
1971	248.0		1997	222.0	
1972	357.0		1998	408.0	
1973	314.0		1999	174.0	
1974	2040.0		2000	169.0	
1975	960.0		2001	230.0	
1976	89.0		2002	164.0	
1977	315.0		2003	216.0	
1978	233.0		2004	3700.0	
1979	426.0		2005	580.0	
1980	84.0		2006	206.0	
1981	74.0		2007	1020.0	
1982	305.0		2008	360.0	
1983	361.0		2009	238.0	
1984	135.0		2010	531.0	
1985	240.0		2011	1070.0	
1986	7190.0		2012	261.0	
1987	1380.0		2013	329.0	
1988	78.0		2014	372.0	

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization

```
          H        7    Historic peak

          -  Minus-flagged discharge -- Not used in computation
                -8888.0 -- No discharge value given
          -  Minus-flagged water year -- Historic peak used in computation

 End PeakFQ analysis.
   Stations processed :       1
   Number of errors   :       0
   Stations skipped   :       0
   Station years      :      52


Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4,  or *.)
(2, 4, and * records are ignored.)

 For the station below, the following records were ignored:

 FINISHED PROCESSING STATION:  03049800       USGS Little Pine Creek near Etna,


 For the station below, the following records were ignored:

 FINISHED PROCESSING STATION:
```

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.000.000
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 02/11/2016 13:19

Station - 03083600 Gillespie Run near Sutersville, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	23
Peaks not used in analysis	=	1
Systematic peaks in analysis	=	22
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.120
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

**WCF109W-PEAKS WITH MINUS-FLAGGED DISCHARGES WERE BYPASSED. 1
**WCF113W-NUMBER OF SYSTEMATIC PEAKS HAS BEEN REDUCED TO NSYS = 22
WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF162I-SYSTEMATIC PEAKS EXCEEDED HIGH-OUTLIER CRITERION. 1 1005.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 37.2
WCF002J-CALCS COMPLETED. RETURN CODE = 2

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE	LOGARITHMIC		
	EXCEEDANCE		STANDARD	
	DISCHARGE PROBABILITY	MEAN	DEVIATION	SKEW
SYSTEMATIC RECORD	0.0 1.0000	2.2865	0.2946	1.393
BULL.17B ESTIMATE	0.0 1.0000	2.2865	0.2946	0.599

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	49.2	77.1	44.1	28.7	69.9
0.9900	54.0	78.8	49.2	32.3	75.6
0.9500	71.9	87.4	68.3	46.7	96.7
0.9000	85.7	95.3	82.7	58.2	112.7
0.8000	108.1	109.9	106.0	77.6	139.2
0.6667	137.4	131.2	136.1	103.2	174.5
0.5000	180.8	166.1	180.8	140.6	230.3
0.4292	204.1	186.3	204.9	160.1	262.1
0.2000	332.7	312.3	342.4	259.3	460.1
0.1000	476.4	479.1	506.3	358.3	717.0
0.0400	720.7	818.5	813.6	511.5	1217.0
0.0200	958.4	1210.0	1149.0	649.6	1763.0
0.0100	1254.0	1775.0	1617.0	811.4	2505.0
0.0050	1619.0	2586.0	2279.0	1001.0	3507.0
0.0020	2236.0	4222.0	3615.0	1304.0	5374.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1959	259.0		1971	195.0	
1960	318.0		1972	586.0	
1961	163.0		1973	139.0	
1962	179.0		1974	65.0	
1963	289.0		1975	1520.0	
1964	122.0		1976	138.0	
1965	-8888.0		1977	165.0	
1966	163.0		1978	120.0	
1967	93.0		1979	233.0	
1968	96.0		1980	175.0	
1969	394.0		1981	185.0	
1970	128.0				

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

\- Minus-flagged discharge -- Not used in computation
-8888.0 -- No discharge value given
\- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 23

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)

(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03083600   USGS Gillespie Run near Sutersvill

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.000.000
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 11/17/2015 13:22

Station - 03084000 Abers Creek near Murrysville, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	45
Peaks not used in analysis	=	0
Systematic peaks in analysis	=	45
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.107
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 79.1
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 2182.9

Station - 03084000 Abers Creek near Murrysville, PA

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	2.6186	0.2642	-0.281
BULL.17B ESTIMATE	0.0	1.0000	2.6186	0.2642	-0.162

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	79.1	73.9	71.4	53.6	105.0
0.9900	93.9	89.2	86.8	65.8	122.0
0.9500	148.7	145.9	143.4	113.2	182.9
0.9000	188.7	187.6	184.6	149.5	226.7
0.8000	250.4	251.6	247.6	206.4	294.2
0.6667	324.2	327.6	322.7	274.6	376.7
0.5000	422.5	427.6	422.5	363.2	491.8
0.4292	470.6	475.9	471.3	405.3	550.6
0.2000	696.3	697.9	703.4	592.4	845.7
0.1000	895.9	887.7	913.4	747.4	1128.0
0.0400	1164.0	1134.0	1204.0	946.1	1530.0
0.0200	1374.0	1320.0	1440.0	1096.0	1858.0
0.0100	1591.0	1507.0	1691.0	1247.0	2210.0
0.0050	1815.0	1696.0	1960.0	1399.0	2585.0
0.0020	2124.0	1948.0	2346.0	1605.0	3117.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1949	135.0		1972	720.0	
1950	1600.0		1973	373.0	
1951	490.0		1974	640.0	
1952	1000.0		1975	317.0	
1953	308.0		1976	1230.0	
1954	226.0		1977	602.0	
1955	950.0		1978	508.0	
1956	500.0		1979	399.0	
1957	322.0		1980	806.0	
1958	320.0		1981	422.0	
1959	1100.0		1982	210.0	
1960	108.0		1983	498.0	
1961	310.0		1984	212.0	
1962	590.0		1985	500.0	
1963	569.0		1986	396.0	
1964	449.0		1987	439.0	
1965	160.0		1988	103.0	
1966	711.0		1989	302.0	
1967	156.0		1990	371.0	
1968	608.0		1991	479.0	
1969	449.0		1992	436.0	
1970	528.0		1993	391.0	
1971	267.0				

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
-8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

```
 End PeakFQ analysis.
   Stations processed :       1
   Number of errors   :       0
   Stations skipped   :       0
   Station years      :      45

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4,  or *.)
(2, 4, and * records are ignored.)

 For the station below, the following records were ignored:

 FINISHED PROCESSING STATION:  03084000       USGS Abers Creek near Murrysville,


 For the station below, the following records were ignored:

 FINISHED PROCESSING STATION:
```

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.000.000
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 12/07/2015 15:47

Station - 03084500 Turtle Creek at Trafford, PA.

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	38
Peaks not used in analysis	=	1
Systematic peaks in analysis	=	37
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.108
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

**WCF109W-PEAKS WITH MINUS-FLAGGED DISCHARGES WERE BYPASSED. 1
**WCF113W-NUMBER OF SYSTEMATIC PEAKS HAS BEEN REDUCED TO NSYS = 37
WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 601.1
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 7566.7
WCF002J-CALCS COMPLETED. RETURN CODE = 2

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	EXCEEDANCE			STANDARD	
	DISCHARGE	PROBABILITY	MEAN	DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.3289	0.2075	-0.333
BULL.17B ESTIMATE	0.0	1.0000	3.3289	0.2075	-0.179

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	'EXPECTED SYSTEMATIC RECORD	PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	574.9	536.8	520.0	406.6	733.7
0.9900	659.2	625.2	610.2	480.3	825.4
0.9500	949.1	931.2	916.5	745.7	1134.0
0.9000	1146.0	1139.0	1122.0	932.9	1342.0
0.8000	1433.0	1440.0	1418.0	1209.0	1646.0
0.6667	1757.0	1776.0	1749.0	1520.0	2000.0
0.5000	2163.0	2190.0	2163.0	1897.0	2469.0
0.4292	2354.0	2382.0	2358.0	2069.0	2700.0
0.2000	3200.0	3207.0	3231.0	2784.0	3796.0
0.1000	3896.0	3858.0	3968.0	3335.0	4771.0
0.0400	4777.0	4650.0	4934.0	4000.0	6077.0
0.0200	5433.0	5216.0	5680.0	4478.0	7091.0
0.0100	6086.0	5761.0	6450.0	4943.0	8133.0
0.0050	6740.0	6291.0	7250.0	5400.0	9204.0
0.0020	7611.0	6972.0	8364.0	5996.0	10670.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1917	1530.0		1936	3700.0	
1918	1590.0		1937	2510.0	
1919	3280.0		1938	1530.0	
1920	2930.0		1939	1360.0	
1921	860.0		1940	2380.0	
1922	1710.0		1941	2110.0	
1923	1950.0		1942	2570.0	
1924	2650.0		1943	4040.0	
1925	800.0		1944	1260.0	
1926	2090.0		1945	2480.0	
1927	1830.0		1946	5200.0	
1928	2790.0		1947	1520.0	
1929	3070.0		1948	2580.0	
1930	1830.0		1949	1040.0	
1931	2090.0		1950	4430.0	
1932	1090.0		1951	3140.0	
1933	4420.0		1952	2670.0	
1934	2510.0		1953	860.0	
1935	3220.0		1955	-7360.0	H

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
-8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.

```
   Stations processed :       1
   Number of errors   :       0
   Stations skipped   :       0
   Station years      :      38
```

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03084500   USGS Turtle Creek at Trafford, PA.

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

Program PeakFq — U. S. GEOLOGICAL SURVEY — Seq.000.000
Ver. 5.2 — Annual peak flow frequency analysis — Run Date / Time
11/01/2007 — following Bulletin 17-B Guidelines — 11/17/2015 13:42

Station - 03084698 Turtle Creek at Wilmerding, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	10
Peaks not used in analysis	=	0
Systematic peaks in analysis	=	10
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.100
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 1648.5
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 12487.2

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.6568	0.2160	0.357
BULL.17B ESTIMATE	0.0	1.0000	3.6568	0.2160	0.197

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	1382.0	1489.0	988.1	607.8	2062.0
0.9900	1534.0	1628.0	1181.0	716.8	2237.0
0.9500	2061.0	2113.0	1824.0	1135.0	2829.0
0.9000	2426.0	2452.0	2248.0	1455.0	3242.0
0.8000	2973.0	2967.0	2858.0	1963.0	3879.0
0.6667	3615.0	3580.0	3554.0	2575.0	4684.0
0.5000	4464.0	4405.0	4464.0	3361.0	5894.0
0.4292	4880.0	4816.0	4913.0	3726.0	6557.0
0.2000	6857.0	6820.0	7170.0	5261.0	10350.0
0.1000	8663.0	8719.0	9495.0	6464.0	14600.0
0.0400	11200.0	11480.0	13390.0	7978.0	21630.0
0.0200	13270.0	13820.0	17290.0	9122.0	28210.0
0.0100	15500.0	16410.0	22450.0	10290.0	36050.0
0.0050	17900.0	19280.0	29450.0	11490.0	45350.0
0.0020	21390.0	23570.0	43150.0	13140.0	60240.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
2005	8430.0		2010	2590.0	
2006	2790.0		2011	4280.0	
2007	6180.0		2012	2680.0	
2008	4390.0		2013	6350.0	
2009	10100.0		2014	3040.0	

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
  -8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 10

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03084698 USGS Turtle Creek at Wilmerding, P

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

Program PeakFq — U. S. GEOLOGICAL SURVEY — Seq.000.000
Ver. 5.2 — Annual peak flow frequency analysis — Run Date / Time
11/01/2007 — following Bulletin 17-B Guidelines — 12/17/2015 13:24

Station - 03084800 Thompson Run at Turtle Creek, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	10
Peaks not used in analysis	=	0
Systematic peaks in analysis	=	10
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.095
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 211.1
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 6540.0

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.0700	0.3662	-0.107
BULL.17B ESTIMATE	0.0	1.0000	3.0700	0.3662	0.016

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	135.6	123.0	68.0	31.0	276.5
0.9900	166.9	154.7	98.6	43.1	324.4
0.9500	294.7	286.3	233.6	104.7	508.6
0.9000	399.4	395.1	346.6	166.3	654.4
0.8000	577.5	580.6	537.8	286.3	905.8
0.6667	815.5	827.3	791.3	461.7	1266.0
0.5000	1172.0	1193.0	1172.0	728.0	1886.0
0.4292	1363.0	1386.0	1379.0	864.9	2262.0
0.2000	2387.0	2399.0	2565.0	1522.0	4812.0
0.1000	3467.0	3427.0	4003.0	2115.0	8335.0
0.0400	5166.0	4982.0	6778.0	2937.0	15340.0
0.0200	6687.0	6322.0	9925.0	3606.0	22950.0
0.0100	8439.0	7815.0	14510.0	4323.0	33110.0
0.0050	10440.0	9471.0	21330.0	5093.0	46410.0
0.0020	13530.0	11920.0	36160.0	6201.0	70090.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
2005	1030.0		2010	1470.0	
2006	260.0		2011	2160.0	
2007	1640.0		2012	862.0	
2008	469.0		2013	1980.0	
2009	5280.0		2014	851.0	

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
  -8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 10

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03084800 USGS Thompson Run at Turtle Creek,

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.000.000
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 12/18/2015 09:44
Station - 03085213 Sawmill Run at Duquesne Heights nr Pittsburgh, P

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	10
Peaks not used in analysis	=	0
Systematic peaks in analysis	=	10
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.061
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 1232.2
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 6002.8

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.4345	0.1689	0.164
BULL.17B ESTIMATE	0.0	1.0000	3.4345	0.1689	0.100

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	1036.0	1061.0	773.8	534.1	1429.0
0.9900	1133.0	1154.0	904.8	614.9	1531.0
0.9500	1451.0	1462.0	1311.0	904.7	1863.0
0.9000	1660.0	1665.0	1559.0	1110.0	2083.0
0.8000	1957.0	1955.0	1896.0	1415.0	2409.0
0.6667	2288.0	2281.0	2257.0	1758.0	2802.0
0.5000	2702.0	2691.0	2702.0	2167.0	3361.0
0.4292	2897.0	2885.0	2912.0	2348.0	3655.0
0.2000	3765.0	3760.0	3895.0	3060.0	5198.0
0.1000	4495.0	4505.0	4815.0	3576.0	6747.0
0.0400	5444.0	5489.0	6212.0	4187.0	9050.0
0.0200	6171.0	6252.0	7490.0	4624.0	11010.0
0.0100	6915.0	7041.0	9044.0	5052.0	13170.0
0.0050	7681.0	7861.0	10980.0	5476.0	15560.0
0.0020	8734.0	9000.0	14360.0	6036.0	19100.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
2005	1930.0		2010	4300.0	
2006	2390.0		2011	1620.0	
2007	1920.0		2012	4110.0	
2008	1950.0		2013	4600.0	
2009	2750.0		2014	3540.0	

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
  -8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 10

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03085213 USGS Sawmill Run at Duquesne Heigh

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

1

Program PeakFq — U. S. GEOLOGICAL SURVEY — Seq.000.000
Ver. 5.2 — Annual peak flow frequency analysis — Run Date / Time
11/01/2007 — following Bulletin 17-B Guidelines — 11/17/2015 13:57
Station - 03086100 Big Sewickley Creek near Ambridge, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	16
Peaks not used in analysis	=	0
Systematic peaks in analysis	=	16
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.024
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF162I-SYSTEMATIC PEAKS EXCEEDED HIGH-OUTLIER CRITERION. 1 2270.6
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 180.2

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	2.8059	0.2414	0.622
BULL.17B ESTIMATE	0.0	1.0000	2.8059	0.2414	0.296

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	178.3	210.8	147.6	96.7	255.1
0.9900	198.2	226.9	170.5	112.0	278.2
0.9500	269.2	285.6	249.7	170.2	358.8
0.9000	320.0	328.9	304.9	214.5	416.1
0.8000	398.2	397.2	388.0	285.3	505.8
0.6667	492.8	482.6	487.2	372.3	619.6
0.5000	622.4	604.1	622.4	488.3	789.0
0.4292	687.6	667.0	690.8	544.3	881.2
0.2000	1011.0	996.5	1043.0	797.1	1405.0
0.1000	1324.0	1339.0	1411.0	1014.0	1998.0
0.0400	1787.0	1886.0	2019.0	1306.0	2997.0
0.0200	2183.0	2388.0	2612.0	1540.0	3949.0
0.0100	2627.0	2983.0	3368.0	1789.0	5105.0
0.0050	3123.0	3689.0	4345.0	2055.0	6499.0
0.0020	3870.0	4825.0	6121.0	2437.0	8781.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1963	990.0		1971	485.0	
1964	868.0		1972	800.0	
1965	485.0		1973	287.0	
1966	810.0		1974	844.0	
1967	527.0		1975	2540.0	
1968	476.0		1976	788.0	
1969	302.0		1977	300.0	
1970	574.0		1978	948.0	

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
  -8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 16

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03086100 USGS Big Sewickley Creek near Ambr

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

Program PeakFq — U. S. GEOLOGICAL SURVEY — Seq.000.000
Ver. 5.2 — Annual peak flow frequency analysis — Run Date / Time
11/01/2007 — following Bulletin 17-B Guidelines — 12/07/2015 15:49
Station - 03111150 Brush Run near Buffalo, PA

I N P U T D A T A S U M M A R Y

Number of peaks in record	=	21
Peaks not used in analysis	=	0
Systematic peaks in analysis	=	21
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.048
Standard error	=	0.550
Mean Square error	=	0.303
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

********* NOTICE -- Preliminary machine computations. *********
********* User responsible for assessment and interpretation. *********
WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE. 0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION. 102.7
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 2687.1

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	2.7205	0.2944	-0.292
BULL.17B ESTIMATE	0.0	1.0000	2.7205	0.2944	-0.135

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	84.1	76.2	65.1	41.7	130.2
0.9900	101.5	94.0	83.4	53.4	152.1
0.9500	168.0	163.3	153.8	103.0	232.0
0.9000	218.4	216.4	206.9	144.2	291.2
0.8000	298.4	300.5	290.5	212.8	385.6
0.6667	397.3	403.5	392.9	299.1	506.9
0.5000	533.4	543.0	533.4	415.0	687.1
0.4292	601.6	611.8	604.2	470.9	784.0
0.2000	933.1	936.4	956.7	721.7	1312.0
0.1000	1239.0	1223.0	1300.0	931.7	1867.0
0.0400	1667.0	1603.0	1816.0	1204.0	2728.0
0.0200	2011.0	1897.0	2267.0	1412.0	3482.0
0.0100	2376.0	2196.0	2783.0	1623.0	4331.0
0.0050	2763.0	2500.0	3377.0	1840.0	5280.0
0.0020	3308.0	2913.0	4305.0	2134.0	6699.0

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1961	966.0		1972	581.0	
1962	1010.0		1973	233.0	
1963	1110.0		1974	268.0	
1964	508.0		1975	790.0	
1965	182.0		1976	792.0	
1966	1180.0		1977	834.0	
1967	253.0		1978	1700.0	
1968	290.0		1983	502.0	
1969	829.0		1984	138.0	
1970	397.0		1985	473.0	
1971	448.0				

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
-8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 21

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03111150 USGS Brush Run near Buffalo, PA

For the station below, the following records were ignored:

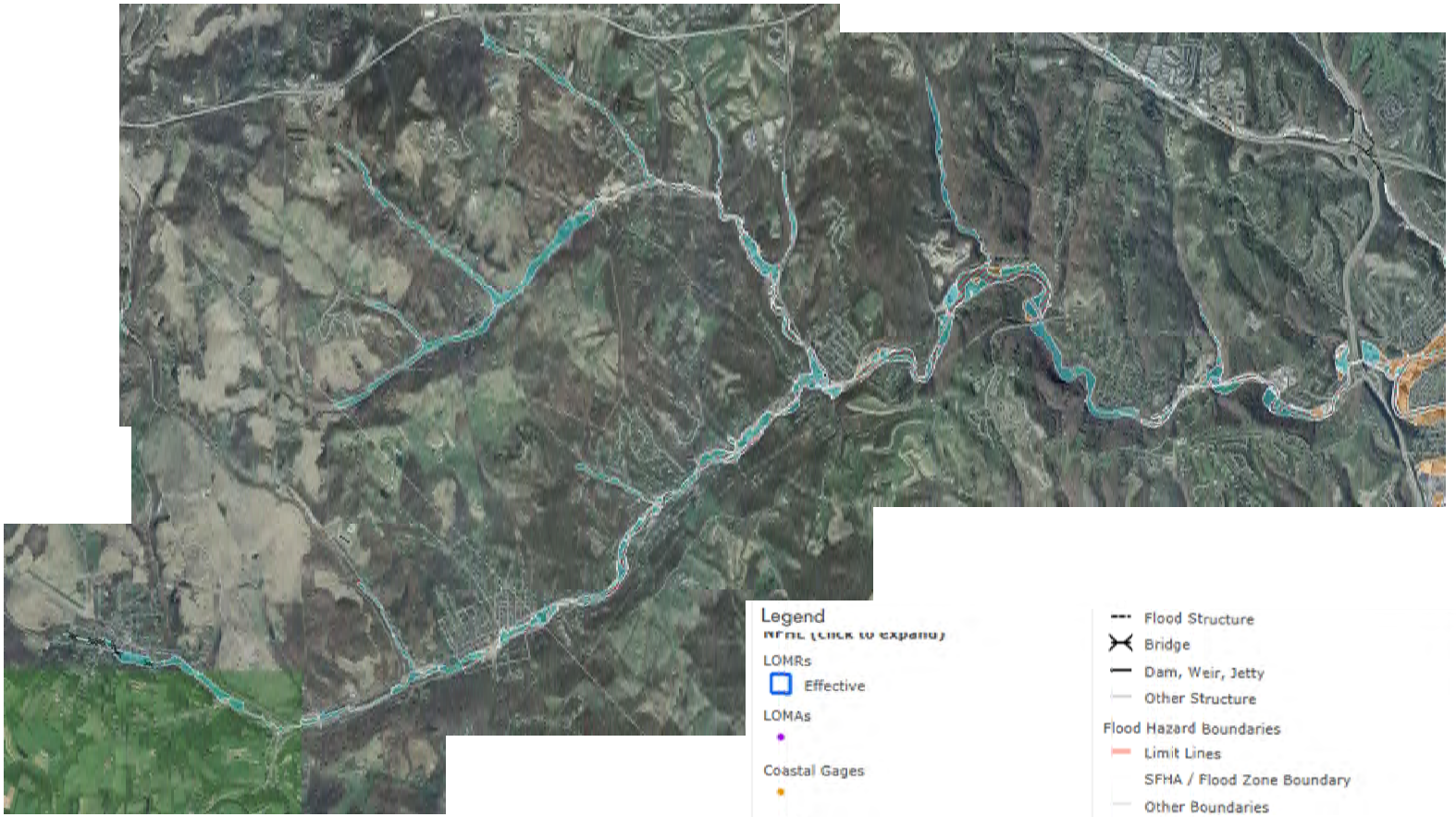
FINISHED PROCESSING STATION:

TECHNICAL APPENDIX B.2

FEMA FIS Information

NEWELL TERESKA & MACKAY ENGINEERING

FEMA National Flood Hazard Layer –Robinson Run Watershed



FEMA FIS Peak Flows

TABLE 6- SUMMARY OF DISCHARGES – (continued)

	FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding: 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
	ROBINSON RUN					
POI1	At confluence with Chartiers Creek	40.00	3,350	6,100	7,500	11,500
POI2	At confluence of Scotts Run	37.60	3,100	5,600	7,000	10,800
	Approximately 0.2 mile downstream of confluence of Pinkertons Run	33.90	2,900	5,100	6,300	9,900
POI3	At confluence of Pinkertons Run	30.30	2,600	4,700	5,800	8,800
	Above confluence of Fink Run	13.80	1,350	2,370	2,900	4,330
	ROBINSON RUN (continued)					
	Above confluence with unnamed tributary at Sturgeon Road	11.20	1,170	2,050	2,500	3,750
	At downstream Borough of McDonald corporate limits	10.40	1,170	2,050	2,500	3,750
	NORTH BRANCH ROBINSON RUN					
POI8	At Township of North Fayette downstream corporate limits	12.9	1,170	2,200	2,700	4,200

Robinson Run Watershed

TECHNICAL APPENDIX B.3

HEC-HMS Model Calibration

Allegheny County
PennDOT District 11-0

NEWELL TERESKA & MACKAY ENGINEERING

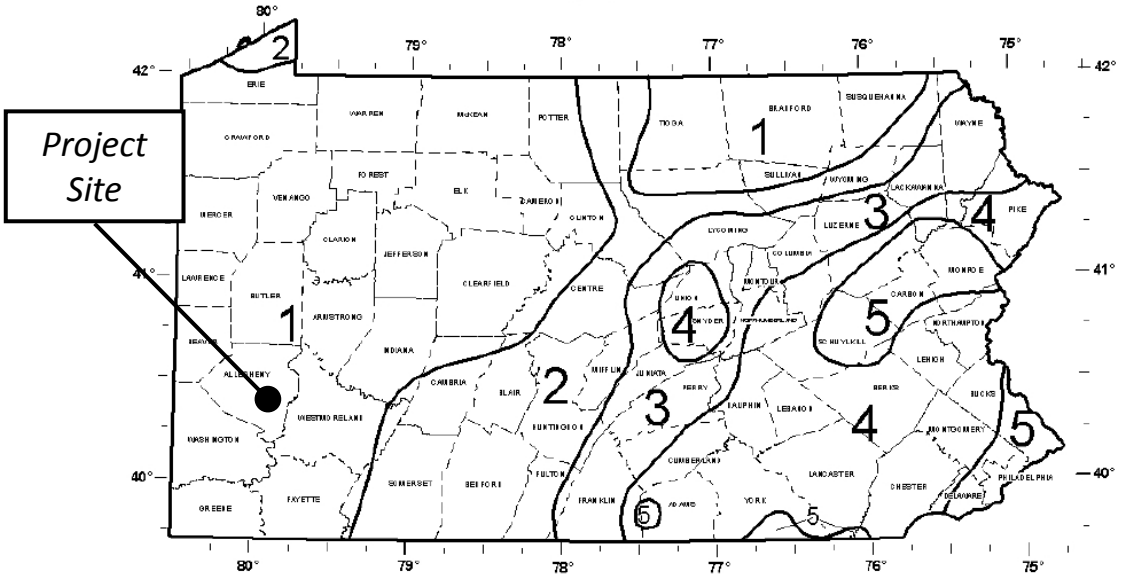
PDT-IDF Curves

24-Hour Precipitation Depths

Table 7A.1 Appropriate Rainfall Region Map for each Storm Duration and Frequency

	Frequency							
Duration	**1 year**	**2 year**	**5 year**	**10 year**	**25 year**	**50 year**	**100 year**	**500 year**
5 min	C	C	C	C	B	B	B	-
10 min	C	C	C	C	C	C	C	-
15 min	A	A	A	A	C	C	C	-
30 min	A	A	A	A	A	C	C	-
60 min	A	A	A	A	A	C	C	-
2 hr	E	E	E	E	E	E	E	-
3 hr	E	E	E	E	E	E	E	-
6 hr	D	D	D	D	D	D	D	-
12 hr	F	F	F	F	F	F	F	-
24 hr	F	F	F	F	F	F	F	F

MAP F

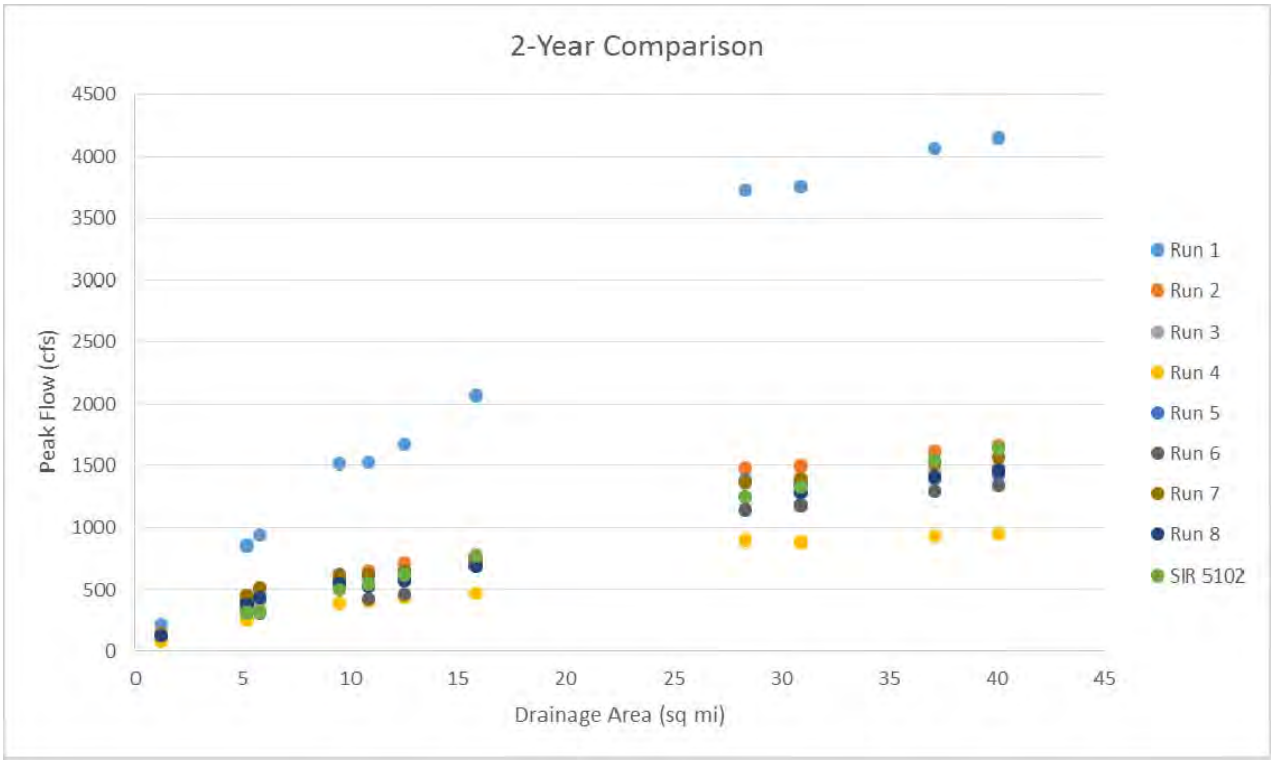


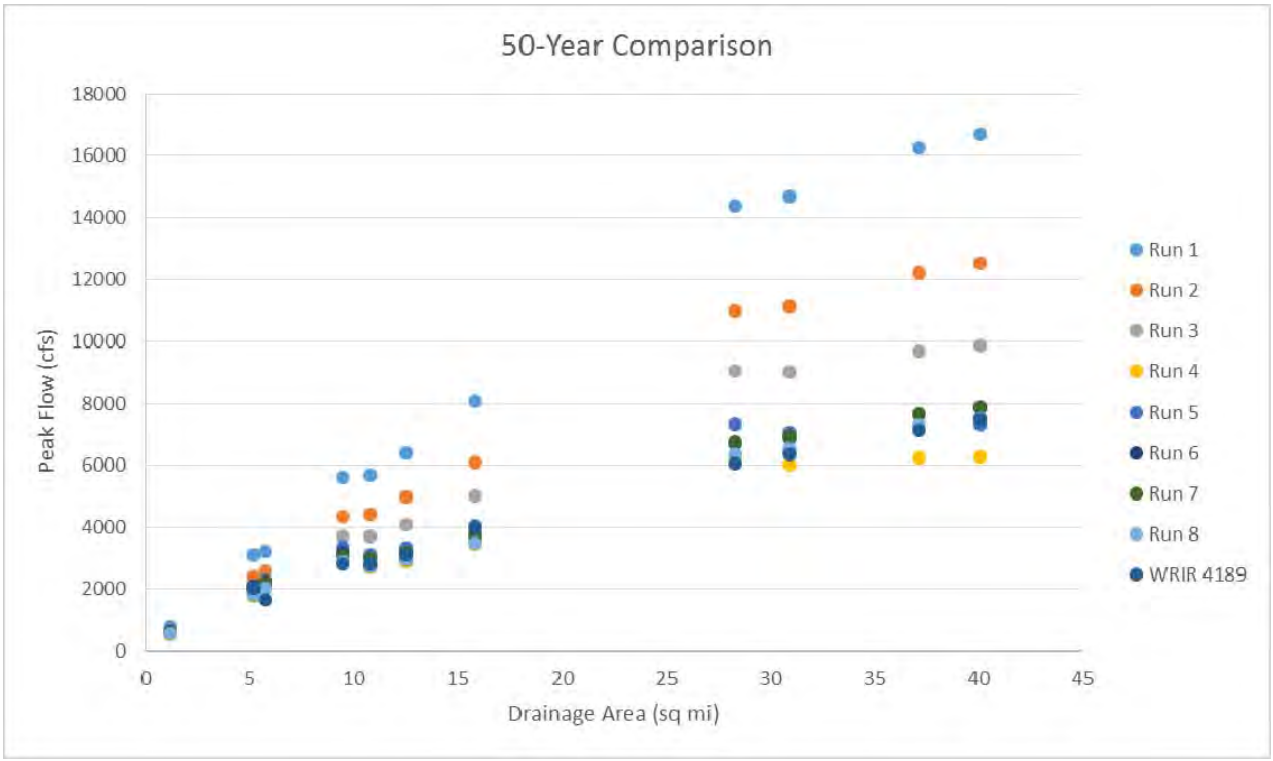
Region 4								
Rainfall Total								
	1-Yr Storm	2-Yr Storm	5-Yr Storm	10-Yr Storm	25-Yr Storm	50-Yr Storm	100-Yr Storm	500-Yr Storm
Duration (Min)	in	in	in	in	in	in	in	in
5	0.35	0.42	0.49	0.55	0.63	0.70	0.77	
10	0.54	0.65	0.76	0.85	0.97	1.07	1.16	
15	0.67	0.79	0.94	1.05	1.21	1.32	1.44	
30	0.88	1.07	1.29	1.47	1.71	1.90	2.09	
60	1.09	1.32	1.65	1.90	2.23	2.51	2.80	
120	1.29	1.57	1.96	2.28	2.72	3.09	3.58	
180	1.42	1.72	2.16	2.51	3.01	3.45	3.98	
360	1.77	2.14	2.70	3.15	3.80	4.33	4.89	
720	2.20	2.65	3.29	3.87	4.74	5.46	6.26	
1440	2.64	3.16	3.91	4.57	5.60	6.53	7.63	10.98

Calibration Target Flows

Robinson Run Flows									
Method		SIR 5102					WRIR 4189		
POI\Event	Drainage Area (sq mi)	1	2	2.33	5	10	25	50	100
1	39.9	710.635	1640	1770.762	2710	3530	6142	7477	8974
2	37.4	660.2	1550	1669.575	2560	3340	5849	7127	8562
3	31	556.815	1330	1430.005	2200	2870	5184	6351	7671
4	28.9	515.1	1250	1343.053	2070	2710	4951	6074	7346
5	16	286.44	768	823.7694	1290	1710	3229	3976	4826
6	9.59	170.36	499	534.4471	851	1130	2257	2803	3431
7	5.4	91.958	310	329.96	536	716	1,611	2,023	2,503
8	12.4	221.34	623	668.4575	1060	1400	2491	3122	3854
9	10.7	188.75	551	588.7442	938	1240	2229	2799	3462
10	5.69	95.93	325	345.994	562	752	1307	1672	2105

Calibration Results





Run Parameters (Run 1)

Robinson Run HEC-HMS Parameters (Run 1)										
Subbasin	Drainage Area (mi^2)	Initial Abstraction (in)	Curve Number	Lag Time (min)	Reach	Length (ft)	Slope (ft/ft)	Manning's n	Shape	Width (ft)
W980	1.2063		78.557	56.461	R440	3192.3	0.007108	0.045	Trapezoid	5
W950	1.4259		78.461	64.597	R470	2494	0.004018	0.045	Trapezoid	5
W1050	0.91902		79.256	53.849	R510	3057.4	0.004141	0.045	Trapezoid	5
W1060	0.75487		76.526	42.932	R520	1759.2	0.008822	0.045	Trapezoid	5
W2300	0.48357		79.643	39.79	R490	5801.3	0.012496	0.045	Trapezoid	5
W2290	0.30495		79.151	36.915	R500	5310.6	0.004453	0.045	Trapezoid	5
W2270	0.10625		82.463	29.912	R450	8052.8	0.010313	0.045	Trapezoid	5
W2350	0.75336		79.637	45.411	R460	4763.1	0.003351	0.045	Trapezoid	5
W2340	0.90628		78.387	69.002	R390	5824.6	0.01122	0.045	Trapezoid	5
W1020	0.80034		77.301	61.661	R400	10575	0.003292	0.045	Trapezoid	5
W2400	0.54205		80.375	48.761	R370	4309.5	0.009864	0.045	Trapezoid	5
W990	0.76477		77.711	48.914	R380	6688.8	0.00392	0.045	Trapezoid	5
W2390	0.51479		78.001	59.462	R310	2776	0.002745	0.045	Trapezoid	5
W900	0.69938		76.528	56.694	R230	1469.3	0.004424	0.045	Trapezoid	5
W880	0.50381		74.587	49.559	R260	9386.9	0.007365	0.045	Trapezoid	5
W930	1.7246		76.178	88.03	R180	6985.3	0.008801	0.045	Trapezoid	5
W910	0.57215		77.771	71.581	R170	3175.1	0.005039	0.045	Trapezoid	5
W890	0.9587		76.371	71.728	R120	8985.9	0.007085	0.045	Trapezoid	5
W870	0.84356		76.743	72.266	R130	5830	0.00329	0.045	Trapezoid	5
W750	0.61104		77.108	74.189	R40	6335.8	0.010834	0.045	Trapezoid	5
W830	0.42627		74.153	59.478	R50	3495.7	0.004932	0.045	Trapezoid	5
W2450	0.81116		81.447	51.988	R10	7163	0.00958	0.045	Trapezoid	5
W2500	0.74193		80.613	57.975	R20	3068.4	0.002878	0.045	Trapezoid	5
W2440	1.0812		79.075	69.974	R1680	5078.8	0.013033	0.045	Trapezoid	5
W2490	0.53652		79.385	46.655	R80	5435.1	0.005119	0.045	Trapezoid	5
W2550	1.3944		78.706	78.256	R90	5190.5	0.014837	0.045	Trapezoid	5
W2690	0.92655		76.75	64.355	R220	5988.1	0.004013	0.045	Trapezoid	5
W2700	0.27415		76.156	43.137	R240	831.63	0.002645	0.045	Trapezoid	5
W2600	0.56353		77.672	52.62	R200	9555.9	0.002384	0.045	Trapezoid	5
W640	0.70314		78.579	47.234	R110	1832.2	0.001921	0.045	Trapezoid	5
W2590	0.36265		76.9	46.8	R60	6230.3	0.012036	0.045	Trapezoid	5
W2650	0.66928		77.956	59.444	R100	2540.7	0.00237	0.045	Trapezoid	5
W2640	0.75152		77.821	55.054	R70	4959.5	0.02317	0.045	Trapezoid	5
W610	0.63481		76.508	64.25	R140	1921	0.001702	0.045	Trapezoid	5
W2720	0.6333		80.802	54.571	R330	12630	0.003059	0.045	Trapezoid	5
W2710	0.37428		80.562	42.61	R3150	5782.1	0.02868	0.045	Trapezoid	5
W1640	0.34742		80.141	52.78	R290	1117.7	0.006442	0.045	Trapezoid	5
W2770	0.69263		80.784	55.734	R250	6976	0.021881	0.045	Trapezoid	5
W2760	0.59693		74.418	47.48	R320	9425.9	0.003675	0.045	Trapezoid	5
W1660	0.41402		74.361	54.11	R270	2276.2	0.003675	0.045	Trapezoid	5
W810	0.70467		77.699	51.406						
W710	0.48032		76.357	49.018						
W770	0.82198		76.769	80.041						
W730	0.59221		74.059	74.915						
W1280	1.5677		78.75	80.161						
W1540	1.0341		75.332	84.649						
W2820	0.45119		76.526	48.557						
W2810	0.58254		76.663	78.873						
W700	0.66104		73.417	71.175						
W3160	0.26663		72.28	42.346						
W860	1.3454		77.602	107.17						
W3140	0.29314		77.413	53.51						
W2870	0.66588		74.782	54.759						
W2860	0.64303		76.769	52.321						
W840	0.78184		80.338	81.757						
W760	0.62262		75.897	63.873						
W780	0.24577		72.947	36.554						

Run Parameters (Run 8)

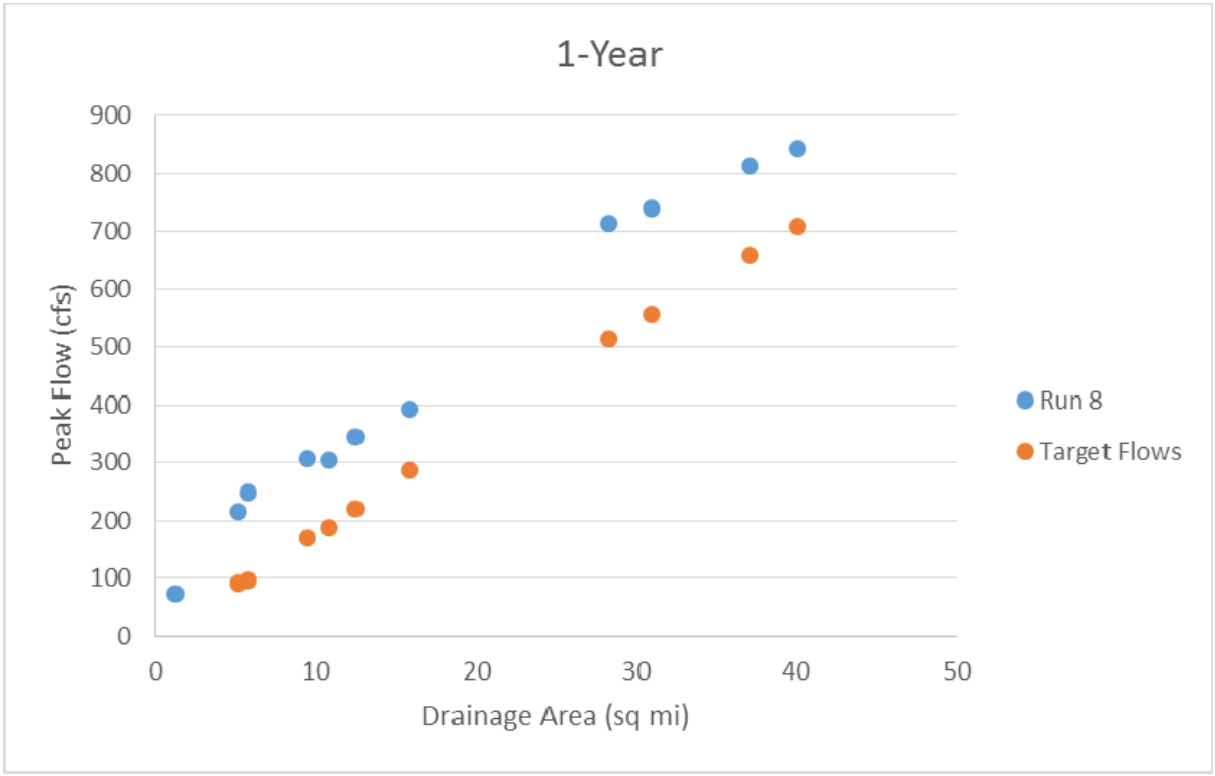
Robinson Run HEC-HMS Parameters (Run 6) IA Ratio = 0.31*S (0.4*S in the POI10 watershed), Increase Lag Time by 10% (Increase 20% in the POI10 watershed), Increase Length 10%, Decrease Slope 10%, Increase Manning's n to 0.12 (Decrease to 0.035 downstream of POI4 and Increase to 0.15 between POI7 and POI6), LiDAR Channel Widths										
Subbasin	Drainage Area (mi2)	Initial Abstraction (in)	Curve Number	Lag Time (min)	Reach	Length (ft)	Slope (ft/ft)	Manning's n	Shape	Width (ft)
W980	1.2063	0.84617921	78.557	62.1071	R440	3511.53	0.006397	0.12	Trapezoid	13
W950	1.4259	0.85100751	78.461	71.0567	R470	2743.4	0.003616	0.12	Trapezoid	20
W1050	0.91902	0.81137579	79.256	59.2339	R510	3363.14	0.003727	0.12	Trapezoid	20
W1060	0.75487	0.9509108	76.526	47.2252	R520	1935.12	0.00794	0.12	Trapezoid	25
W2300	0.48357	0.7923697	79.643	43.769	R490	6381.43	0.011246	0.12	Trapezoid	35
W2290	0.30495	0.81656454	79.151	40.6065	R500	5841.66	0.004008	0.15	Trapezoid	20
W2270	0.10625	0.65926173	82.463	32.9032	R450	8858.08	0.009282	0.12	Trapezoid	25
W2350	0.75336	0.79266296	79.637	49.9521	R460	5239.41	0.003016	0.15	Trapezoid	30
W2340	0.90628	0.85473739	78.387	75.9022	R390	6407.06	0.010098	0.12	Trapezoid	20
W1020	0.80034	0.91029741	77.301	67.8271	R400	11632.5	0.002963	0.12	Trapezoid	30
W2400	0.54205	0.75692068	80.375	53.6371	R370	4740.45	0.008878	0.12	Trapezoid	15
W990	0.76477	0.88913925	77.711	53.8054	R380	7357.68	0.003528	0.12	Trapezoid	35
W2390	0.51479	0.87430802	78.001	65.4082	R310	3053.6	0.002471	0.12	Trapezoid	40
W900	0.69938	0.95080493	76.528	62.3634	R230	1616.23	0.003981	0.12	Trapezoid	45
W880	0.50381	1.05622025	74.587	54.5149	R260	10325.59	0.006628	0.12	Trapezoid	10
W930	1.7246	0.96941637	76.178	96.833	R180	7683.83	0.007921	0.12	Trapezoid	40
W910	0.57215	0.88606164	77.771	78.7391	R170	3492.61	0.004535	0.12	Trapezoid	20
W890	0.9587	0.95913239	76.371	78.9008	R120	9884.49	0.006376	0.12	Trapezoid	40
W870	0.84356	0.93945637	76.743	79.4926	R130	6413	0.002961	0.12	Trapezoid	20
W750	0.61104	0.92033511	77.108	81.6079	R40	6969.38	0.00975	0.12	Trapezoid	25
W830	0.42627	1.08054563	74.153	65.4258	R50	3845.27	0.004439	0.12	Trapezoid	20
W2450	0.81116	0.91116923	81.447	57.1868	R10	7879.3	0.008622	0.12	Trapezoid	40
W2500	0.74193	0.96197884	80.613	63.7725	R20	3375.24	0.00259	0.12	Trapezoid	25
W2440	1.0812	1.05848878	79.075	76.9714	R1680	5586.68	0.011729	0.12	Trapezoid	20
W2490	0.53652	1.03873528	79.385	51.3205	R80	5978.61	0.004607	0.12	Trapezoid	40
W2550	1.3944	1.08220466	78.706	86.0816	R90	5709.55	0.013353	0.12	Trapezoid	15
W2690	0.92655	1.21172638	76.75	70.7905	R220	6586.91	0.003612	0.12	Trapezoid	30
W2700	0.27415	0.97059194	76.156	47.4507	R240	914.793	0.002381	0.12	Trapezoid	27
W2600	0.56353	0.89114224	77.672	57.882	R200	10511.49	0.002146	0.035	Trapezoid	45
W640	0.70314	0.84507438	78.579	51.9574	R110	2015.42	0.001729	0.035	Trapezoid	50
W2590	0.36265	0.93120936	76.9	51.48	R60	6853.33	0.010833	0.12	Trapezoid	20
W2650	0.66928	0.87660219	77.956	65.3884	R100	2794.77	0.002133	0.035	Trapezoid	45
W2640	0.75152	0.8835006	77.821	60.5594	R70	5455.45	0.020853	0.12	Trapezoid	15
W610	0.63481	0.95186386	76.508	70.675	R140	2113.1	0.001532	0.035	Trapezoid	50
W2720	0.6333	0.7365387	80.802	60.0281	R330	13893	0.002753	0.035	Trapezoid	55
W2710	0.37428	0.74796802	80.562	46.871	R3150	6360.31	0.025812	0.12	Trapezoid	15
W1640	0.34742	0.76818233	80.141	58.058	R290	1229.47	0.005798	0.035	Trapezoid	50
W2770	0.69263	0.73739354	80.784	61.3074	R250	7673.6	0.019693	0.12	Trapezoid	15
W2760	0.59693	1.06565885	74.418	52.228	R320	10368.49	0.003308	0.035	Trapezoid	50
W1660	0.41402	1.06885195	74.361	59.521	R270	2503.82	0.003308	0.035	Trapezoid	45
W810	0.70467	0.88975534	77.699	56.5466						
W710	0.48032	0.95987663	76.357	53.9198						
W770	0.82198	0.93808829	76.769	88.0451						
W730	0.59221	1.08585182	74.059	82.4065						
W1280	1.5677	0.83650794	78.75	88.1771						
W1540	1.0341	1.01511708	75.332	93.1139						
W2820	0.45119	0.9509108	76.526	53.4127						
W2810	0.58254	0.94367165	76.663	86.7603						
W700	0.66104	1.12245529	73.417	78.2925						
W3160	0.26663	1.18887659	72.28	46.5806						
W860	1.3454	0.8947424	77.602	117.887						
W3140	0.29314	0.90449537	77.413	58.861						
W2870	0.66588	1.04538258	74.782	60.2349						
W2860	0.64303	0.93808829	76.769	57.5531						
W840	0.78184	0.75869701	80.338	89.9327						
W760	0.62262	0.98448292	75.897	70.2603						
W780	0.24577	1.14966071	72.947	40.2094						

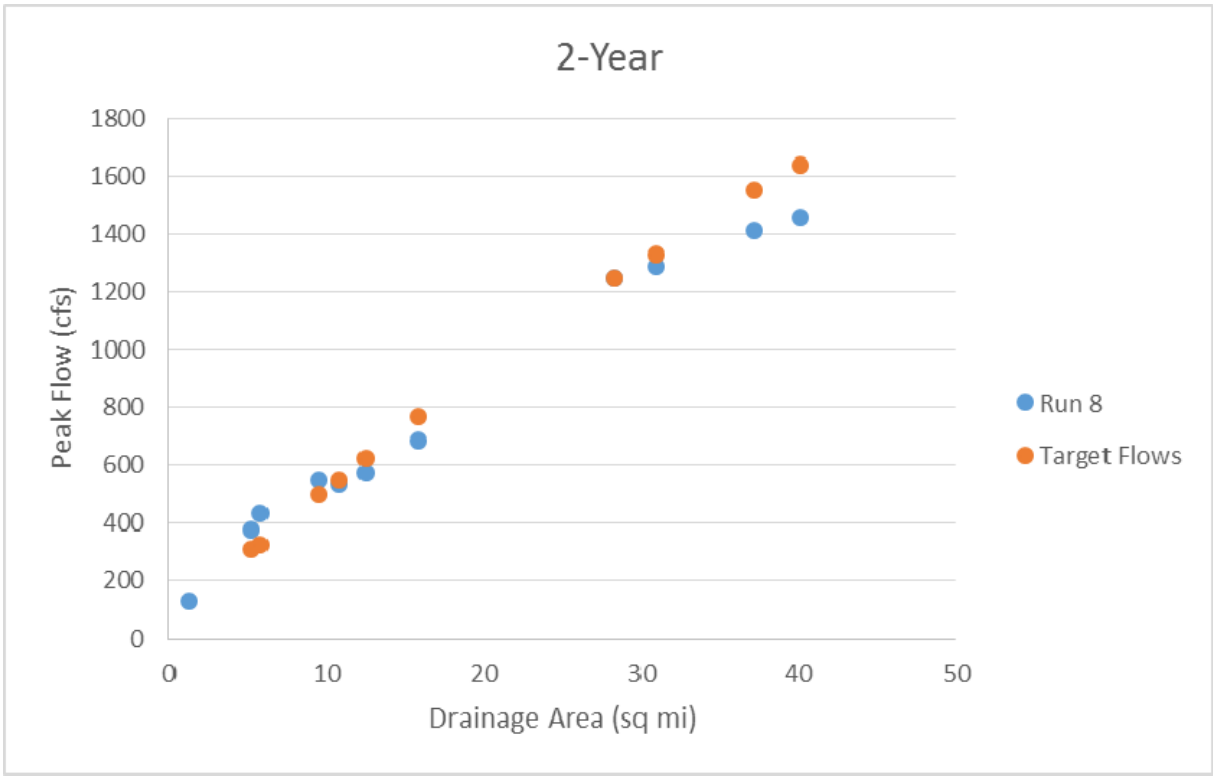
Final Calibrated Results

PEAK FLOW COMPARISON										
Location			Run 8							
POI	Element	DA	1-Year	Difference	2-Year	Difference	2.33-Year	Difference	5-Year	Difference
7	J543	5.20086	215	134%	376.2	21%	403.7	22%	655.3	22%
6	J572	9.48245	307.6	81%	548	10%	590.3	10%	988.1	16%
5	R230	15.82196	393.5	37%	687.6	-10%	738.5	-10%	1212.1	-6%
10	J522	5.76591	248.3	159%	433	33%	464.3	34%	750.9	34%
9	J548	10.80584	305.6	62%	532.3	-3%	571.4	-3%	940.7	0%
8	J551	12.50942	343.9	55%	575.1	-8%	617.3	-8%	1013.4	-4%
4	J656	28.33138	715.9	39%	1249.3	0%	1341.5	0%	2205	7%
3	R110	30.93056	741.3	33%	1288.7	-3%	1383.2	-3%	2270	3%
2	R290	37.1323	814.7	23%	1411.4	-9%	1514.7	-9%	2488	-3%
1	Outlet1	40.09144	843.6	19%	1457.8	-11%	1564.1	-12%	2565	-5%

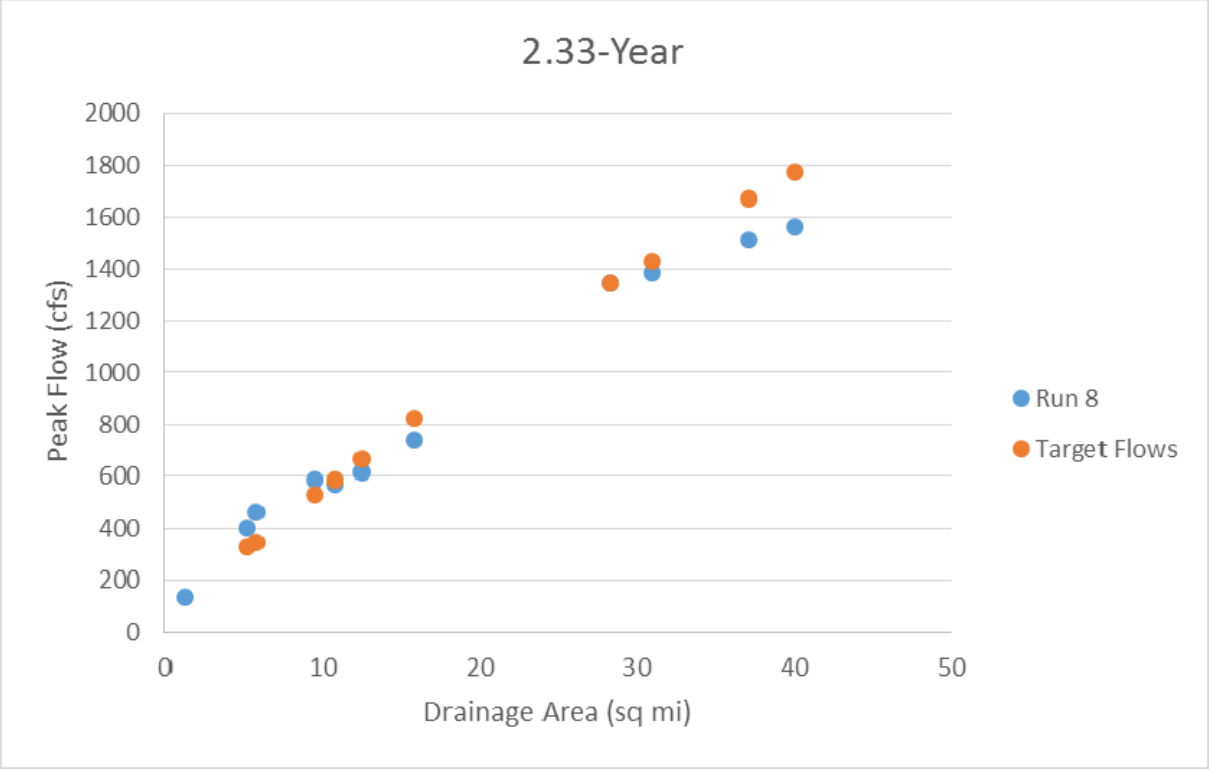
PEAK FLOW COMPARISON										
Location			Run 8							
POI	Element	DA	10-Year	Difference	25-Year	Difference	50-Year	Difference	100-Year	Difference
7	J543	5.20086	925.7	-19%	1370.6	-15%	1795.9	-11%	2278.3	-9%
6	J572	9.48245	1427	-13%	2162	-4%	2868.3	2%	3666.4	7%
5	R230	15.82196	1735	-27%	2619.3	-19%	3484.9	-12%	4481.7	-7%
10	J522	5.76591	1056	16%	1550.7	19%	2016.4	21%	2537.6	21%
9	J548	10.80584	1352	-15%	2049.8	-8%	2731.5	-2%	3512.8	1%
8	J551	12.50942	1455	-18%	2211	-11%	2960.7	-5%	3822.9	-1%
4	J656	28.33138	3161	-13%	4780.5	-3%	6366.9	5%	8194.1	12%
3	R110	30.93056	3253	-15%	4923.3	-5%	6562	3%	8454.3	10%
2	R290	37.1323	3576	-18%	5440.5	-7%	7289.7	2%	9440.7	10%
1	Outlet1	40.09144	3685	-20%	5609.3	-9%	7521.3	1%	9749.2	9%

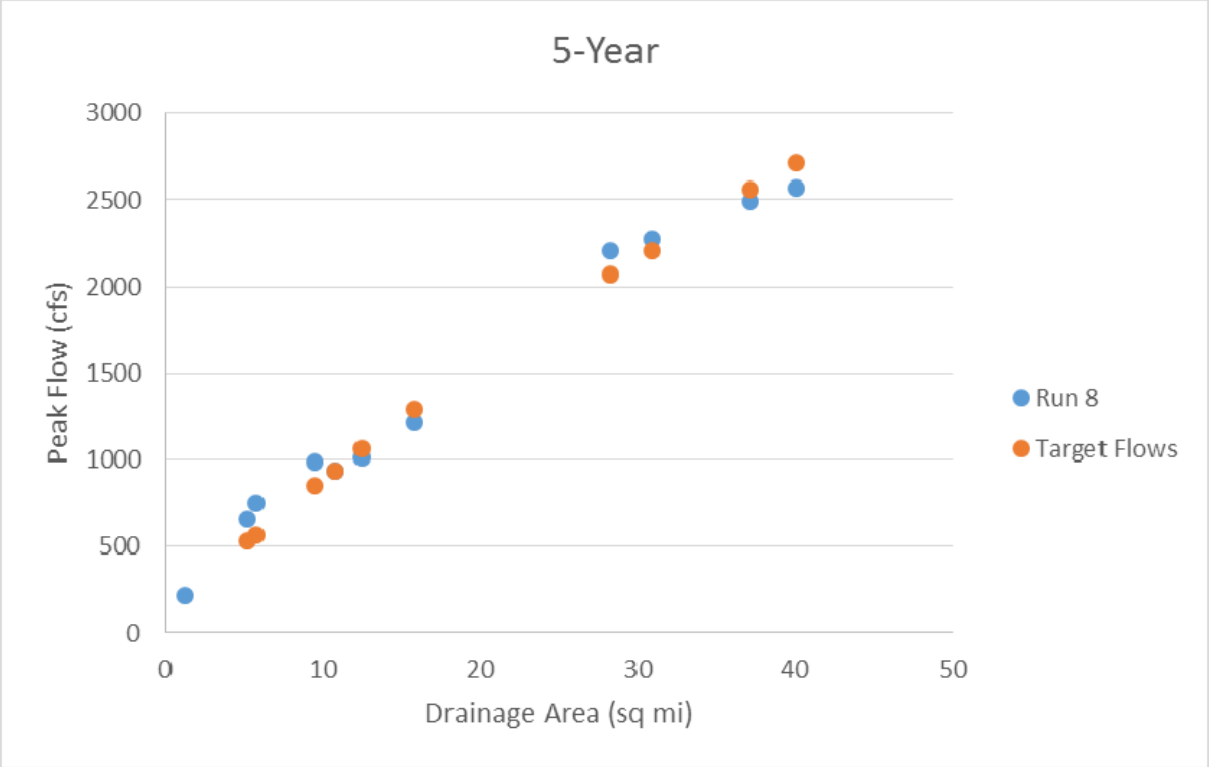
Final Calibrated Results



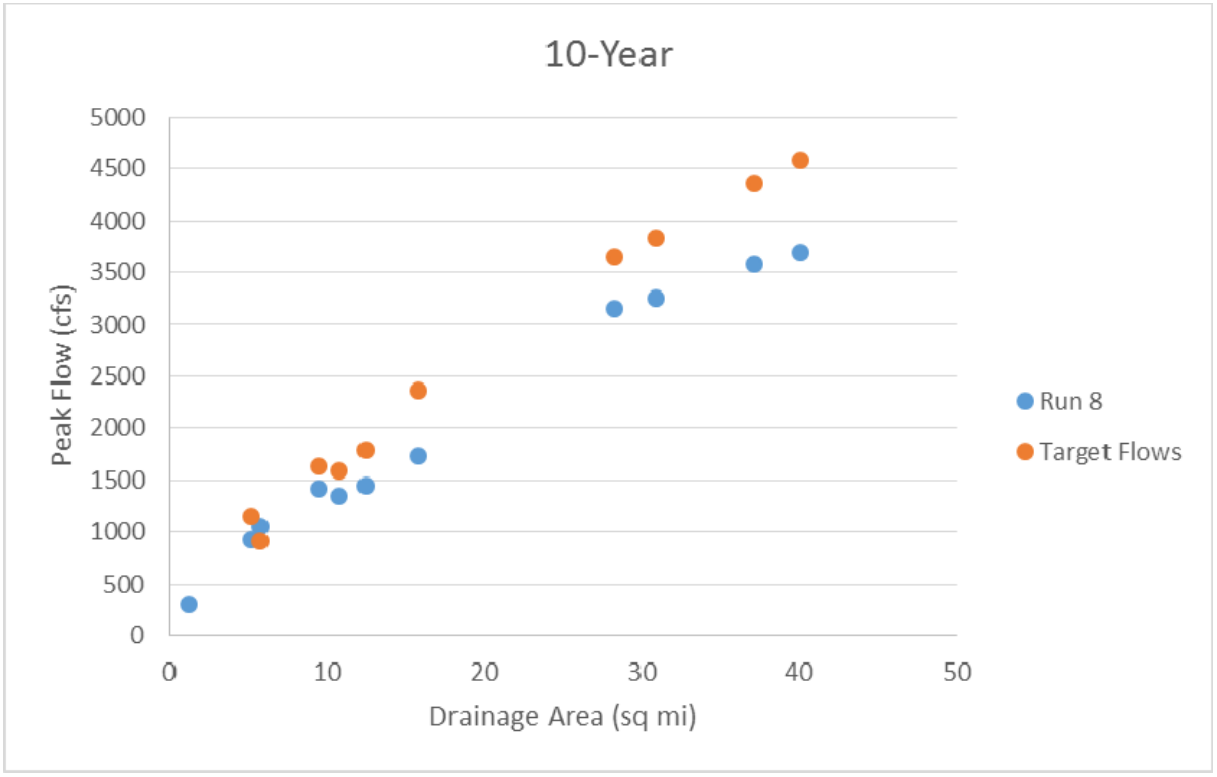


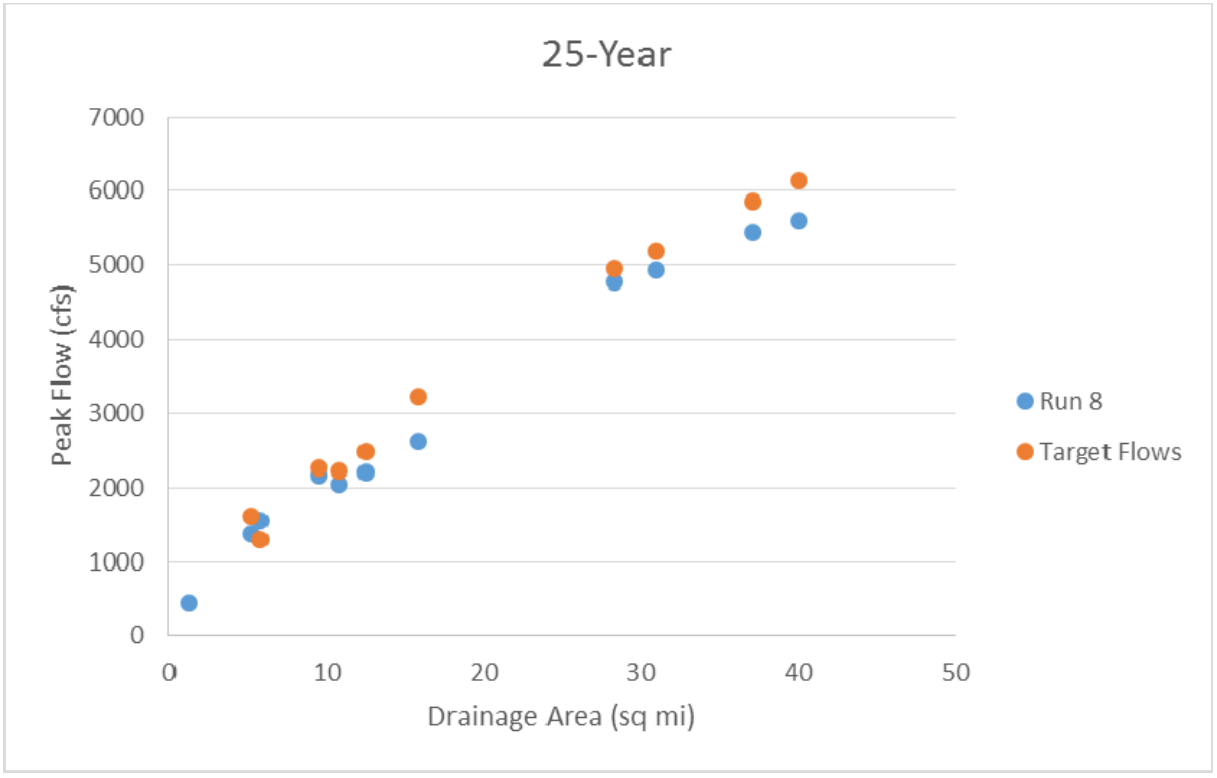
Final Calibrated Results



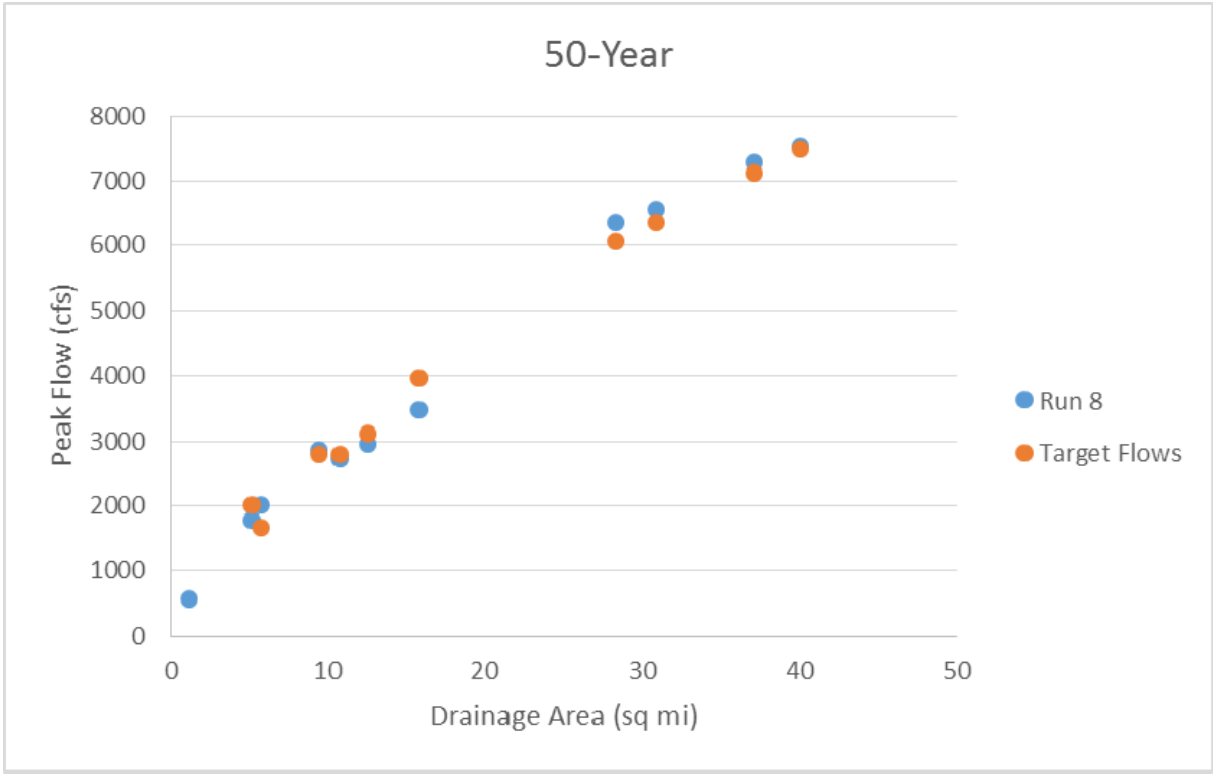


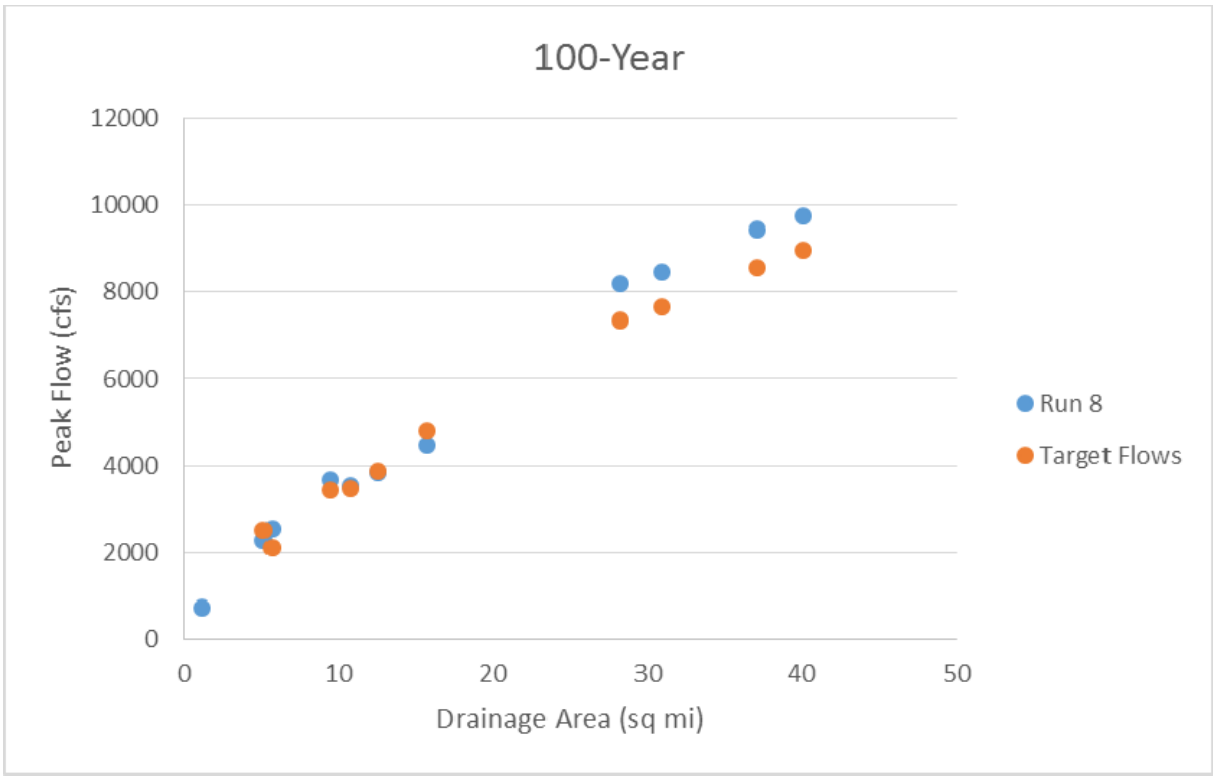
Final Calibrated Results





Final Calibrated Results





Thompson Run Watershed

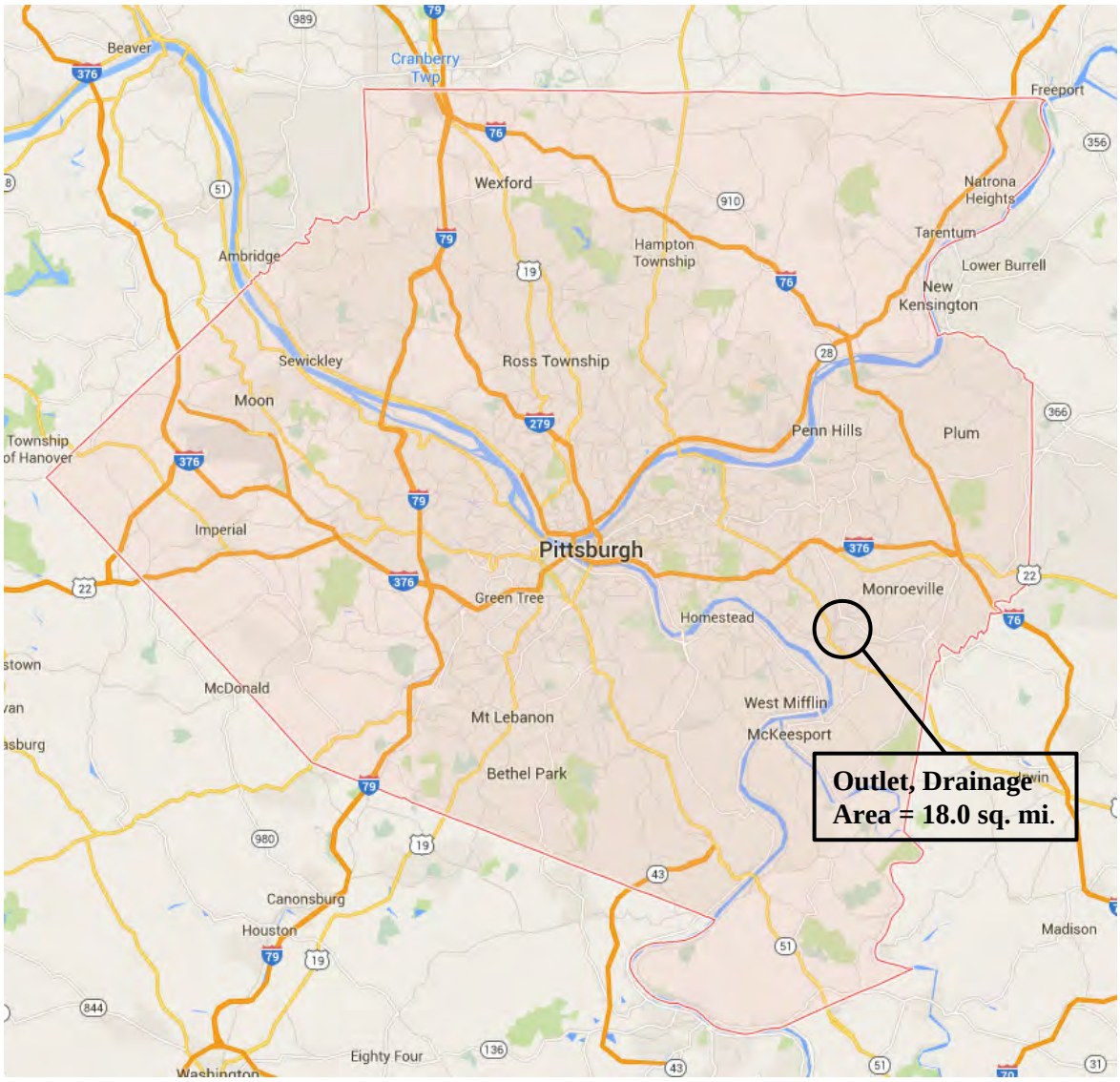
TECHNICAL APPENDIX C.1

Location Maps

Allegheny County
PennDOT District 11-0

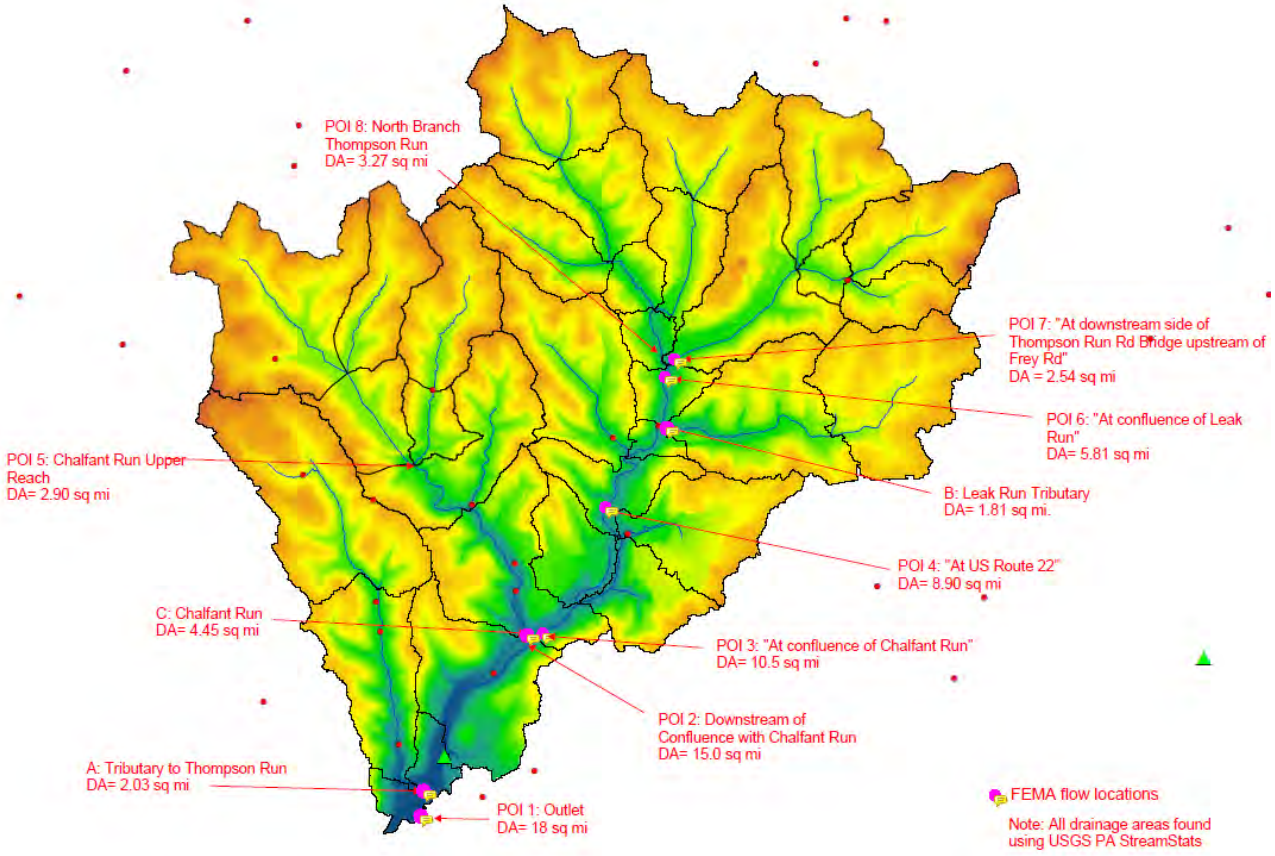
NEWELL TERESKA & MACKAY
ENGINEERING

Allegheny County Location Map: Thompson Run Watershed Outlet



Source: Google Maps

Points of Interest (POI) Map



Thompson Run Watershed

TECHNICAL APPENDIX C.2

Hydrology

Allegheny County
PennDOT District 11-0

NEWELL TERESKA & MACKAY
ENGINEERING

TECHNICAL APPENDIX C.2

Peak Flows

NEWELL TERESKA & MACKAY ENGINEERING

Thompson Run Flows

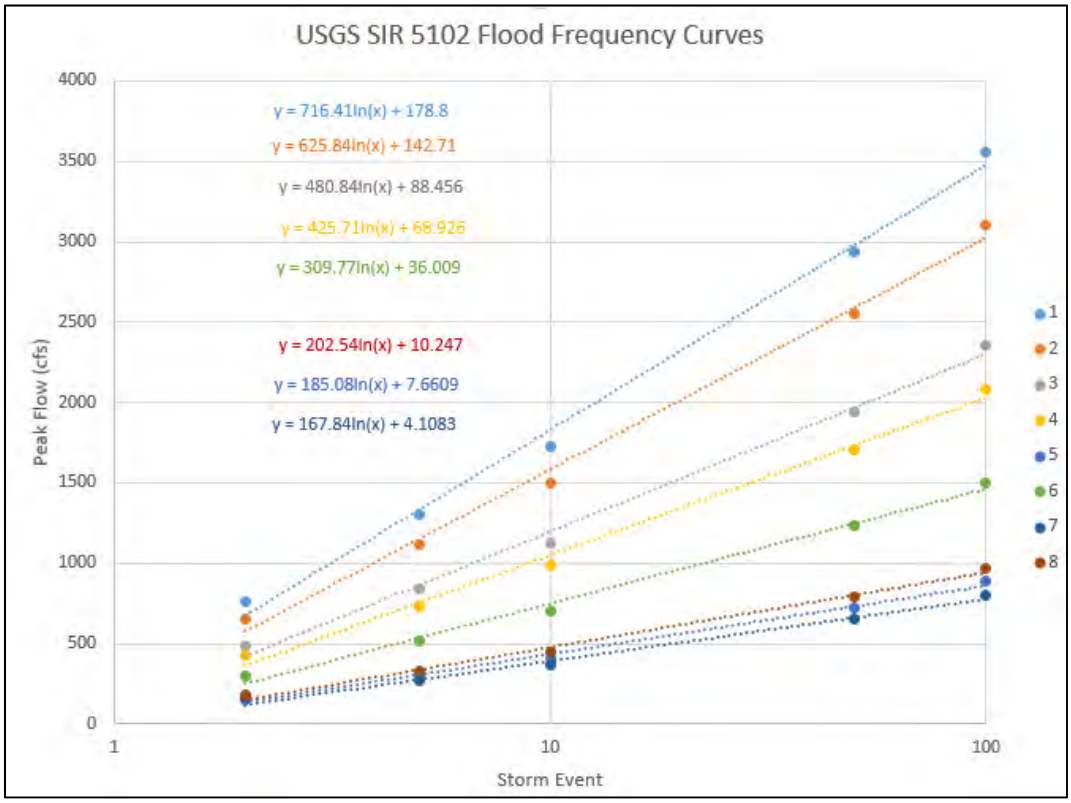
Method	Drainage Area (sq	USGS SIR 2008-5102 (StreamStats)								USGS WRIR 2000-4189							
POI\Event	mi)	1	2	2.33	5	10	25	50	100	1	2	2.33	5	10	25	50	100
1	18	179	765	785	1300	1730	2485	2940	3560	2789	3265	3380	4021	4665	5860	6828	7868
2	15	143	656	672	1120	1500	2157	2550	3100	2299	2705	2804	3354	3911	4950	5796	6711
3	10.5	88	485	495	837	1130	1636	1940	2360	1529	1822	1894	2296	2709	3490	4136	4843
4	8.9	69	422	429	731	988	1439	1710	2080	1388	1650	1714	2073	2441	3137	3709	4334
5	2.9	8	164	164	294	405	603	719	885	777	921	957	1155	1358	1739	2053	2396
6	5.81	36	294	298	517	704	1033	1230	1500	923	1110	1156	1416	1686	2203	2635	3112
7	2.54	4	146	146	264	364	544	649	800	325	406	426	544	671	925	1147	1402
8	3.27	10	181	182	324	445	662	789	970	737	880	916	1113	1317	1703	2023	2375
A	2.03	1	121	121	220	305	458	546	674	563	674	701	856	1016	1319	1572	1852
B	1.81	-1	110	109	200	278	418	500	617	416	501	523	643	767	1007	1207	1430
C	4.45	20	235	236	416	569	842	1000	1230	1078	1273	1320	1586	1856	2361	2775	3224

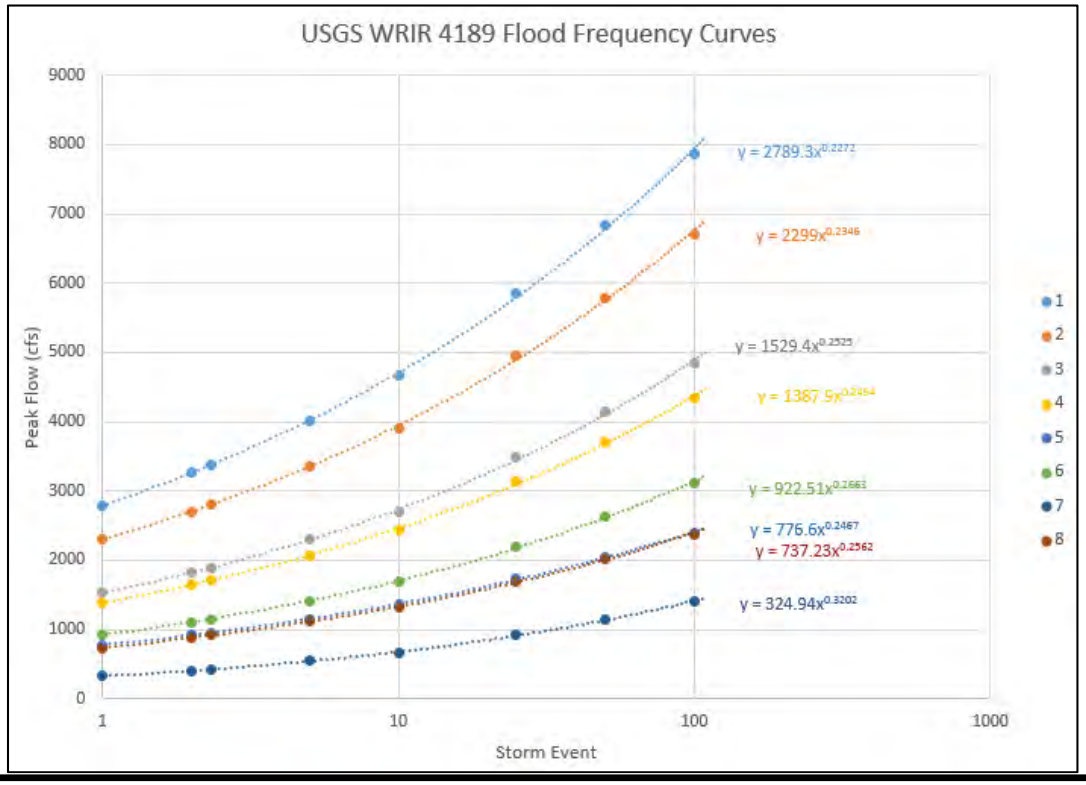
FEMA FIS*				FIS DA	Gage 03084800 Thompson Run at Turtle Creek							
10	50	100	500		1	2	2.33	5	10	25	50	100
2890	5000	6000	8820	17.9	871	1193	1386	2399	3247	4982	6322	7815
					701	1023	1142	1773	2808	4316	5493	6800
2100	3650	4400	6480	10.39	516	757	847	1323	2113	3260	4173	5181
1850	3210	3880	5680	8.9	437	659	725	1086	1852	2862	3674	4567
					150	256	263	329	758	1184	1548	1942
1320	2300	2750	4080	5.81	291	459	493	689	1318	2046	2645	3299
640	1120	1340	1980	2.39	132	229	233	286	682	1067	1398	1755
					168	283	293	374	834	1302	1698	2128
540	930	1110	1640	1.89**	107	189	191	225	570	895	1176	1480
520	900	1080	1590	1.81	96	172	172	199	520	817	1077	1356
1070	1850	2210	3270	4.45	225	367	387	519	1066	1659	2153	2692

Used for comparison purposes only

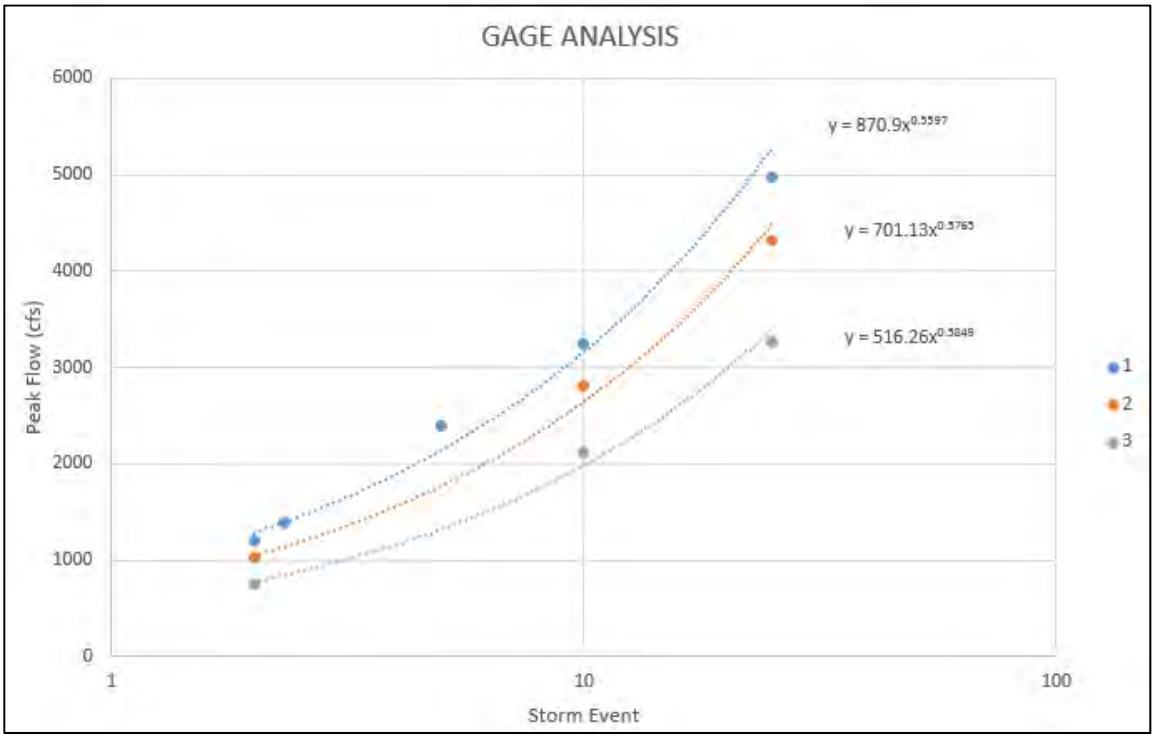
Interpolated

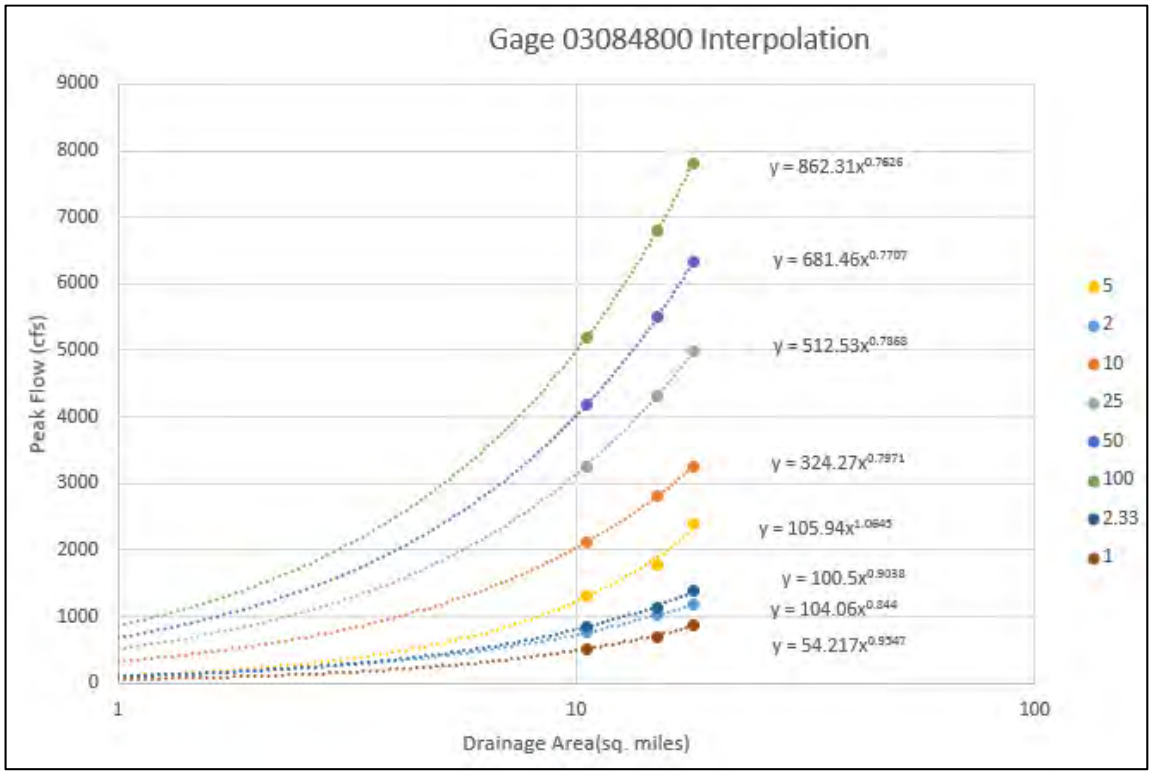
Thompson Run Flood-Frequency Curves



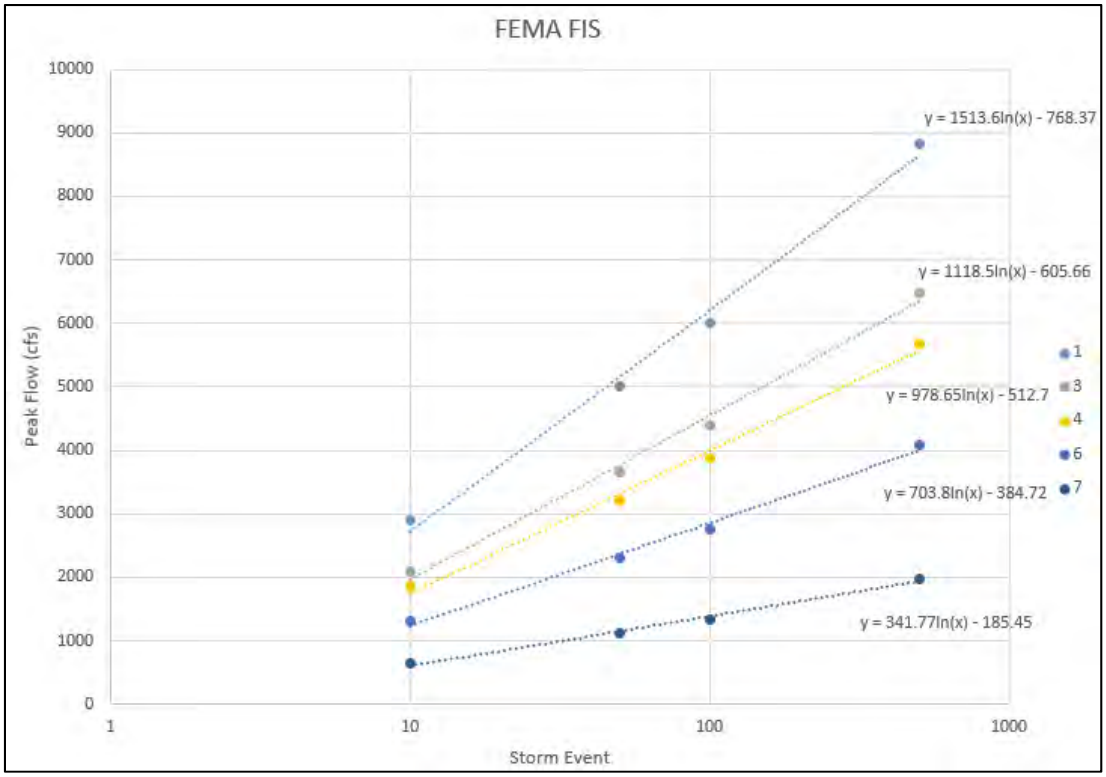


Thompson Run Flood-Frequency Curves

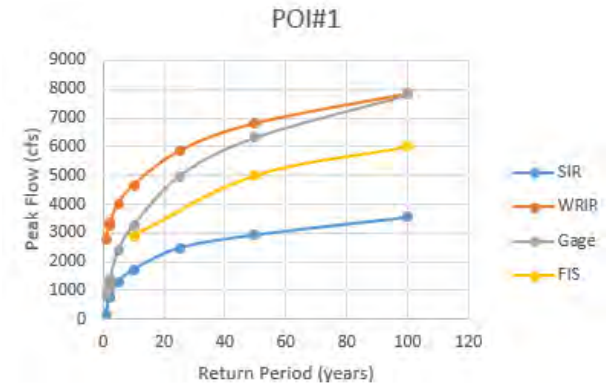




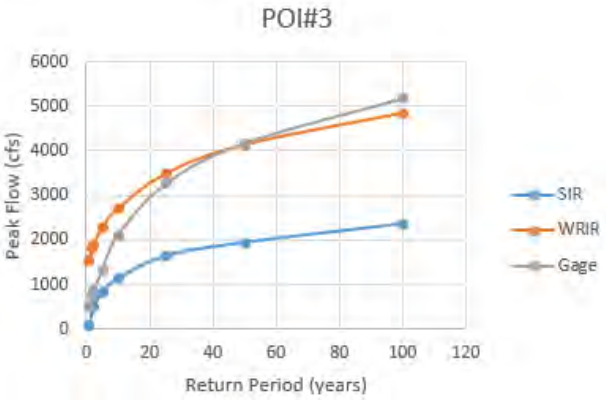
Hydrologic Method Comparison at Points of Interest



Hydrologic Method Comparison at Points of Interest

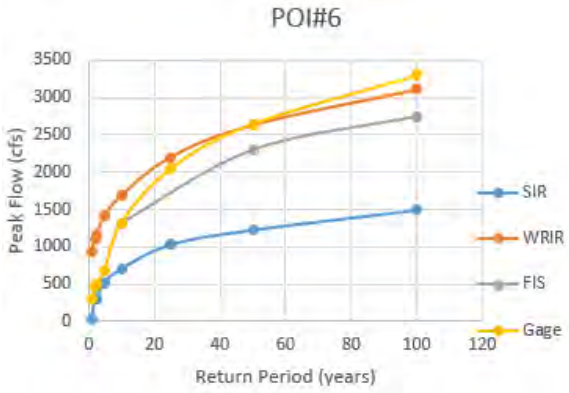




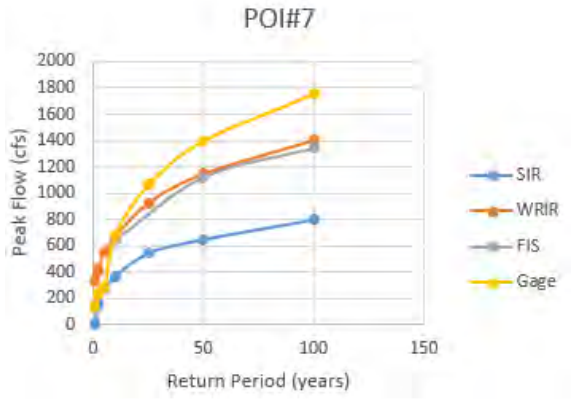


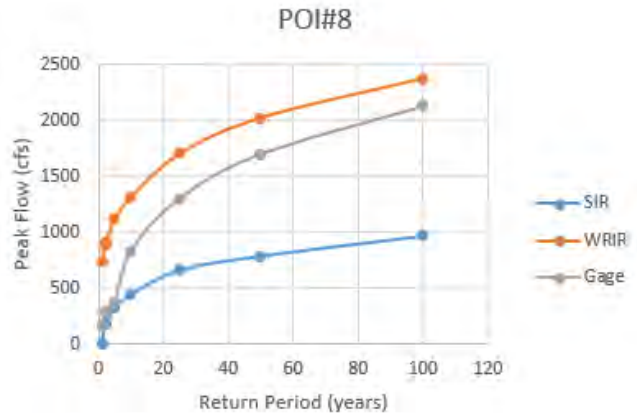


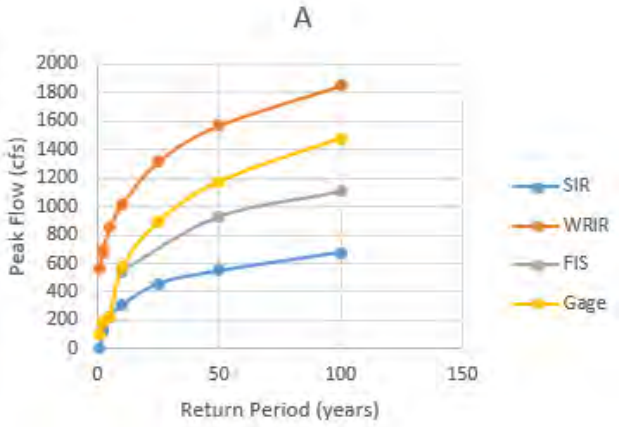


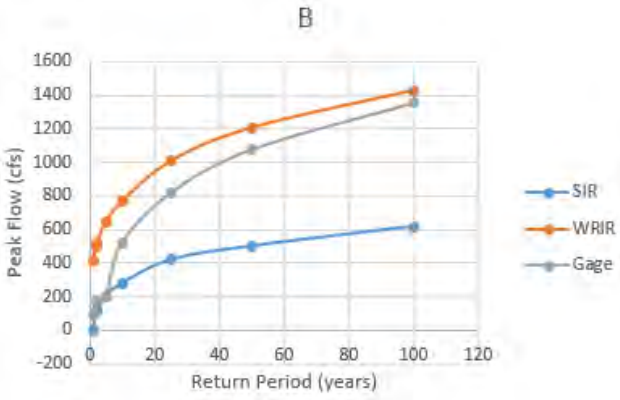


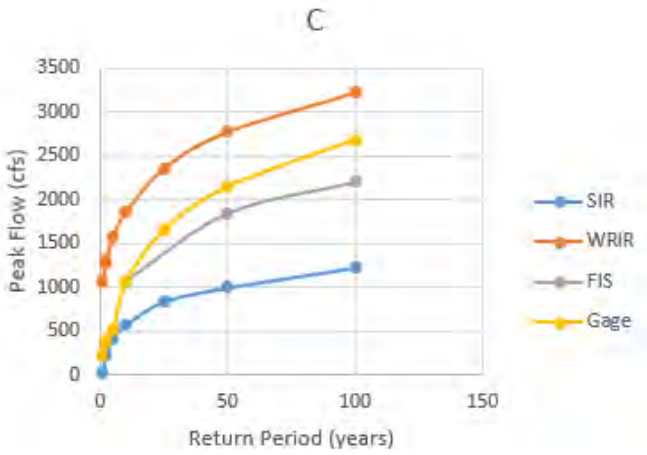
Hydrologic Method Comparison at Points of Interest











TECHNICAL APPENDIX C.2

USGS 2000-4189

NEWELL TERESKA & MACKAY ENGINEERING

USGS WRIR 2000-4189 Regional Map

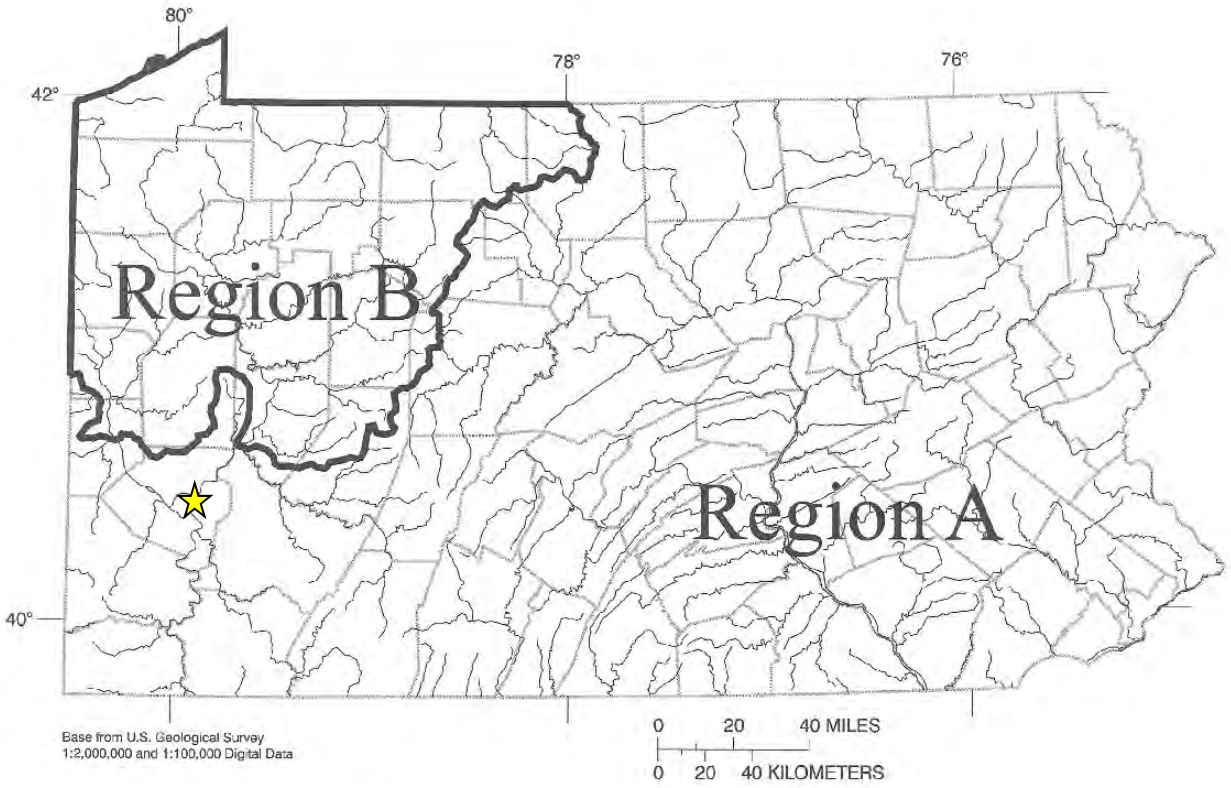


Figure 3. Flood-frequency regions in Pennsylvania.

☆ - Indicates project location

NEWELL TERESKA & MACKAY ENGINEERING

USGS WRIR 2000-4189 Pennsylvania
Carbonate Coverage Map

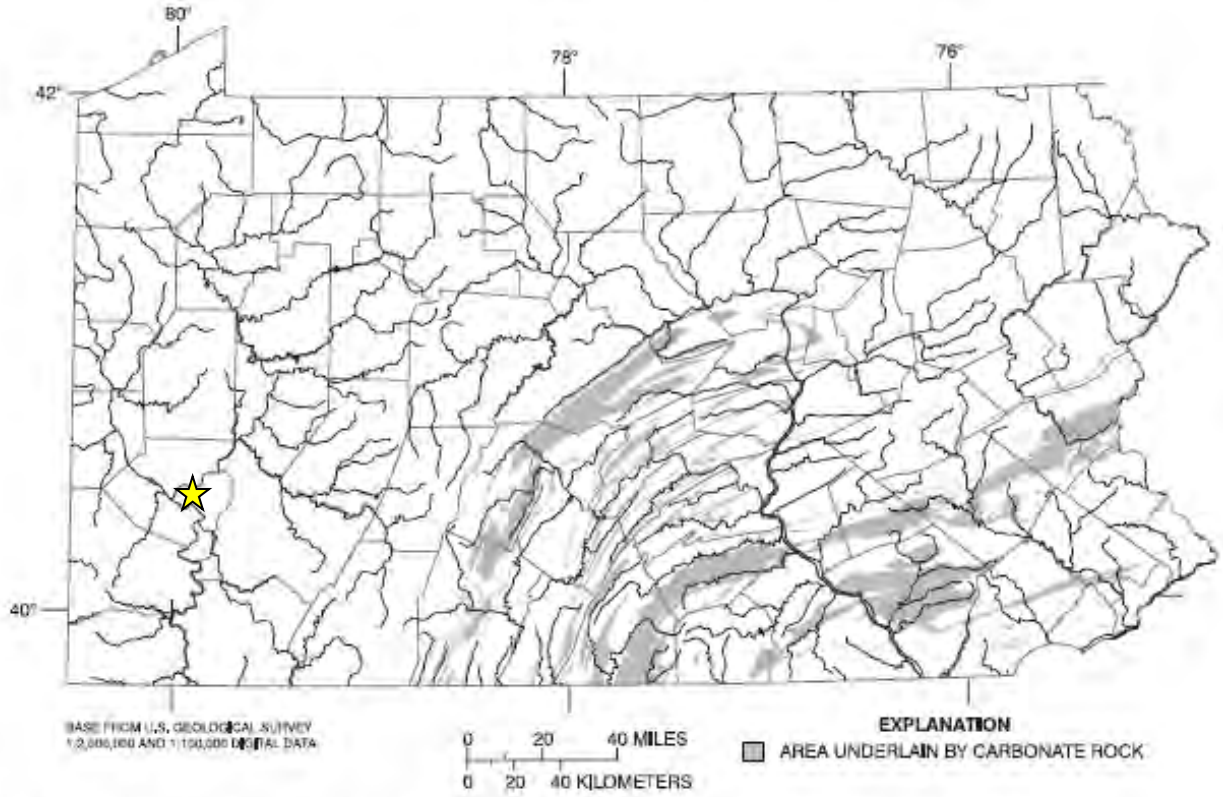


Figure 2. Carbonate regions in Pennsylvania (modified from Environmental Resources Research Institute, 1998).

☆ - Indicates project location

NEWELL TERESKA & MACKAY ENGINEERING

USGS WRIR 2000-4189
POI#1 Calculations

NEWELL TERESKA & MACKAY ENGINEERING

Project:	Allegheny Co Act 167		
County:	Allegheny		
By:	CMW	Ckd:	BBS
Date:	12/17/2015	Date:	2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$

$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$

$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$

$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$

$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:		
	DA =	*Drainage Area*
	F =	*Percent Forested Area*
	U =	*Percent Urban Area*
	C =	*Percent Carbonate Area*
	CA =	*Percent Controlled Areas*
		(areas controlled by lakes, swamps, and reservoirs)

Thompson Run POI #1: Confluence with Turtle Creek

Total drainage area (mi^2) =	18.00
otal forest area in watershed (mi^2) =	3.06
% Forested (F) =	17.0
otal urban area in watershed (mi^2) =	12.60
% Urban Development (U) =	70.0
Total carbonate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
4,665	**5,860**	**6,828**	**7,868**	**10,612**

NEWELL TERESKA & MACKAY ENGINEERING

USGS WRIR 2000-4189
POI#2 Calculations

NEWELL TERESKA & MACKAY ENGINEERING

Project:	Allegheny Co Act 167		
County:	Allegheny		
By:	CMW	Ckd:	BBS
Date:	12/17/2015	Date:	2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$

$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$

$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$

$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$

$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:		
	DA =	*Drainage Area*
	F =	*Percent Forested Area*
	U =	*Percent Urban Area*
	C =	*Percent Carbonate Area*
	CA =	*Percent Controlled Areas*
		(areas controlled by lakes, swamps, and reservoirs)

Thompson Run POI #2

Total drainage area (mi^2) =	15.00
otal forest area in watershed (mi^2) =	2.85
% Forested (F) =	19.0
otal urban area in watershed (mi^2) =	10.05
% Urban Development (U) =	67.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
3,911	**4,950**	**5,796**	**6,711**	**9,140**

NEWELL TERESKA & MACKAY ENGINEERING

USGS WRIR 2000-4189
POI#3 Calculations

NEWELL TERESKA & MACKAY ENGINEERING

Project:	Allegheny Co Act 167		
County:	Allegheny		
By:	CMW	Ckd:	BBS
Date:	12/17/2015	Date:	2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$

$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$

$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$

$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$

$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA =	*Drainage Area*
F =	*Percent Forested Area*
U =	*Percent Urban Area*
C =	*Percent Carbonate Area*
CA =	*Percent Controlled Areas*
	(areas controlled by lakes, swamps, and reservoirs)

Thompson Run POI #3

Total drainage area (mi^2) =	10.50
otal forest area in watershed (mi^2) =	2.52
% Forested (F) =	24.0
otal urban area in watershed (mi^2) =	6.20
% Urban Development (U) =	59.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
2,709	**3,490**	**4,136**	**4,843**	**6,753**

NEWELL TERESKA & MACKAY ENGINEERING

USGS WRIR 2000-4189
POI#4 Calculations

NEWELL TERESKA & MACKAY ENGINEERING

Project:	Allegheny Co Act 167		
County:	Allegheny		
By:	CMW	Ckd:	BBS
Date:	12/17/2015	Date:	2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$

$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$

$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$

$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$

$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA =	*Drainage Area*
F =	*Percent Forested Area*
U =	*Percent Urban Area*
C =	*Percent Carbonate Area*
CA =	*Percent Controlled Areas*
	(areas controlled by lakes, swamps, and reservoirs)

Thompson Run POI #4

Total drainage area (mi^2) =	8.89
otal forest area in watershed (mi^2) =	2.13
% Forested (F) =	24.0
otal urban area in watershed (mi^2) =	5.60
% Urban Development (U) =	63.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
2,441	**3,137**	**3,709**	**4,334**	**6,014**

NEWELL TERESKA & MACKAY ENGINEERING

USGS WRIR 2000-4189
POI#5 Calculations

NEWELL TERESKA & MACKAY ENGINEERING

Project:	Allegheny Co Act 167		
County:	Allegheny		
By:	CMW	Ckd:	BBS
Date:	12/17/2015	Date:	2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$

$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$

$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$

$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$

$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:		
	DA =	*Drainage Area*
	F =	*Percent Forested Area*
	U =	*Percent Urban Area*
	C =	*Percent Carbonate Area*
	CA =	*Percent Controlled Areas*
		(areas controlled by lakes, swamps, and reservoirs)

Thompson Run POI #5

Total drainage area (mi^2) =	2.90
otal forest area in watershed (mi^2) =	0.20
% Forested (F) =	7.0
otal urban area in watershed (mi^2) =	2.52
% Urban Development (U) =	87.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
1,358	**1,739**	**2,053**	**2,396**	**3,321**

NEWELL TERESKA & MACKAY ENGINEERING

USGS WRIR 2000-4189
POI#6 Calculations

NEWELL TERESKA & MACKAY ENGINEERING

Project:	Allegheny Co Act 167		
County:	Allegheny		
By:	CMW	Ckd:	BBS
Date:	12/17/2015	Date:	2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$

$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$

$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$

$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$

$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:	*DA* =	*Drainage Area*
	F =	*Percent Forested Area*
	U =	*Percent Urban Area*
	C =	*Percent Carbonate Area*
	CA =	*Percent Controlled Areas*
		(areas controlled by lakes, swamps, and reservoirs)

Thompson Run POI #6

Total drainage area (mi^2) =	5.81
otal forest area in watershed (mi^2) =	1.45
% Forested (F) =	25.0
otal urban area in watershed (mi^2) =	3.37
% Urban Development (U) =	58.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
1,686	**2,203**	**2,635**	**3,112**	**4,419**

NEWELL TERESKA & MACKAY ENGINEERING

USGS WRIR 2000-4189
POI#7 Calculations

NEWELL TERESKA & MACKAY ENGINEERING

Project:	Allegheny Co Act 167		
County:	Allegheny		
By:	CMW	Ckd:	BBS
Date:	12/17/2015	Date:	2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$

$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$

$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$

$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$

$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:		
	DA =	*Drainage Area*
	F =	*Percent Forested Area*
	U =	*Percent Urban Area*
	C =	*Percent Carbonate Area*
	CA =	*Percent Controlled Areas*
		(areas controlled by lakes, swamps, and reservoirs)

Thompson Run POI #7

Total drainage area (mi^2) =	2.54
otal forest area in watershed (mi^2) =	1.02
% Forested (F) =	40.0
otal urban area in watershed (mi^2) =	0.86
% Urban Development (U) =	34.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
671	**925**	**1,147**	**1,402**	**2,139**

NEWELL TERESKA & MACKAY ENGINEERING

USGS WRIR 2000-4189
POI#8 Calculations

NEWELL TERESKA & MACKAY ENGINEERING

Project:	Allegheny Co Act 167		
County:	Allegheny		
By:	CMW	Ckd:	BBS
Date:	12/17/2015	Date:	2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$

$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$

$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$

$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$

$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:		
	DA =	*Drainage Area*
	F =	*Percent Forested Area*
	U =	*Percent Urban Area*
	C =	*Percent Carbonate Area*
	CA =	*Percent Controlled Areas*
		(areas controlled by lakes, swamps, and reservoirs)

Thompson Run POI #8

Total drainage area (mi^2) =	3.27
otal forest area in watershed (mi^2) =	0.46
% Forested (F) =	14.0
otal urban area in watershed (mi^2) =	2.49
% Urban Development (U) =	76.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
1,317	**1,703**	**2,023**	**2,375**	**3,329**

NEWELL TERESKA & MACKAY ENGINEERING

USGS WRIR 2000-4189
POI A Calculations

NEWELL TERESKA & MACKAY ENGINEERING

Project:	Allegheny Co Act 167		
County:	Allegheny		
By:	CMW	Ckd:	BBS
Date:	12/17/2015	Date:	2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$

$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$

$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$

$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$

$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:	*DA* =	*Drainage Area*
	F =	*Percent Forested Area*
	U =	*Percent Urban Area*
	C =	*Percent Carbonate Area*
	CA =	*Percent Controlled Areas*
		(areas controlled by lakes, swamps, and reservoirs)

Thompson Run A

Total drainage area (mi^2) =	2.03
otal forest area in watershed (mi^2) =	0.12
% Forested (F) =	6.0
otal urban area in watershed (mi^2) =	1.68
% Urban Development (U) =	83.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
1,016	**1,319**	**1,572**	**1,852**	**2,618**

NEWELL TERESKA & MACKAY ENGINEERING

USGS WRIR 2000-4189
POI B Calculations

NEWELL TERESKA & MACKAY ENGINEERING

Project:	Allegheny Co Act 167		
County:	Allegheny		
By:	CMW	Ckd:	BBS
Date:	12/17/2015	Date:	2/10/2016

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$

$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$

$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$

$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$

$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:

DA =	*Drainage Area*
F =	*Percent Forested Area*
U =	*Percent Urban Area*
C =	*Percent Carbonate Area*
CA =	*Percent Controlled Areas*
	(areas controlled by lakes, swamps, and reservoirs)

Thompson Run Run B

Total drainage area (mi^2) =	1.81
otal forest area in watershed (mi^2) =	0.38
% Forested (F) =	21.0
otal urban area in watershed (mi^2) =	1.30
% Urban Development (U) =	72.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
767	**1,007**	**1,207**	**1,430**	**2,040**

NEWELL TERESKA & MACKAY ENGINEERING

USGS WRIR 2000-4189
POI C Calculations

NEWELL TERESKA & MACKAY ENGINEERING

Project:	Allegheny Co Act 167		
County:	Allegheny		
By:	CMW	Ckd:	BBS
Date:	12/17/2015	Date:	2/11/2015

Hydrology computations are based on the USGS WRIR Report 2000-4189, "Techniques for Estimating Magnitude and Frequency of Peak Flows for Pennsylvania Streams," which was published in 2000 to replace WRIR 82-21.

Based on Figure 3 from USGS WRIR 2000-4189, the project is located in **Region A**.
The equations for Region A are as follows:

$$Q_{10} = 334.4DA^{0.7770}(1+0.01F)^{-0.9712}(1+0.01U)^{1.0217}(1+0.01C)^{-1.7184}(1+0.01CA)^{-0.5179}$$

$$Q_{25} = 518.2DA^{0.7556}(1+0.01F)^{-1.0324}(1+0.01U)^{0.7608}(1+0.01C)^{-1.5302}(1+0.01CA)^{-0.5302}$$

$$Q_{50} = 698.4DA^{0.7414}(1+0.01F)^{-1.0821}(1+0.01U)^{0.5785}(1+0.01C)^{-1.3955}(1+0.01CA)^{-0.4980}$$

$$Q_{100} = 925.8DA^{0.7278}(1+0.01F)^{-1.1342}(1+0.01U)^{0.4040}(1+0.01C)^{-1.2691}(1+0.01CA)^{-0.4637}$$

$$Q_{500} = 1696DA^{0.6994}(1+0.01F)^{-1.2666}(1+0.01U)^{0.0208}(1+0.01C)^{-0.9877}(1+0.01CA)^{-0.3834}$$

Where:	*DA* =	*Drainage Area*
	F =	*Percent Forested Area*
	U =	*Percent Urban Area*
	C =	*Percent Carbonate Area*
	CA =	*Percent Controlled Areas*
		(areas controlled by lakes, swamps, and reservoirs)

Thompson Run C

Total drainage area (mi^2) =	4.45
otal forest area in watershed (mi^2) =	0.36
% Forested (F) =	8.0
otal urban area in watershed (mi^2) =	3.78
% Urban Development (U) =	85.0
Total cabronate area in watershed (mi^2) =	0.00
% Carbonate Rock (C) =	0.0
Total controlled area in watershed (mi^2) =	0.00
% Controlled Areas (CA) =	0.0

10-Year Event (cfs)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)	500-Year Event (cfs)
1,856	**2,361**	**2,775**	**3,224**	**4,427**

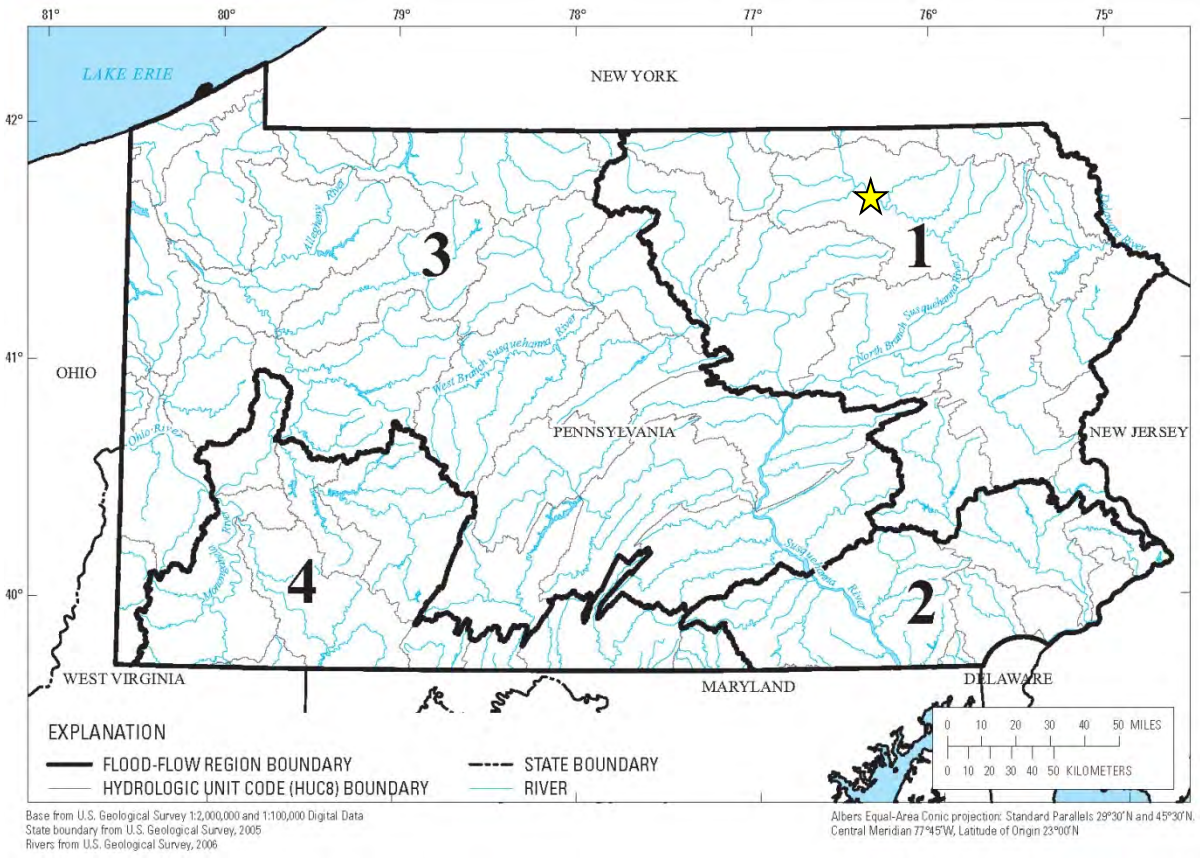
NEWELL TERESKA & MACKAY ENGINEERING

TECHNICAL APPENDIX C.2

USGS SIR 2008-5102

NEWELL TERESKA & MACKAY ENGINEERING

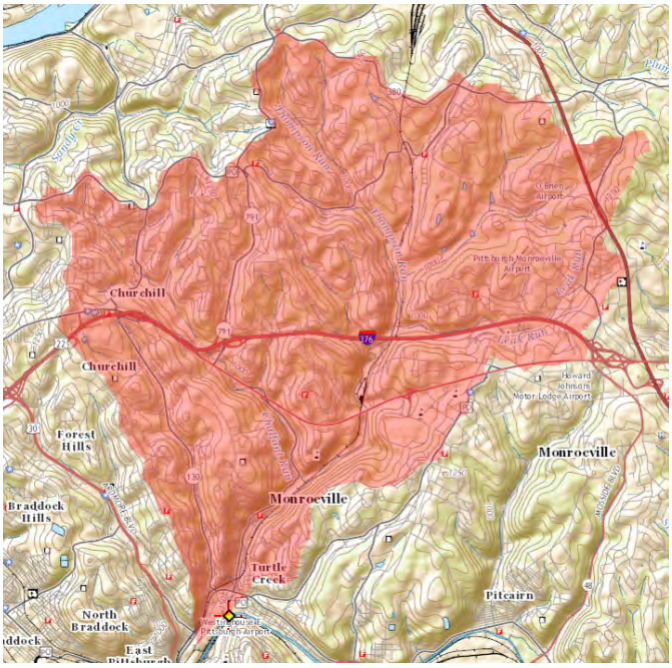
USGS SIR 2008-5102 Regional Map



☆ - Indicates project location

NEWELL TERESKA & MACKAY ENGINEERING

USGS SIR 2008-5102 (PA Stream Stats)
POI#1 Calculations



Peak Flow Statistics

Statistic	Value	Unit
PK2	765	ft3/s
PK5	1300	ft3/s
PK10	1730	ft3/s
PK50	2940	ft3/s
PK100	3560	ft3/s
PK500	5340	ft3/s

Basin Characteristics

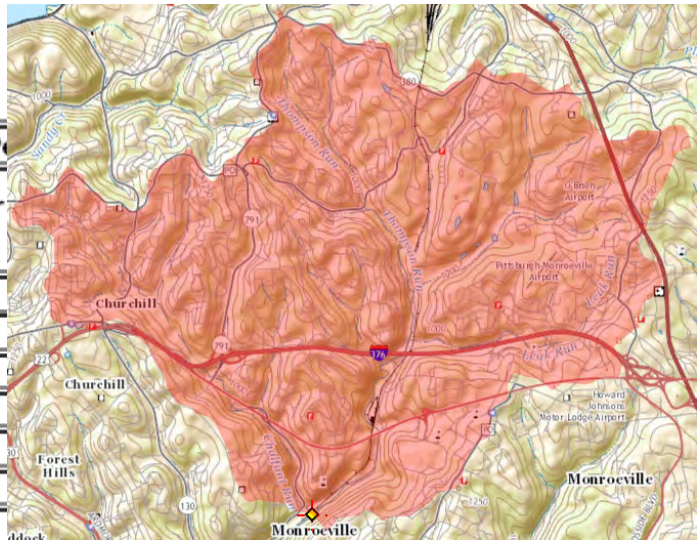
Label	Value	Units	Definition
DRNAREA	18	square miles	Area that drains to a point on a stream
STRMTOT	33.94	miles	Total length of mapped streams in basin
STRDEN	1.89	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	7.7	degrees	Mean basin slope measured in degrees
CENTROIDX	-153414.4	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	162336.3	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-155125	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	157385	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-79.82768	degrees	Longitude of Basin Outlet
BSLOPDRAW	7.94	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	17	percent	Percentage of area covered by forest
PRECIP	39	inches	Mean Annual Precipitation
URBAN	70	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	2.8	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1101.8	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.5	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	28	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset

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USGS SIR 2008-5102 (PA Stream Stats)
POI#2 Calculations

Peak Flow Statistics

Statistic	Value	Unit	Prediction Error (percent)
PK2	656	ft3/s	28
PK5	1120	ft3/s	26
PK10	1500	ft3/s	28
PK50	2550	ft3/s	33
PK100	3100	ft3/s	38
PK500	4660	ft3/s	49

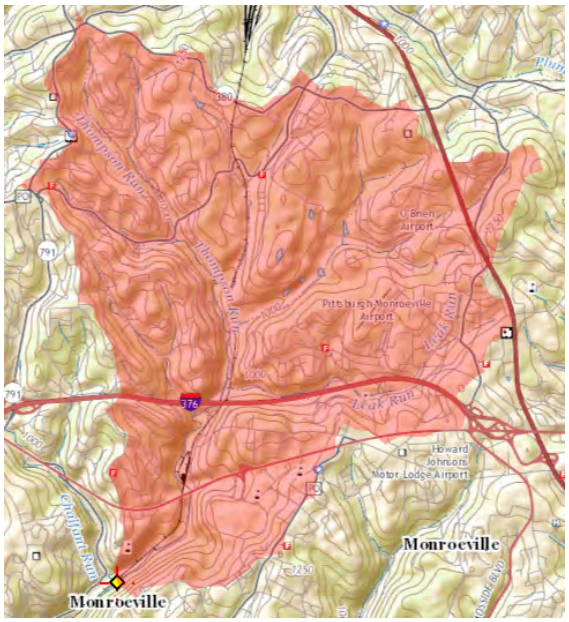


Basin Characteristics

Label	Value	Units	Definition
DRNAREA	15	square miles	Area that drains to a point on a stream
STRMTOT	28.47	miles	Total length of mapped streams in basin
STRDEN	1.9	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	7.5	degrees	Mean basin slope measured in degrees
CENTROIDX	-152970.9	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	162868.4	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-153875	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	159405	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-79.81345	degrees	Longitude of Basin Outlet
BSLOPDRAW	7.67	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	19	percent	Percentage of area covered by forest
PRECIP	39	inches	Mean Annual Precipitation
URBAN	67	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	2.8	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1112.2	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.5	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	28	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset
LC01DEV	69	percent	Percentage of land-use from NLCD 2001 classes 21-24
LC11IMP	29.6	percent	Percentage of impervious area determined from NLCD 2011 impervious dataset
LC11DEV	71.9	percent	Percentage of land-use from NLCD 2011 classes 21-24

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USGS SIR 2008-5102 (PA Stream Stats)
POI#3 Calculations



Peak Flow Statistics

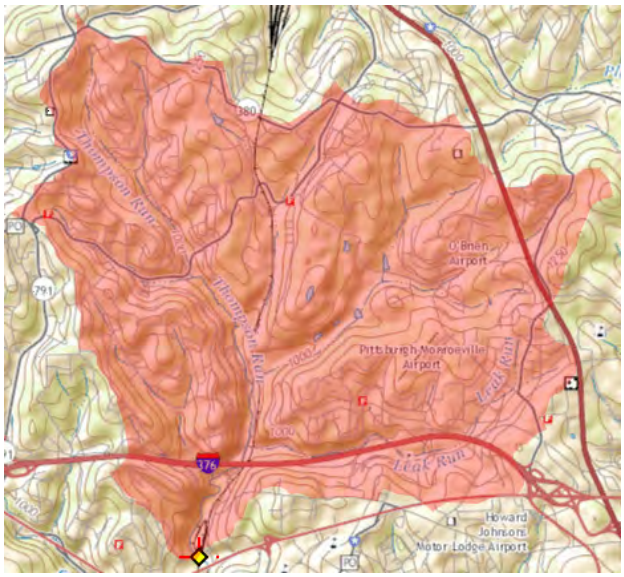
Peak F			
Statistic	Value	Unit	Prediction Error (percent)
PK2	485	ft3/s	28
PK5	837	ft3/s	26
PK10	1130	ft3/s	28
PK50	1940	ft3/s	33
PK100	2360	ft3/s	38
PK500	3570	ft3/s	49

Basin Characteristics

Label	Value	Units	Definition
DRNAREA	10.5	square miles	Area that drains to a point on a stream
STRMTOT	19.47	miles	Total length of mapped streams in basin
STRDEN	1.85	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	7.3	degrees	Mean basin slope measured in degrees
CENTROIDX	-151929	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	163080.8	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-153845	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	159425	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-79.8131	degrees	Longitude of Basin Outlet
BSLOPDRAW	7.52	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	24	percent	Percentage of area covered by forest
PRECIP	39	inches	Mean Annual Precipitation
URBAN	59	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	3	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1106.6	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.5	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	28	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset
LC01DEV	67	percent	Percentage of land-use from NLCD 2001 classes 21-24
LC11IMP	30.1	percent	Percentage of impervious area determined from NLCD 2011 impervious dataset
LC11DEV	70.4	percent	Percentage of land-use from NLCD 2011 classes 21-24

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USGS SIR 2008-5102 (PA Stream Stats)
POI#4 Calculations



Peak Flow Statistics

Peak F			
Statistic	Value	Unit	Prediction Error (percent)
PK2	422	ft3/s	28
PK5	731	ft3/s	26
PK10	988	ft3/s	28
PK50	1710	ft3/s	33
PK100	2080	ft3/s	38
PK500	3150	ft3/s	49

Basin Characteristics

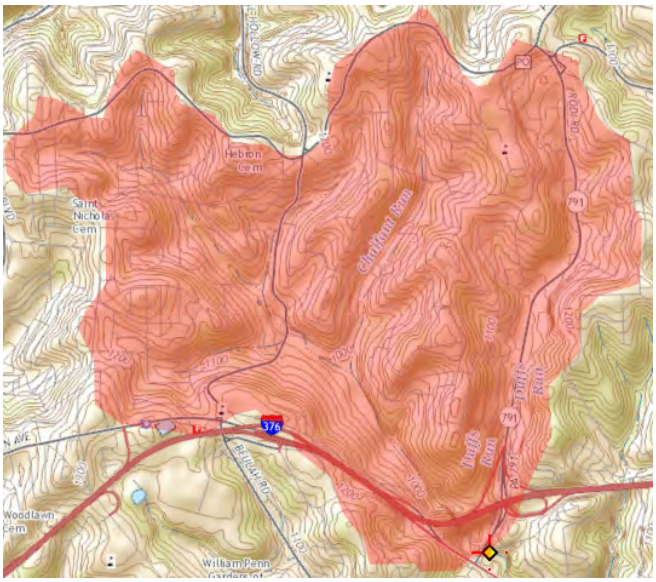
Label	Value	Units	Definition
DRNAREA	8.89	square miles	Area that drains to a point on a stream
STRMTOT	18.15	miles	Total length of mapped streams in basin
STRDEN	2.04	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	7.1	degrees	Mean basin slope measured in degrees
CENTROIDX	-151797.8	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	163570.6	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-153025	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	160955	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-79.80382	degrees	Longitude of Basin Outlet
BSLOPDRAW	7.36	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	24	percent	Percentage of area covered by forest
PRECIP	39	inches	Mean Annual Precipitation
URBAN	63	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	2.9	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1117.8	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.5	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	26	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset
LC01DEV	67	percent	Percentage of land-use from NLCD 2001 classes 21-24
LC11IMP	27.5	percent	Percentage of impervious area determined from NLCD 2011 impervious dataset
LC11DEV	69.4	percent	Percentage of land-use from NLCD 2011 classes 21-24

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USGS SIR 2008-5102 (PA Stream Stats)
POI#5 Calculations

Peak Flow Statistics

Statistic	Value	Unit	Predict (per
PK2	164	ft3/s	
PK5	294	ft3/s	
PK10	405	ft3/s	
PK50	719	ft3/s	
PK100	885	ft3/s	
PK500	1360	ft3/s	

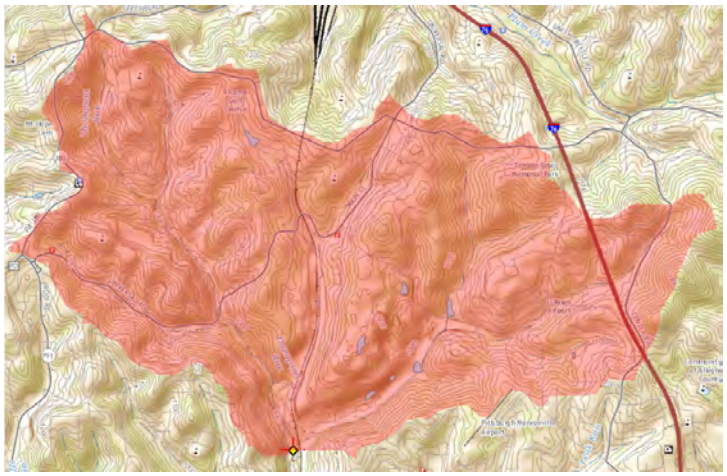


Basin Characteristics

Label	Value	Units	Definition
DRNAREA	2.9	square miles	Area that drains to a point on a stream
STRMTOT	5.61	miles	Total length of mapped streams in basin
STRDEN	1.93	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	7.3	degrees	Mean basin slope measured in degrees
CENTROIDX	-155946.5	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	163045.4	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-155185	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	161355	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-79.82937	degrees	Longitude of Basin Outlet
BSLOPDRAW	7.47	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	7	percent	Percentage of area covered by forest
PRECIP	39	inches	Mean Annual Precipitation
URBAN	87	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	2	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1160.6	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.4	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	31	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset
LC01DEV	83	percent	Percentage of land-use from NLCD 2001 classes 21-24
LC11IMP	67	percent	Percentage of impervious area determined from NLCD 2011 impervious dataset
LC11DEV	100	percent	Percentage of land-use from NLCD 2011 classes 21-24

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USGS SIR 2008-5102 (PA Stream Stats)
POI#6 Calculations



Peak Flow Statistics

Statistic	Value	Unit	Prediction Error (percent)
PK2	294	ft3/s	28
PK5	517	ft3/s	26
PK10	704	ft3/s	28
PK50	1230	ft3/s	33
PK100	1500	ft3/s	38
PK500	2290	ft3/s	49

Basin Characteristics

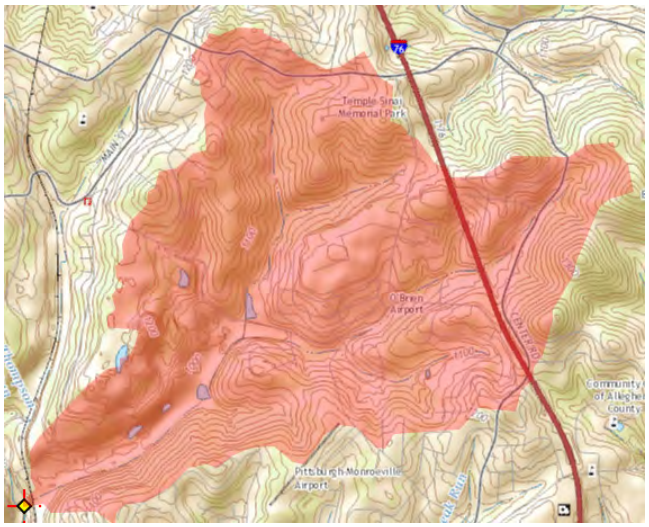
Label	Value	Units	Definition
DRNAREA	5.81	square miles	Area that drains to a point on a stream
STRMTOT	11.68	miles	Total length of mapped streams in basin
STRDEN	2.01	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	7	degrees	Mean basin slope measured in degrees
CENTROIDX	-151898.6	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	164327.2	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-152355	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	162525	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-79.7963	degrees	Longitude of Basin Outlet
BSLOPDRAW	7.2	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	25	percent	Percentage of area covered by forest
PRECIP	39	inches	Mean Annual Precipitation
URBAN	58	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	3.2	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1131.9	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.5	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	23	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset
LC01DEV	62	percent	Percentage of land-use from NLCD 2001 classes 21-24
LC11IMP	24.9	percent	Percentage of impervious area determined from NLCD 2011 impervious dataset
LC11DEV	65.4	percent	Percentage of land-use from NLCD 2011 classes 21-24

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USGS SIR 2008-5102 (PA Stream Stats)
POI#7 Calculations

Peak Flow Statistics

Statistic	Value	Unit	Prediction Error (percent)
PK2	294	ft3/s	28
PK5	517	ft3/s	26
PK10	704	ft3/s	28
PK50	1230	ft3/s	33
PK100	1500	ft3/s	38
PK500	2290	ft3/s	49

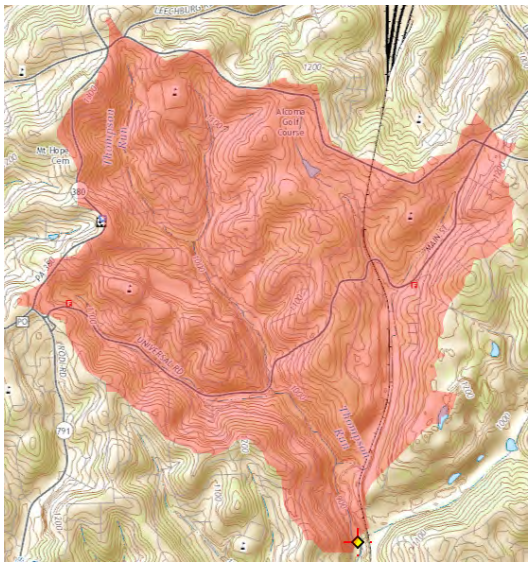


Basin Characteristics

Label	Value	Units	Definition
DRNAREA	2.54	square miles	Area that drains to a point on a stream
STRMTOT	4.99	miles	Total length of mapped streams in basin
STRDEN	1.97	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	6.8	degrees	Mean basin slope measured in degrees
CENTROIDX	-150434.4	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	163955.5	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-152355	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	162555	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-79.79631	degrees	Longitude of Basin Outlet
BSLOPDRAW	7	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	40	percent	Percentage of area covered by forest
PRECIP	39	inches	Mean Annual Precipitation
URBAN	34	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	3.7	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1134.5	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.5	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	19	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset
LC01DEV	49	percent	Percentage of land-use from NLCD 2001 classes 21-24
LC11IMP	22.5	percent	Percentage of impervious area determined from NLCD 2011 impervious dataset
LC11DEV	55.9	percent	Percentage of land-use from NLCD 2011 classes 21-24

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USGS SIR 2008-5102 (PA Stream Stats)
POI#8 Calculations



Peak Flow Statistics

Peak Fl			
Statistic	Value	Unit	Prediction Error (percent)
PK2	181	ft3/s	
PK5	324	ft3/s	
PK10	445	ft3/s	
PK50	789	ft3/s	
PK100	970	ft3/s	
PK500	1490	ft3/s	

Basin Characteristics

Label	Value	Units	Definition
DRNAREA	3.27	square miles	Area that drains to a point on a stream
STRMTOT	6.66	miles	Total length of mapped streams in basin
STRDEN	2.04	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	7.1	degrees	Mean basin slope measured in degrees
CENTROIDX	-153033	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	164616.8	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-152375	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	162545	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-79.79654	degrees	Longitude of Basin Outlet
BSLOPDRAW	7.36	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	14	percent	Percentage of area covered by forest
PRECIP	39	inches	Mean Annual Precipitation
URBAN	76	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	2.8	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1130.1	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.5	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	27	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset
LC01DEV	73	percent	Percentage of land-use from NLCD 2001 classes 21-24
LC11IMP	26.8	percent	Percentage of impervious area determined from NLCD 2011 impervious dataset
LC11DEV	72.8	percent	Percentage of land-use from NLCD 2011 classes 21-24

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USGS SIR 2008-5102 (PA Stream Stats)
POI A Calculations



Peak Flow Statistics

Statistic	Value	Unit	Pre
PK2	121	ft3/s	
PK5	220	ft3/s	
PK10	305	ft3/s	
PK50	546	ft3/s	
PK100	674	ft3/s	
PK500	1040	ft3/s	

Basin Characteristics

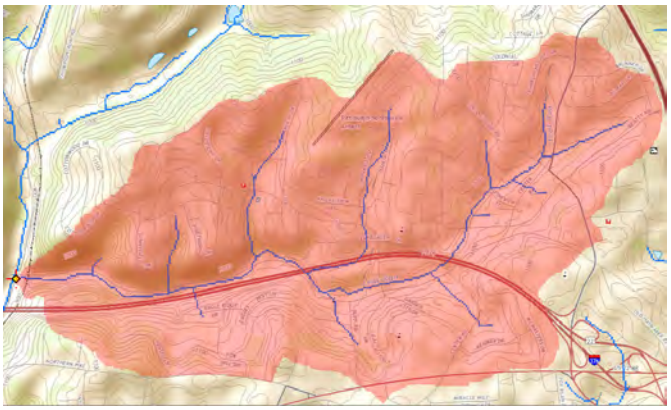
Label	Value	Units	Definition
DRNAREA	2.03	square miles	Area that drains to a point on a stream
STRMTOT	3.81	miles	Total length of mapped streams in basin
STRDEN	1.88	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	8.5	degrees	Mean basin slope measured in degrees
CENTROIDX	-156071.6	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	160204.8	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-154965	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	157935	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-79.82593	degrees	Longitude of Basin Outlet
BSLOPDRAW	8.68	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	6	percent	Percentage of area covered by forest
PRECIP	38	inches	Mean Annual Precipitation
URBAN	83	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	2.3	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1102.4	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.4	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	27	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset
LC01DEV	80	percent	Percentage of land-use from NLCD 2001 classes 21-24
LC11IMP	27.2	percent	Percentage of impervious area determined from NLCD 2011 impervious dataset
LC11DEV	80.1	percent	Percentage of land-use from NLCD 2011 classes 21-24

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USGS SIR 2008-5102 (PA Stream Stats)
POI B Calculations

Peak Flow Statistics

Statistic	Value	Unit	Prediction E (percent)
PK2	110	ft3/s	
PK5	200	ft3/s	
PK10	278	ft3/s	
PK50	500	ft3/s	
PK100	617	ft3/s	
PK500	957	ft3/s	



Basin Characteristics

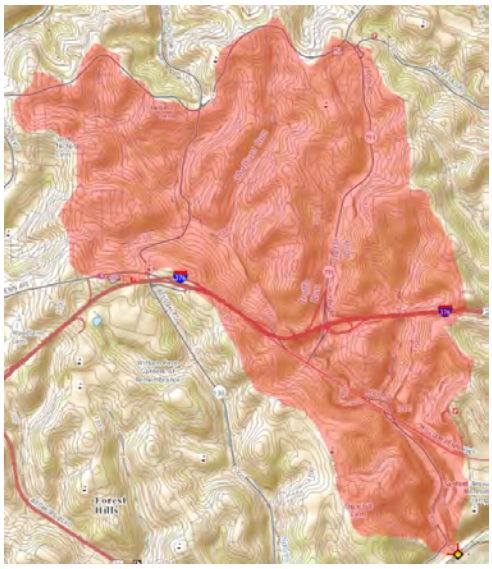
Label	Value	Units	Definition
DRNAREA	1.81	square miles	Area that drains to a point on a stream
STRMTOT	2.99	miles	Total length of mapped streams in basin
STRDEN	1.65	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	6	degrees	Mean basin slope measured in degrees
CENTROIDX	-150522.4	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	162087.4	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-152435	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	161825	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-79.79707	degrees	Longitude of Basin Outlet
BSLOPDRAW	6.22	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	21	percent	Percentage of area covered by forest
PRECIP	39	inches	Mean Annual Precipitation
URBAN	72	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	2.2	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1108.4	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.4	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	37	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset
LC01DEV	83	percent	Percentage of land-use from NLCD 2001 classes 21-24
LC11IMP	58	percent	Percentage of impervious area determined from NLCD 2011 impervious dataset
LC11DEV	100	percent	Percentage of land-use from NLCD 2011 classes 21-24

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USGS SIR 2008-5102 (PA Stream Stats)
POI C Calculations

Peak Flow Statistics

Statistic	Value	Unit	Pre
PK2	235	ft3/s	
PK5	416	ft3/s	
PK10	569	ft3/s	
PK50	1000	ft3/s	
PK100	1230	ft3/s	
PK500	1880	ft3/s	



Basin Characteristics

Label	Value	Units	Definition
DRNAREA	4.45	square miles	Area that drains to a point on a stream
STRMTOT	8.98	miles	Total length of mapped streams in basin
STRDEN	2.02	miles per square mile	Stream Density -- total length of streams divided by drainage area
BSLOPD	7.8	degrees	Mean basin slope measured in degrees
CENTROIDX	-155431.8	State plane coordinates	Basin centroid horizontal (x) location in state plane coordinates
CENTROIDY	162370.8	State plane coordinates	Basin centroid vertical (y) location in state plane units
OUTLETX	-153865	State plane coordinates	Basin outlet horizontal (x) location in state plane coordinates
OUTLETY	159425	State plane coordinates	Basin outlet vertical (y) location in state plane coordinates
LONG_OUT	-79.81334	degrees	Longitude of Basin Outlet
BSLOPDRAW	8.02	degrees	Mean basin slope, in degrees, raw value unadjusted for bias
FOREST	8	percent	Percentage of area covered by forest
PRECIP	39	inches	Mean Annual Precipitation
URBAN	85	percent	Percentage of basin with urban development
GLACIATED	0	percent	Percentage of basin area that was historically covered by glaciers
ROCKDEP	2.2	feet	Depth to rock
CARBON	0	percent	Percentage of area of carbonate rock
STORAGE	0	percent	Percentage of area of storage (lakes ponds reservoirs wetlands)
ELEV	1125.6	feet	Mean Basin Elevation
MAXTEMP	60	degrees F	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid
DRN	3.4	dimensionless	Drainage quality (1=well drained to 7=poorly drained) from dataset at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ussoils.xml
IMPNLCD01	28	percent	Percentage of impervious area determined from NLCD 2001 impervious dataset
LC01DEV	76	percent	Percentage of land-use from NLCD 2001 classes 21-24
LC11IMP	28.3	percent	Percentage of impervious area determined from NLCD 2011 impervious dataset
LC11DEV	75.4	percent	Percentage of land-use from NLCD 2011 classes 21-24

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TECHNICAL APPENDIX C.2

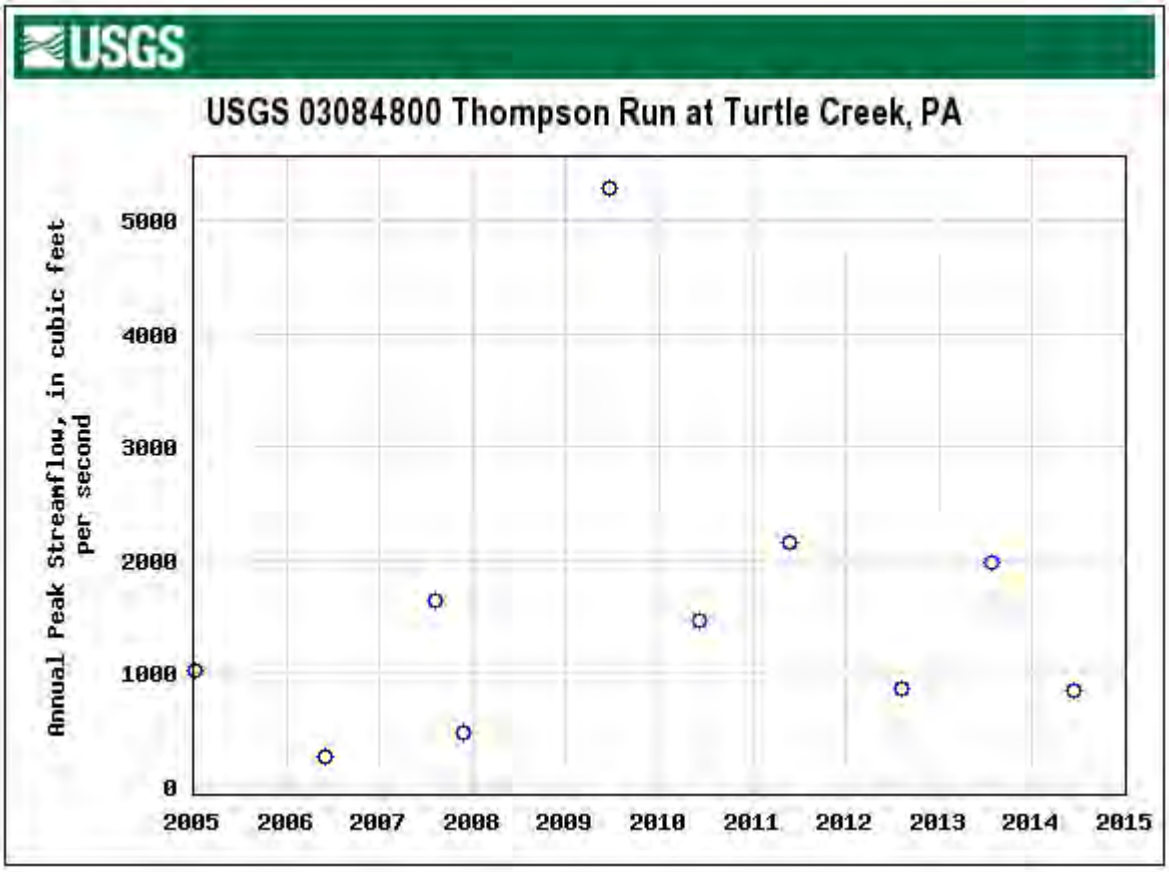
Gage Analysis

NEWELL TERESKA & MACKAY ENGINEERING

Peak Streamflow

USGS 03084800 Thompson Run at Turtle Creek, PA

Allegheny County, Pennsylvania
Hydrologic Unit Code 05020005
Latitude 40°24‘19", Longitude 79°49‘41" NAD27
Drainage area 18.0 square miles
Gage datum 750 feet above NGVD29



NEWELL TERESKA & MACKAY ENGINEERING

Peak Streamflow

USGS 03084800 Thompson Run at Turtle Creek, PA

Water Year	Date	Gage Height (feet)	Stream-flow (cfs)
2005	Jan. 06, 2005	5.37	1,030
2006	Jun. 03, 2006	3.00	260
2007	Aug. 09, 2007	6.47	1,640
2008	Nov. 26, 2007	3.86	469
2009	Jun. 17, 2009	11.56	5,280[2]
2010	Jun. 05, 2010	5.57	1,470
2011	May 25, 2011	6.78	2,160
2012	Aug. 05, 2012	4.18	862
2013	Jul. 22, 2013	6.56	1,980
2014	Jun. 13, 2014	4.15	851

PeakFQ Results

USGS 03084800 Thompson Run at Turtle Creek, PA

```
                                                    PEAK
1
  Program PeakFq          U. S. GEOLOGICAL SURVEY              Seq.000.000
  Ver. 5.2              Annual peak flow frequency analysis    Run Date / Time
  11/01/2007            following Bulletin 17-B Guidelines     12/17/2015 13:24

                           --- PROCESSING OPTIONS ---

                        Plot option         = None
                        Basin char output   = None
                        Print option        = Yes
                        Debug print         = No
                        Input peaks listing = Long
                        Input peaks format  = WATSTORE peak file

                        Input files used:
                           peaks (ascii)  - P:\12021\H&H\HYDROLOGY\STREAMGAUGE\PEAK FQ FILES\03084800
THOMPSON RUN AT TURTLE
                           specifications - PKFQWPSF.TMP

                        Output file(s):
                           main - P:\12021\H&H\HYDROLOGY\STREAMGAUGE\PEAK FQ FILES\03084800 THOMPSON RUN AT
TURTLE

1


  Program PeakFq          U. S. GEOLOGICAL SURVEY              Seq.001.001
  Ver. 5.2              Annual peak flow frequency analysis    Run Date / Time
  11/01/2007            following Bulletin 17-B Guidelines     12/17/2015 13:24

            Station - 03084800  Thompson Run at Turtle Creek, PA


                    I N P U T   D A T A   S U M M A R Y

                  Number of peaks in record           =       10
                  Peaks not used in analysis          =        0
                  Systematic peaks in analysis        =       10
                  Historic peaks in analysis          =        0
                  Years of historic record            =        0
                  Generalized skew                    =    0.095
                       Standard error                 =    0.550
                       Mean Square error              =    0.303
                  Skew option                         =   WEIGHTED
                  Gage base discharge                 =      0.0
                  User supplied high outlier threshold =   --
                  User supplied low outlier criterion  =   --
                  Plotting position parameter         =     0.00


  *********  NOTICE  --  Preliminary machine computations.         *********
  *********  User responsible for assessment and interpretation.   *********

    WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE.                    0.0
    WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION.             211.1
    WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE.       6540.0
1


  Program PeakFq          U. S. GEOLOGICAL SURVEY              Seq.001.002
  Ver. 5.2              Annual peak flow frequency analysis    Run Date / Time
  11/01/2007            following Bulletin 17-B Guidelines     12/17/2015 13:24

            Station - 03084800  Thompson Run at Turtle Creek, PA


          ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

                        FLOOD BASE                  LOGARITHMIC
                  ----------------------  --------------------------------
                                EXCEEDANCE
                   DISCHARGE  PROBABILITY     MEAN     STANDARD DEVIATION     SKEW
                  ---------------------------------------------------------------
  SYSTEMATIC RECORD      0.0     1.0000     3.0700          0.3662          -0.107
  BULL.17B ESTIMATE      0.0     1.0000     3.0700          0.3662           0.016


                                                    Page 1
```

PeakFQ Results

USGS 03084800 Thompson Run at Turtle Creek, PA

PEAK
ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	135.6	123.0	68.0	31.0	276.5
0.9900	166.9	154.7	98.6	43.1	324.4
0.9500	294.7	286.3	233.6	104.7	508.6
0.9000	399.4	395.1	346.6	166.3	654.4
0.8000	577.5	580.6	537.8	286.3	905.8
0.6667	815.5	827.3	791.3	461.7	1266.0
0.5000	1172.0	1193.0	1172.0	728.0	1886.0
0.4292	1363.0	1386.0	1379.0	864.9	2262.0
0.2000	2387.0	2399.0	2565.0	1522.0	4812.0
0.1000	3467.0	3427.0	4003.0	2115.0	8335.0
0.0400	5166.0	4982.0	6778.0	2937.0	15340.0
0.0200	6687.0	6322.0	9925.0	3606.0	22950.0
0.0100	8439.0	7815.0	14510.0	4323.0	33110.0
0.0050	10440.0	9471.0	21330.0	5093.0	46410.0
0.0020	13530.0	11920.0	36160.0	6201.0	70090.0

1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.003
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 12/17/2015 13:24

Station - 03084800 Thompson Run at Turtle Creek, PA

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
2005	1030.0		2010	1470.0	
2006	260.0		2011	2160.0	
2007	1640.0		2012	862.0	
2008	469.0		2013	1980.0	
2009	5280.0		2014	851.0	

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

- Minus-flagged discharge -- Not used in computation
  -8888.0 -- No discharge value given
- Minus-flagged water year -- Historic peak used in computation

1

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.004
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 12/17/2015 13:24

Station - 03084800 Thompson Run at Turtle Creek, PA

EMPIRICAL FREQUENCY CURVES -- WEIBULL PLOTTING POSITIONS

WATER YEAR	RANKED DISCHARGE	SYSTEMATIC RECORD	BULL.17B ESTIMATE
2009	5280.0	0.0909	0.0909
2011	2160.0	0.1818	0.1818
2013	1980.0	0.2727	0.2727

PeakFQ Results

USGS 03084800 Thompson Run at Turtle Creek, PA

			PEAK
2007	1640.0	0.3636	0.3636
2010	1470.0	0.4545	0.4545
2005	1030.0	0.5455	0.5455
2012	862.0	0.6364	0.6364
2014	851.0	0.7273	0.7273
2008	469.0	0.8182	0.8182
2006	260.0	0.9091	0.9091

1

End PeakFQ analysis.
Stations processed : 1
Number of errors : 0
Stations skipped : 0
Station years : 10

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4, or *.)
(2, 4, and * records are ignored.)

For the station below, the following records were ignored:

FINISHED PROCESSING STATION: 03084800 USGS Thompson Run at Turtle Creek,

For the station below, the following records were ignored:

FINISHED PROCESSING STATION:

Peak Flow Transposition

For Point of Interest #2

NEWELL TERESKA & MACKAY ENGINEERING

Project:	Thompson Run Watershed		
	PennDOT District 12-0		
By:	CMW	Ckd:	BBS
Date:	02/11/16	Date:	02/12/16

Peak Flow Transposition

$$\frac{Q_{site}}{Q_{gage}} = \left(\frac{A_{site}}{A_{gage}} \right)^{b}$$

Reference: PennDOT DM-2.10.6.C.4.a.

Return Period (years)	USGS SIR 2008-5102 Drainage Area Characteristic Coefficient "b"			
	Region 1	Region 2	Region 3	Region 4
2	0.86396	0.69782	0.82143	0.84471
10	0.83197	0.64853	0.78127	0.79689
25	0.82741	0.64014	0.77260	0.78710
50	0.81981	0.62615	0.75816	0.77079
100	0.81626	0.61864	0.75043	0.76279
500	0.81002	0.60294	0.73500	0.74809

Note: 25-year "b" value interpolated from 10-year and and 50-year values.

Page 1

A_{site} (mi^2)	15.00
A_{gage} (mi^2)	18.00
USGS Gage #	3084800
Flood-Flow Region	4

Thompson Run at Turtle Creek

Return Period (years)	Q_{gage} (cfs)	Q_{site} (cfs)
2	1,193	**1,023**
10	3,247	**2,808**
25	4,982	**4,316**
50	6,322	**5,493**
100	7,815	**6,800**

Peak Flow Transposition

For Point of Interest #3

NEWELL TERESKA & MACKAY ENGINEERING

Project:	Thompson Run Watershed		
	PennDOT District 12-0		
By:	CMW	Ckd:	BBS
Date:	02/11/16	Date:	02/12/16

Peak Flow Transposition

$$\frac{Q_{site}}{Q_{gage}} = \left(\frac{A_{site}}{A_{gage}} \right)^{b}$$

Reference: PennDOT DM-2.10.6.C.4.a.

Return Period (years)	USGS SIR 2008-5102 Drainage Area Characteristic Coefficient "b"			
	Region 1	Region 2	Region 3	Region 4
2	0.86396	0.69782	0.82143	0.84471
10	0.83197	0.64853	0.78127	0.79689
25	0.82741	0.64014	0.77260	0.78710
50	0.81981	0.62615	0.75816	0.77079
100	0.81626	0.61864	0.75043	0.76279
500	0.81002	0.60294	0.73500	0.74809

Note: 25-year "b" value interpolated from 10-year and and 50-year values.

Page 1

A_{site} (mi^2)	10.50
A_{gage} (mi^2)	18.00
USGS Gage #	3084800
Flood-Flow Region	4

Thompson Run at Turtle Creek

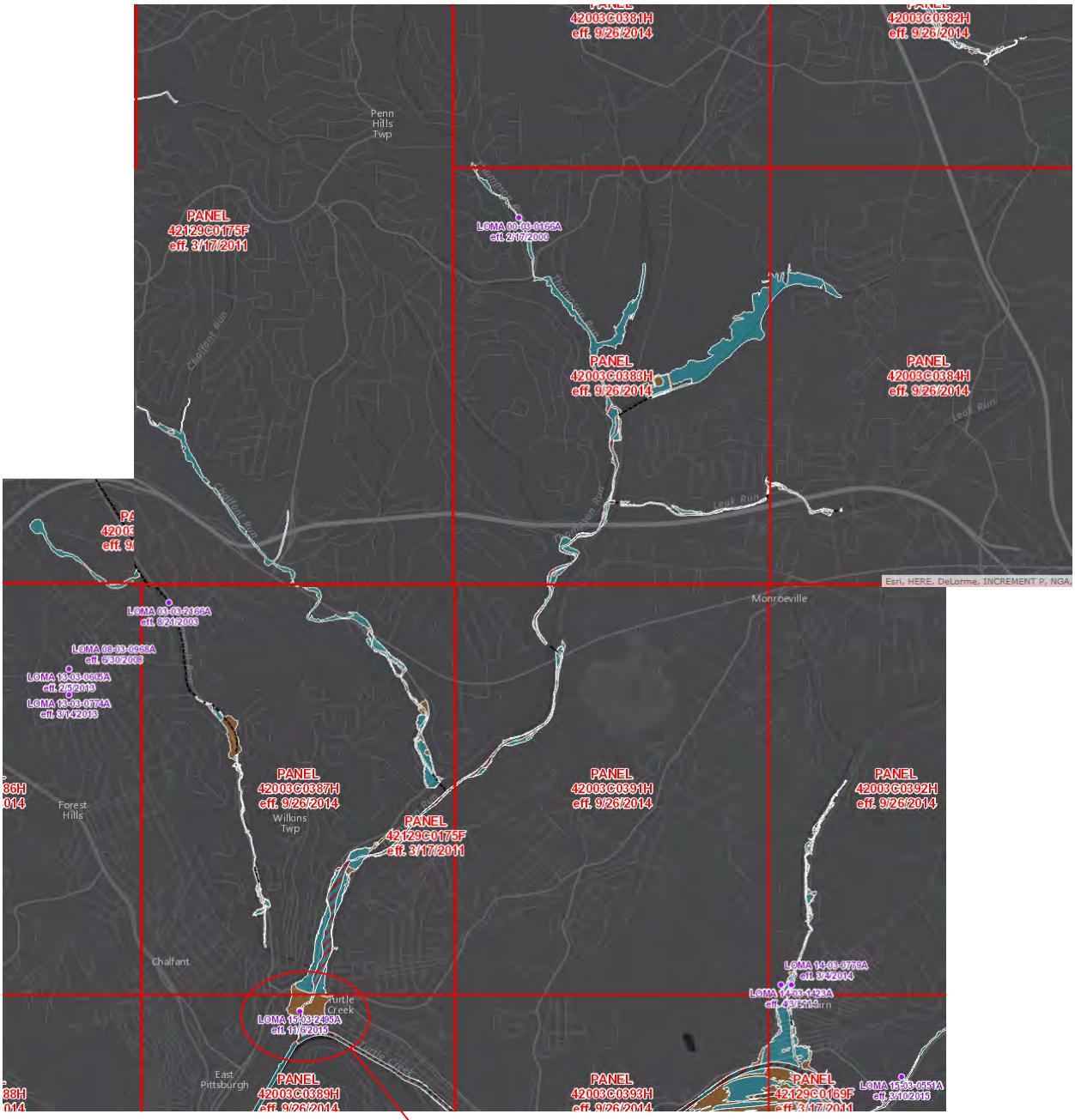
Return Period (years)	Q_{gage} (cfs)	Q_{site} (cfs)
2	1,193	**757**
10	3,247	**2,113**
25	4,982	**3,260**
50	6,322	**4,173**
100	7,815	**5,181**

TECHNICAL APPENDIX C.2

FEMA FIS Information

NEWELL TERESKA & MACKAY ENGINEERING

FEMA National Flood Hazard Layer –Thompson Run Watershed



Thompson Run watershed outlet,
POI 1

Allegheny County FIS Description of Hydrologic Analysis

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this FIS. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 1-percent annual chance flood (1-percent chance of annual exceedance) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the county at the time of completion of this FIS. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting Allegheny, County.

Information on the methods used to determine peak discharge-frequency relationships for the streams studied by detailed methods is shown below.

Hydrology for the following streams was developed using the log-Pearson Type III method as outlined by the Water Resources Council's Bulletins 15, 17, 17A, and 17B (References 16, 21 – 24).

Borough of McKees Rocks:	Chartiers Creek
Borough of Millvale:	Allegheny River, Girty's Run
Municipality of Monroeville:	Abers Creek, Dirty Camp Run, East Thompson Run, Leak Run, Piersons Run, Turtle Creek, Unnamed Stream along Moss Side Boulevard

Allegheny County FIS Description of Hydrologic Analysis

Hydrology for the following streams was developed using multiple regression formulae for rural watersheds with drainage areas between 0 and 25 square miles (Reference 27).

Borough of Bell Acres:	Big Sewickley Creek
Municipality of Bethel Park:	Graesers Run, Piney Fork, Tributary 1 to Piney Fork
Borough of Bridgeville:	McLaughlin Run
Township of Fawn:	Bull Creek, Tributary to Bull Creek
Township of Findlay:	Montour Run, McClarens Run, North Fork Montour Run, South Fork Montour Run
Township of Harrison:	Little Bull Creek
Township of Indiana:	Little Deer Creek
Borough of Jefferson Hills:	Lick Run
Borough of Leetsdale:	Big Sewickley Creek
Township of Marshall:	Brush Creek 2
Township of North Fayette:	Montour Run, South Fork Montour Run
Township of North Versailles:	Thompson Run
Township of Ohio:	Bear Run
Township of Ross:	Girty's Run, Lowries Run, Rochester Run
Township of South Park:	Lick Run
Borough of Turtle Creek:	Thompson Run
Township of Upper St. Clair:	McLaughlin Run
Township of West Deer:	Deer Creek, Little Deer Creek, West Branch Deer Creek
Borough of White Oak:	Jacks Run, Long Run
Township of Wilkins:	Thompson Run

▸ Replac

Allegheny County FIS Summary of Discharges

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chanc
CHARTIERS CREEK (continued)					
At confluence of Robinson Run	216.00	8,800	16,800	21,200	33,600
At confluence of Thoms Run	192.00	8,600	16,100	20,000	31,500
At confluence of Millers Run	163.80	8,050	15,000	18,700	29,200
At Township of Upper St. Clair downstream corporate limits	163.20	8,050	15,000	18,700	29,200
Downstream of McLaughlin Run	*	2,620	3,990	4,880	7,750
Upstream of McLaughlin Run	*	1,500	2,200	2,475	7,750
CHARTIERS CREEK – DIVERSION CHANNEL					
At inlet	*	7,300	14,600	18,725	25,865
CHALFANT RUN					
At confluence of Thompson Run	4.45	1,070	1,850	2,210	3,270
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
THOMPSON RUN					
At confluence with Turtle Creek	17.9	2,890	5,000	6,000	8,820

POI C

POI1

*Data not available

Allegheny County FIS Summary of Discharges

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding: 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
THOMPSON RUN (continued)					
At downstream Township of Wilkins corporate limits	15.42	2,890	3,905[1]	4,280[1]	5,850[1]
Approximately 50 feet upstream of the Union Railroad Spur bridge	15.42	2,890	5,000	6,000	8,820
POI3 At confluence of Chalfant Run	10.39	2,100	3,650	4,400	6,480
POI4 At U.S. Route 22	8.90	1,850	3,210	3,880	5,680
POI6 At confluence of Leak Run	5.81	1,320	2,300	2,750	4,080
POI7 At downstream side of Thompson Run Road bridge upstream of Frey Road	2.39	640	1,120	1,340	1,980
TRIBUTARY A					
At confluence with Chartiers Creek	1.10	300	550	700	1,150
TRIBUTARY TO BULL CREEK					
At confluence with Bull Creek	1.40	525	900	1,090	1,650
TRIBUTARY 1 TO PINEY FORK					
At confluence with Piney Fork	2.30	670	960	1,090	1,410
At tributary near Beagle Drive	1.90	550	790	900	1,150
TURTLE CREEK					
At East Pittsburgh gage n	146.00	9,550	13,800	15,500	20,500
At downstream Municipality of Monroeville corporate limits	120.00	9,550	13,800	15,500	20,500
At confluence of Brush Creek	155.90	4,600	6,500	7,400	9,400
Approximately 650 feet downstream of confluence of Abers Creek	41.60	3,600	5,200	5,820	7,400

[1]Discharges reduced for out-of-bank divided flow

Allegheny County FIS Summary of Discharges

TABLE 6 - SUMMARY OF DISCHARGES – (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	Annual Chance of Flooding: 10-percent annual chance	2-percent annual chance	1- percent annual chance	0.2-percent annual chance
JACKS RUN					
At confluence with Long Run	4.37	675	1,235	1,555	2,545
POI B					
LEAK RUN					
At confluence with Thompson Run	1.81	520	900	1,080	1,590
Approximately 770 feet upstream of Union Railroad tunnel	1.81	520	705[1]	765[1]	975[1]
Approximately 2,210 feet downstream of Old William Penn Highway bridge	1.81	520	900	1,080	1,590
Downstream side of Old William Penn Highway bridge	1.43	460	740	890	1,310

[1]Discharges reduced for out-of-bank divided flow

POI A					
SAWMILL RUN					
At downstream Township of Wilkins corporate limits	1.89	540	930	1,110	1,640
Approximately 50 feet upstream of Moss Street	1.64	480	830	1,000	1,460
Approximately 200 feet upstream of second private road bridge	1.40	440	730	880	1,290
Approximately 150 feet Downstream of intersection Of Kingsdale road and Beulah Road	0.91	*	*	652	*
At the intersection of Thornbury Drive and Beulah Road	0.80	*	*	584	*

*Data not available

Thompson Run Watershed

TECHNICAL APPENDIX C.3

HEC-HMS Model Calibration

Allegheny County
PennDOT District 11-0

NEWELL TERESKA & MACKAY
ENGINEERING

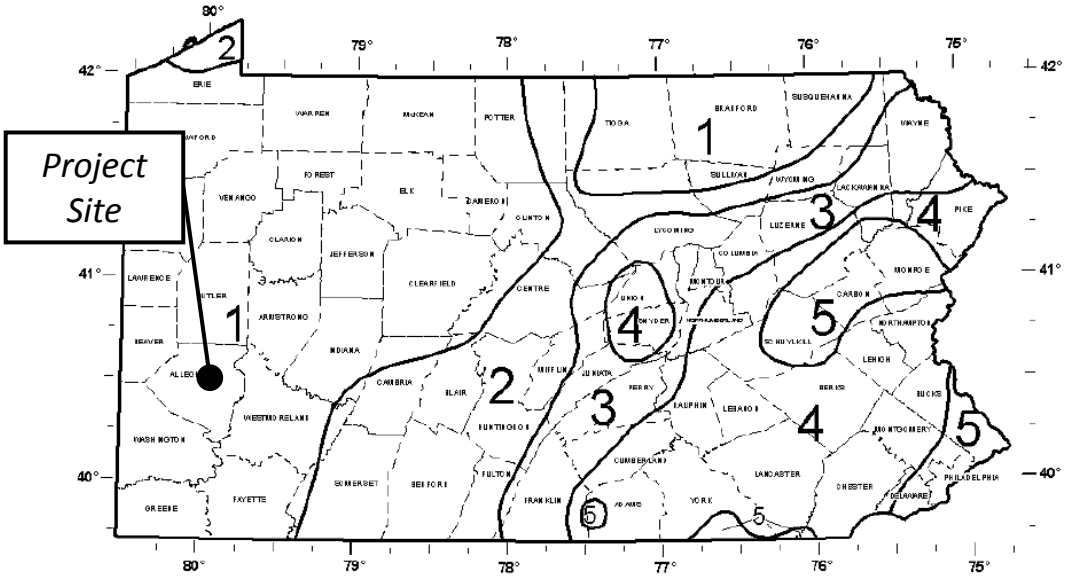
PDT-IDF Curves

24-Hour Precipitation Depths

Table 7A.1 Appropriate Rainfall Region Map for each Storm Duration and Frequency

	Frequency							
Duration	**1 year**	**2 year**	**5 year**	**10 year**	**25 year**	**50 year**	**100 year**	**500 year**
5 min	C	C	C	C	B	B	B	-
10 min	C	C	C	C	C	C	C	-
15 min	A	A	A	A	C	C	C	-
30 min	A	A	A	A	A	C	C	-
60 min	A	A	A	A	A	C	C	-
2 hr	E	E	E	E	E	E	E	-
3 hr	E	E	E	E	E	E	E	-
6 hr	D	D	D	D	D	D	D	-
12 hr	F	F	F	F	F	F	F	-
24 hr	F	F	F	F	F	F	F	F

MAP F

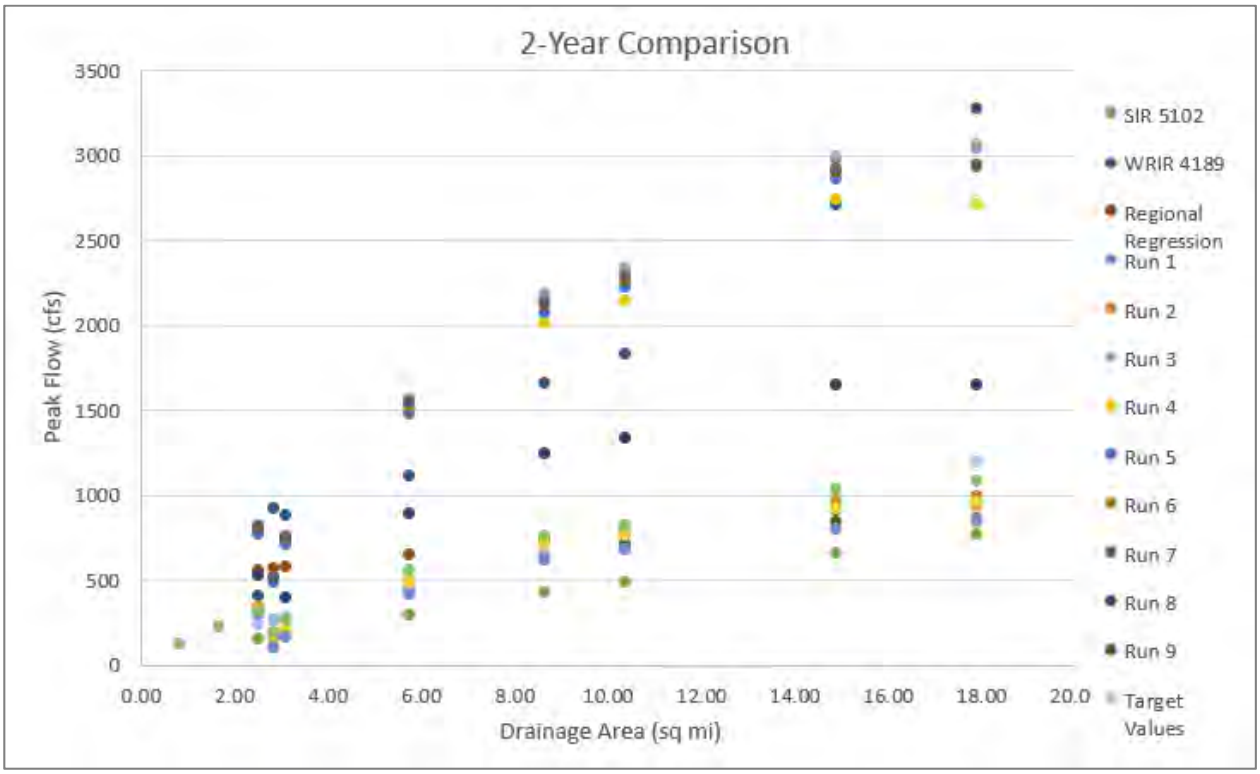


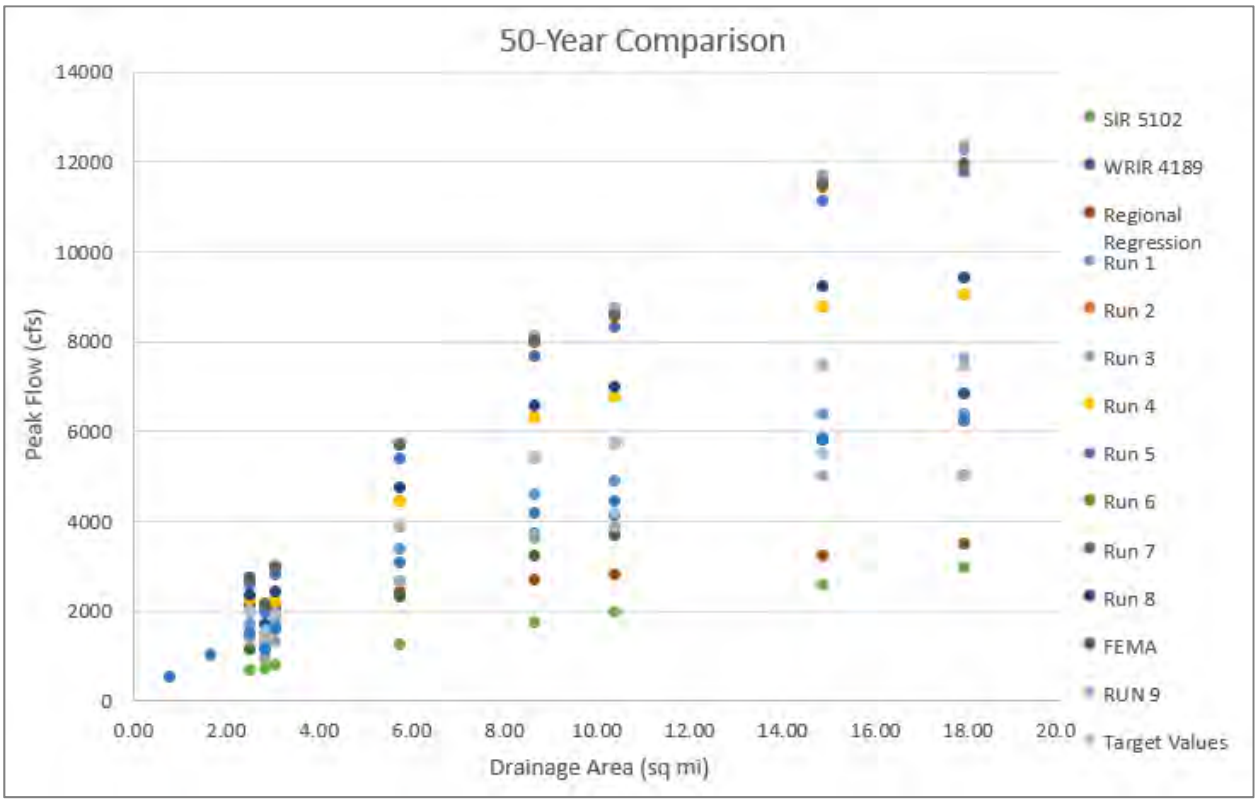
Region 4								
Rainfall Total								
	1-Yr Storm	2-Yr Storm	5-Yr Storm	10-Yr Storm	25-Yr Storm	50-Yr Storm	100-Yr Storm	500-Yr Storm
Duration (Min)	in	in	in	in	in	in	in	in
5	0.35	0.42	0.49	0.55	0.63	0.70	0.77	
10	0.54	0.65	0.76	0.85	0.97	1.07	1.16	
15	0.67	0.79	0.94	1.05	1.21	1.32	1.44	
30	0.88	1.07	1.29	1.47	1.71	1.90	2.09	
60	1.09	1.32	1.65	1.90	2.23	2.51	2.80	
120	1.29	1.57	1.96	2.28	2.72	3.09	3.58	
180	1.42	1.72	2.16	2.51	3.01	3.45	3.98	
360	1.77	2.14	2.70	3.15	3.80	4.33	4.89	
720	2.20	2.65	3.29	3.87	4.74	5.46	6.26	
1440	2.64	3.16	3.91	4.57	5.60	6.53	7.63	10.98

Calibration Target Flows:
Gage Transformation Analysis Flows

		Gage Transformation							
Location		1-Year	2-Year	2.33-Year	5-Year	10-Year	25-Year	50-Year	100-Year
POI	Element	Target	Target	Target	Target	Target	Target	Target	Target
	W980								
POI#7	W680								
POI#8	J306	168	283	293	374	834	1302	1698	2128
POI#7	R220								
POI#6	J314	291	459	493	689	1318	2046	2645	3299
POI#4	J299	437	659	725	1086	1852	2862	3674	4567
POI#3	J272	546	757	847	1323	2133	3260	4173	5181
POI#5	J322	150	256	263	329	758	1184	1548	1942
POI#2	J280	701	1023	1142	1773	2808	4316	5493	6800
POI 1	Outlet1	871	1193	1386	2399	3247	4982	6322	7815
POI#7	W680, R220	132	229	233	286	682	1067	1398	1755

Calibration Results





Run Parameters (Run 1)

Thompson Run HEC-HMS Parameters (Run 1)											
Subbasin	Drainage Area (mi^2)	Initial Abstraction (in)	Curve Number	Lag Time (min)	Reach	Length (ft)	Slope (ft/ft)	Manning's n	Shape	Width (ft)	Side Slope (xH:1V)
W980	0.35668		75.217	27.259	R70	5033.3	0.0127353	0.045	Trapezoid	5	2
W960	0.37825		77.382	19.11	R130	2940.8	0.0102897	0.045	Trapezoid	5	2
W1470	0.65208		79.027	67.429	R140	5598.4	0.0234462	0.045	Trapezoid	5	2
W1450	0.35232		76.186	19.841	R210	2463.9	0.0059744	0.045	Trapezoid	5	2
W1320	0.0774152		80.018	8.8449	R110	2185.7	0.0044516	0.045	Trapezoid	5	2
W1330	0.83992		78.105	27.276	R220	6650.4	0.0167674	0.045	Trapezoid	5	2
W1310	0.17631		79.72	13.294	R250	2602.9	0.0082984	0.045	Trapezoid	5	2
W1300	0.88313		78.504	27.88	R280	7612.7	0.0183313	0.045	Trapezoid	5	2
W1290	0.12782		80.767	10.431	R300	2118.3	0.00279	0.045	Trapezoid	5	2
W680	0.8331		80.802	30.863	R390	4427.4	0.0050143	0.045	Trapezoid	5	2
W1280	0.17022		78.421	11.862	R410	2069.2	0.0117873	0.045	Trapezoid	5	2
W1270	0.35446		79.566	22.571	R460	1390.6	0.0046887	0.045	Trapezoid	5	2
W670	0.53134		72.156	31.77	R480	2286.6	0.0135614	0.045	Trapezoid	5	2
W590	0.54604		75.542	24.491	R310	4301.4	0.0217721	0.045	Trapezoid	5	2
W580	0.79722		76.487	23.6	R320	3351.2	0.0225684	0.045	Trapezoid	5	2
W560	0.71242		76.752	27.819	R360	4003.4	0.0321078	0.045	Trapezoid	5	2
W620	0.67262		79.083	27.362	R470	6281.5	0.0120513	0.045	Trapezoid	5	2
W1620	0.12785		81.967	73.075	R1570	2099.3	0.002115	0.045	Trapezoid	5	2
W1600	0.61647		78.757	26.264	R490	4268.9	0.0075945	0.045	Trapezoid	5	2
W1610	0.28498		80.098	19.282	R520	1918.3	0.0019288	0.045	Trapezoid	5	2
W840	0.91265		79.409	30.051	R510	8954.7	0.0251912	0.045	Trapezoid	5	2
W1210	0.50796		74.292	32.511	R530	956.42	0.0016729	0.045	Trapezoid	5	2
W1400	1.1752		74.007	35.208							
W1500	0.6194		78.189	29.802							
W1230	0.38207		73.085	76.392							
W1490	0.19722		72.14	18.193							
W830	0.77402		70.174	27.046							
W920	0.84467		76.54	24.457							
W1550	0.84315		76.333	23.586							
W1170	0.13162		77.726	13.359							
W1000	0.71649		73.954	29.077							
W900	1.2331		74.398	42.794							
W1060	0.10132		79.148	13.027							

Run Parameters (Run 15 Low Flow)

Thompson Run HEC-HMS Parameters (Run 15 Low Flow) Decrease CN 10.5%, Increase Length 10%, Decrease Slope 10%, Increase Manning's n values to 0.06 and 0.04, LiDAR channel widths, IA Ratio=0.20*S, Increase Lag Time 20%. LAG TIME VALUES UPDATED											
Subbasin	Drainage Area (mi^2)	Initial Abstraction (in)	Curve Number	Lag Time (min)	Reach	Length (ft)	Slope (ft/ft)	Manning's n	Shape	Width (ft)	Side Slope (xH:1V)
W980	0.35668	0.970919967	67.3192	32.7108	R70	5536.63	0.0114618	0.06	Trapezoid	10	2
W960	0.37825	0.887799322	69.2569	22.932	R130	3234.88	0.0092607	0.06	Trapezoid	10	2
W1470	0.65208	0.827687843	70.7292	36.5608512	R140	6158.24	0.0211016	0.06	Trapezoid	10	2
W1450	0.35232	0.933133215	68.1865	23.8092	R210	2710.29	0.005377	0.06	Trapezoid	15	2
W1320	0.0774152	0.792667739	71.6161	10.61388	R110	2404.27	0.0040064	0.06	Trapezoid	10	2
W1330	0.83992	0.861067629	69.904	32.7312	R220	7315.44	0.0150907	0.06	Trapezoid	15	2
W1310	0.17631	0.803106964	71.3494	15.9528	R250	2863.19	0.0074686	0.06	Trapezoid	20	2
W1300	0.88313	0.846526128	70.2611	33.456	R280	8373.97	0.0164982	0.06	Trapezoid	15	2
W1290	0.12782	0.766769685	72.2865	12.5172	R300	2330.13	0.002511	0.06	Trapezoid	20	2
W680	0.8331	0.765571238	72.3178	37.0356	R390	4870.14	0.0045129	0.06	Trapezoid	20	2
W1280	0.17022	0.849538863	70.1868	14.2344	R410	2276.12	0.0106086	0.06	Trapezoid	20	2
W1270	0.35446	0.808532378	71.2116	27.0852	R460	1529.66	0.0042198	0.06	Trapezoid	5	2
W670	0.53134	1.096952258	64.5796	38.124	R480	2515.26	0.0122059	0.06	Trapezoid	20	2
W590	0.54604	0.958138349	67.6101	29.3892	R310	4731.54	0.0195949	0.06	Trapezoid	5	2
W580	0.79722	0.921590429	68.4559	28.32	R320	3686.32	0.0203116	0.06	Trapezoid	5	2
W560	0.71242	0.911503116	68.693	33.3828	R360	4403.74	0.028897	0.06	Trapezoid	15	2
W620	0.67262	0.82568551	70.7793	32.8344	R470	6909.65	0.0108462	0.06	Trapezoid	15	2
W1620	0.12785	0.726264072	73.3605	25.5318048	R1570	2309.23	0.0019035	0.04	Trapezoid	30	2
W1600	0.61647	0.837381911	70.4875	31.5168	R490	4695.79	0.0068351	0.04	Trapezoid	30	2
W1610	0.28498	0.789878488	71.6877	23.1384	R520	2110.13	0.0017359	0.04	Trapezoid	30	2
W840	0.91265	0.814085143	71.0711	36.0612	R510	9650.17	0.0226721	0.04	Trapezoid	5	2
W1210	0.50796	1.007910504	66.4913	39.0132	R530	1052.062	0.0015056	0.04	Trapezoid	30	2
W1400	1.1752	1.019493928	66.2363	42.2496							
W1500	0.6194	0.857993927	69.9792	35.7624							
W1230	0.38207	1.057586196	65.4111	17.019936							
W1490	0.19722	1.097639134	64.5653	21.8316							
W830	0.77402	1.184422823	62.8057	32.4552							
W920	0.84467	0.919567979	68.5033	29.3484							
W1550	0.84315	0.927484668	68.318	28.3032							
W1170	0.13162	0.87501849	69.5648	16.0308							
W1000	0.71649	1.021657884	66.1888	34.8924							
W900	1.2331	1.003624925	66.5862	51.3528							
W1060	0.10132	0.823364926	70.8375	15.6324							

Run Parameters (Run 15 High Flow)

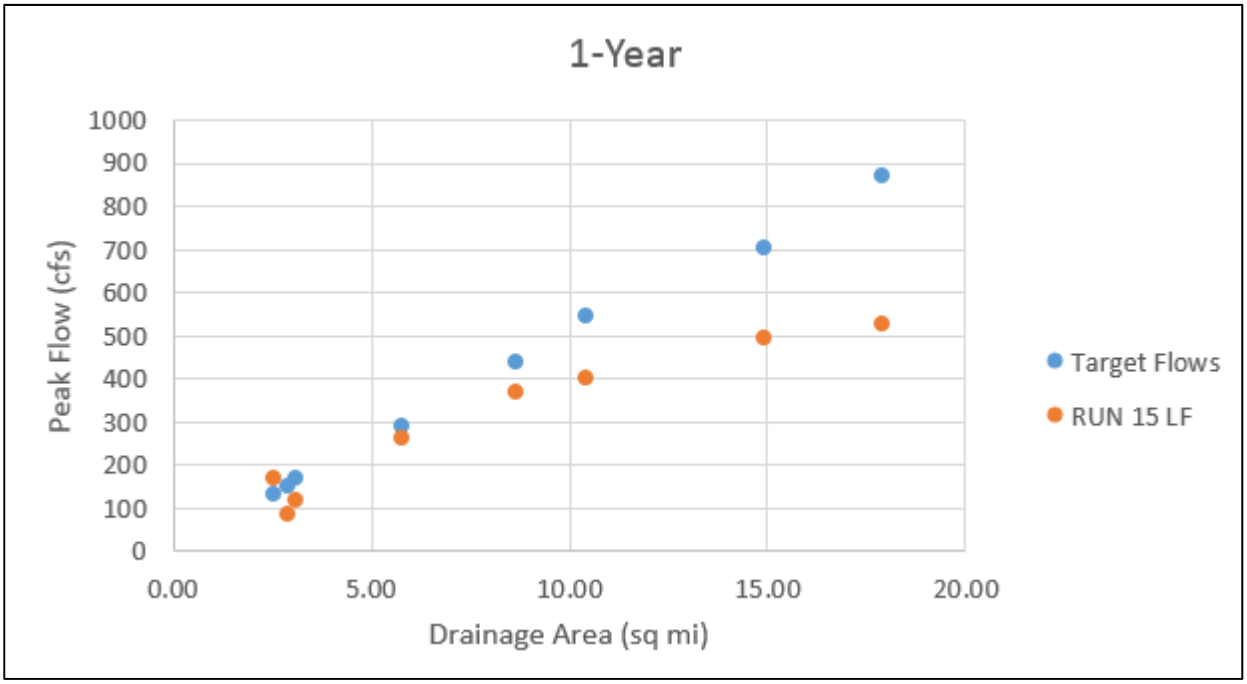
Thompson Run HEC-HMS Parameters (Run 15 High Flow) Decrease CN 13%, Increase Length 10%, Decrease Slope 10%, Increase Manning's n values to 0.06 and 0.04, LiDAR channel widths, IA Ratio=0.20*S, Increase Lag Time 20%. LAG TIME VALUES UPDATED											
Subbasin	Drainage Area (mi^2)	Initial Abstraction (in)	Curve Number	Lag Time (min)	Reach	Length (ft)	Slope (ft/ft)	Manning's n	Shape	Width (ft)	Side Slope (xH:1V)
W980	0.35668	1.05629123	65.4388	32.7108	R70	5536.63	0.0114618	0.06	Trapezoid	10	2
W960	0.37825	0.970782061	67.3223	22.932	R130	3234.88	0.0092607	0.06	Trapezoid	10	2
W1470	0.65208	0.908943241	68.7535	36.5608512	R140	6158.24	0.0211016	0.06	Trapezoid	10	2
W1450	0.35232	1.017418653	66.2818	23.8092	R210	2710.29	0.005377	0.06	Trapezoid	15	2
W1320	0.0774152	0.872916812	69.6157	10.61388	R110	2404.27	0.0040064	0.06	Trapezoid	10	2
W1330	0.83992	0.943282216	67.9514	32.7312	R220	7315.44	0.0150907	0.06	Trapezoid	15	2
W1310	0.17631	0.883656014	69.3564	15.9528	R250	2863.19	0.0074686	0.06	Trapezoid	20	2
W1300	0.88313	0.928322856	68.2985	33.456	R280	8373.97	0.0164982	0.06	Trapezoid	15	2
W1290	0.12782	0.846274561	70.2673	12.5172	R300	2330.13	0.002511	0.06	Trapezoid	20	2
W680	0.8331	0.845041676	70.2977	37.0356	R390	4870.14	0.0045129	0.06	Trapezoid	20	2
W1280	0.17022	0.931422163	68.2263	14.2344	R410	2276.12	0.0106086	0.06	Trapezoid	20	2
W1270	0.35446	0.889237331	69.2224	27.0852	R460	1529.66	0.0042198	0.06	Trapezoid	5	2
W670	0.53134	1.185945139	62.7757	38.124	R480	2515.26	0.0122053	0.06	Trapezoid	20	2
W590	0.54604	1.043142324	65.7215	29.3892	R310	4731.54	0.0195949	0.06	Trapezoid	5	2
W580	0.79722	1.005544177	66.5437	28.32	R320	3686.32	0.0203116	0.06	Trapezoid	5	2
W560	0.71242	0.995166999	66.7742	33.3828	R360	4403.74	0.028897	0.06	Trapezoid	15	2
W620	0.67262	0.906883369	68.8022	32.8344	R470	6909.65	0.0108462	0.06	Trapezoid	15	2
W1620	0.12785	0.804604993	71.3113	25.5318048	R1570	2309.23	0.0019035	0.04	Trapezoid	30	2
W1600	0.61647	0.918915874	68.5186	31.5168	R490	4695.79	0.0068351	0.04	Trapezoid	30	2
W1610	0.28498	0.87004741	69.6853	23.1384	R520	2110.13	0.0017359	0.04	Trapezoid	30	2
W840	0.91265	0.894949659	69.0858	36.0612	R510	9850.17	0.0226721	0.04	Trapezoid	5	2
W1210	0.50796	1.094344714	64.634	39.0132	R530	1052.062	0.0015056	0.04	Trapezoid	30	2
W1400	1.1752	1.106260995	64.3861	42.2496							
W1500	0.6194	0.940120189	68.0244	35.7624							
W1230	0.38207	1.145447869	63.584	17.019936							
W1490	0.19722	1.186651793	62.7618	21.8316							
W830	0.77402	1.275929226	61.0514	32.4552							
W920	0.84467	1.003462993	66.5898	29.3484							
W1550	0.84315	1.01160779	66.4097	28.3032							
W1170	0.13162	0.957633964	67.6216	16.0308							
W1000	0.71649	1.108487134	64.34	34.8924							
W900	1.2331	1.089935986	64.7263	51.3528							
W1060	0.10132	0.904496102	68.8588	15.6324							

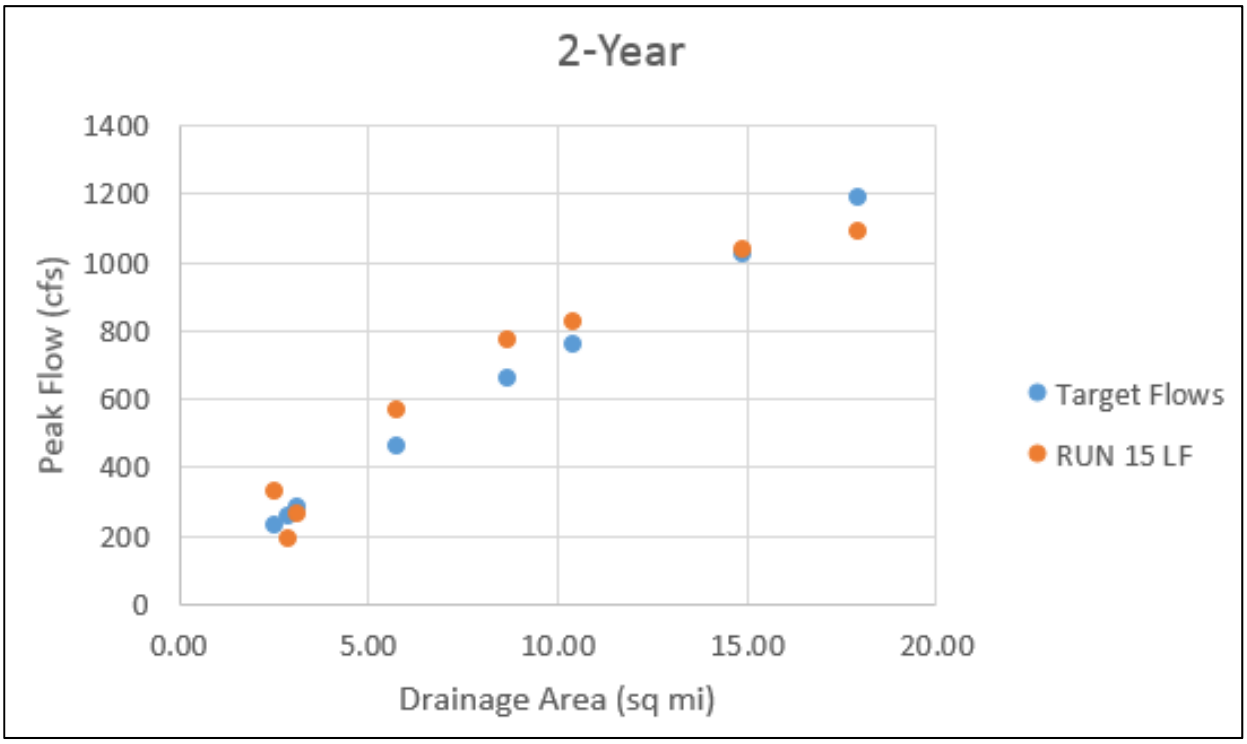
Final Calibrated Results

PEAK FLOW COMPARISON RUN 15 LOW FLOW											
POI	Element	DA	1-Year	% Difference	2-Year	% Difference	2.33-Year	% Difference	5-Year	% Difference	10-Year
POI8	J306	3.11	118.6	7%	264.4	40%	323.1	64%	545	113%	829.5
POI6	J314	5.77	262.5	37%	566.8	83%	687	105%	1136.9	137%	1699.5
POI4	J299	8.66	370.3	28%	774.2	73%	933.5	89%	1529.4	102%	2282.3
POI3	J272	10.40	398.9	12%	823	62%	990.6	73%	1621.1	77%	2425.2
POI5	J322	2.88	86.3	-18%	194.2	8%	237.4	28%	400.5	70%	610.1
POI2	J280	14.90	495.3	7%	1038.8	50%	1256.2	62%	2083	68%	3151.8
POI1	Outlet1	17.93	524.6	-9%	1091.2	34%	1318.2	38%	2187	29%	3320.8
POI7	W680, R220	2.54	168.4	88%	332.8	109%	395.2	142%	622.1	205%	898.2

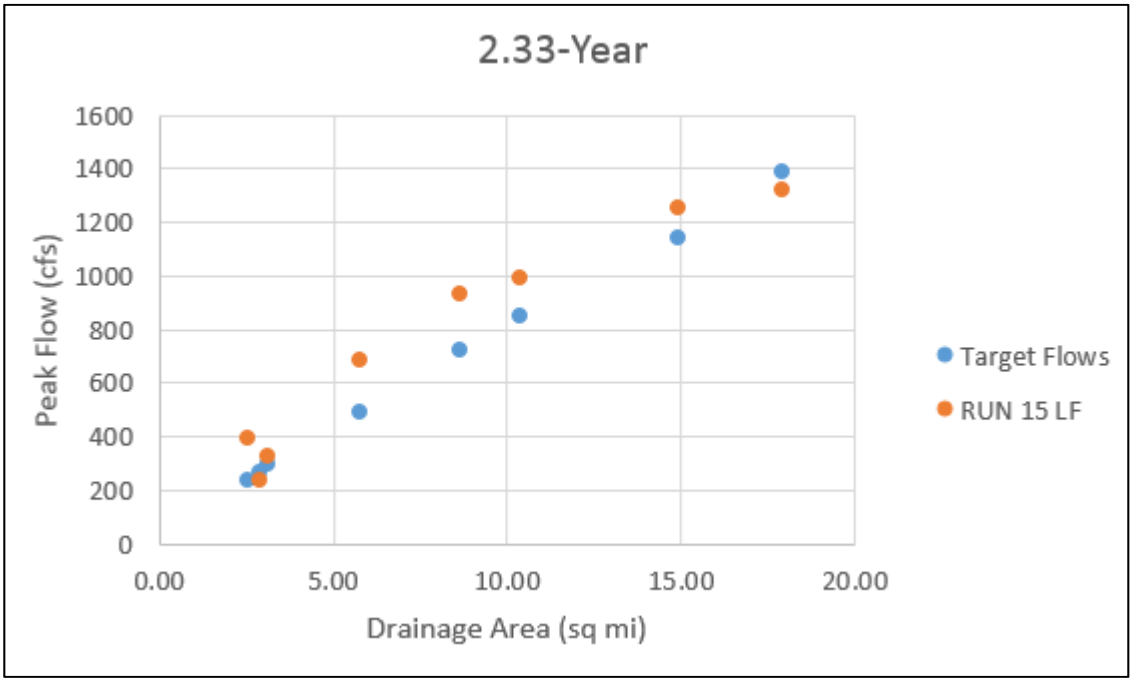
PEAK FLOW COMPARISON RUN 15 HIGH FLOW								
POI	Element	DA	100-Year	% Difference	50-Year	% Difference	25-Year	% Difference
POI8	J306	3.11	2064.2	38.82%	1576.1	35.97%	1147	32.20%
POI6	J314	5.77	4062.3	71.99%	3135.7	69.57%	2312.4	65.89%
POI4	J299	8.66	5518.9	68.91%	4238.1	65.20%	3114.5	59.85%
POI3	J272	10.40	5938.6	57.97%	4540.9	54.33%	3321.5	48.88%
POI5	J322	2.88	1529.8	8.25%	1165.2	5.65%	846	2.53%
POI2	J280	14.90	7912.1	60.17%	6007.5	54.79%	4357.6	47.05%
POI1	Outlet1	17.93	8457.8	47.72%	6393	41.76%	4613.7	33.43%
POI7	W680, R220	2.54	2020.8	56.52%	1583.9	57.87%	1194.7	59.79%

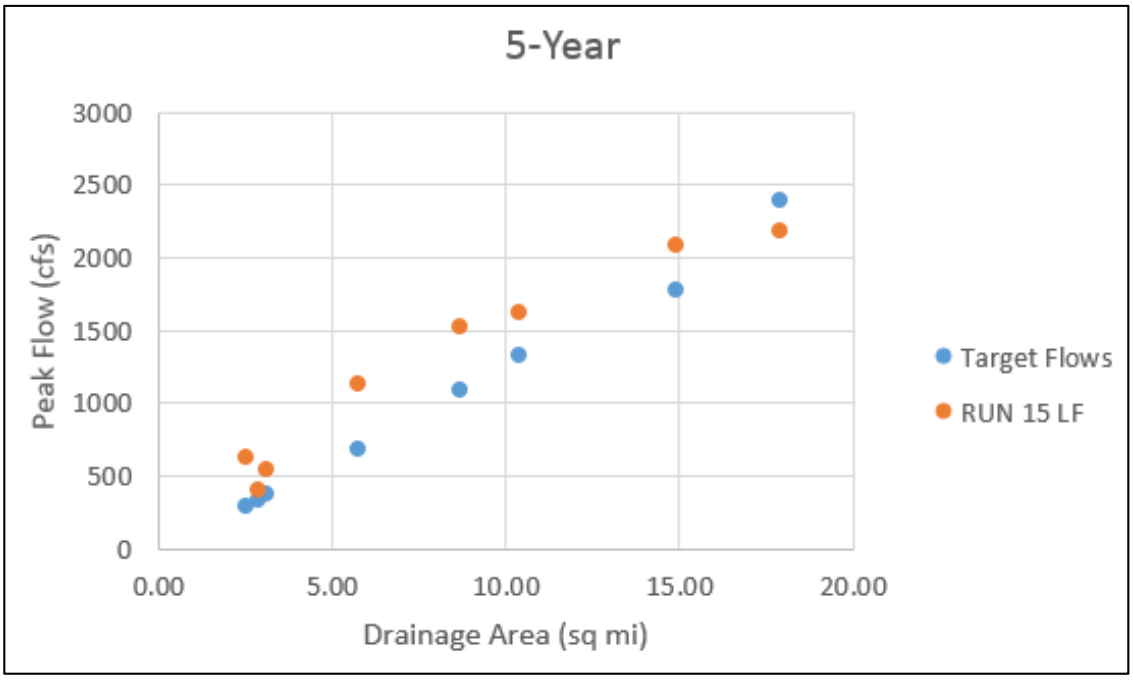
Final Calibrated Results



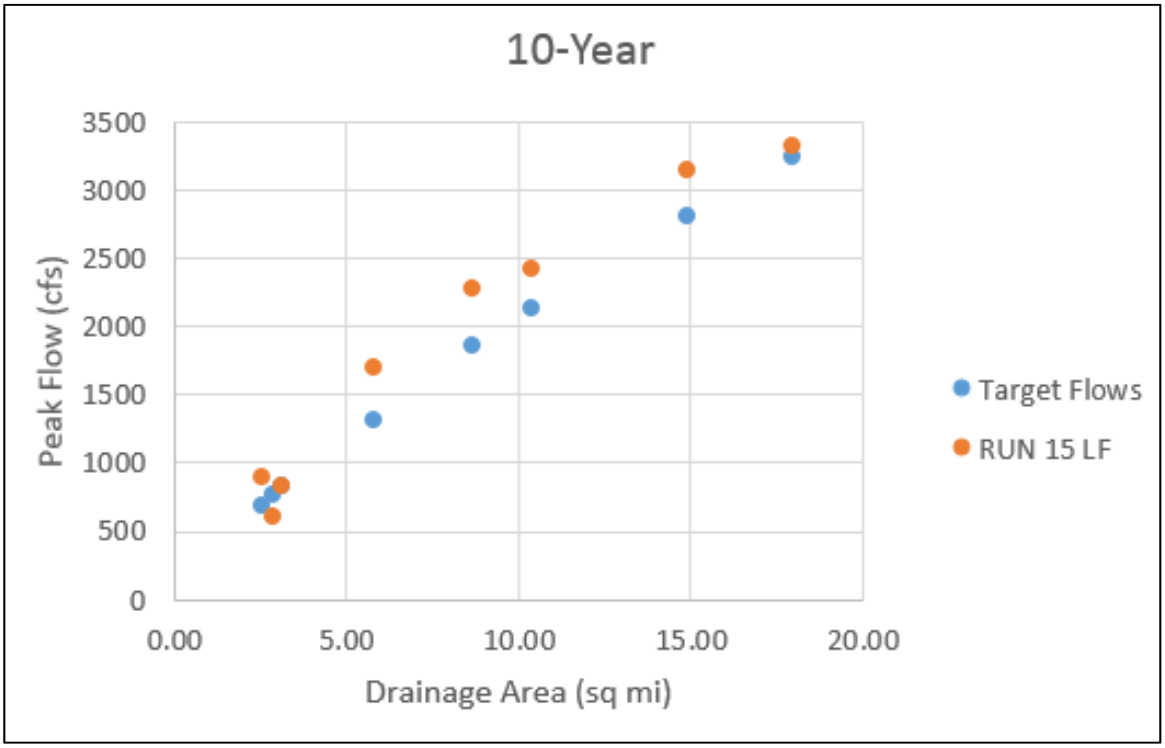


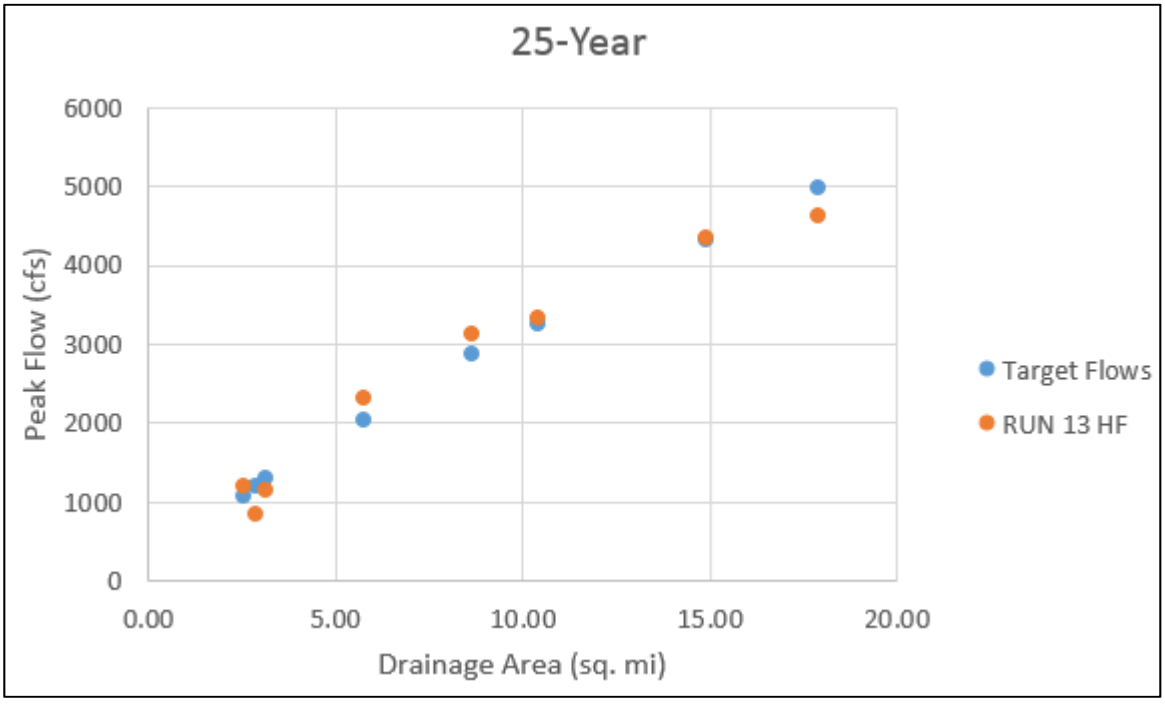
Final Calibrated Results



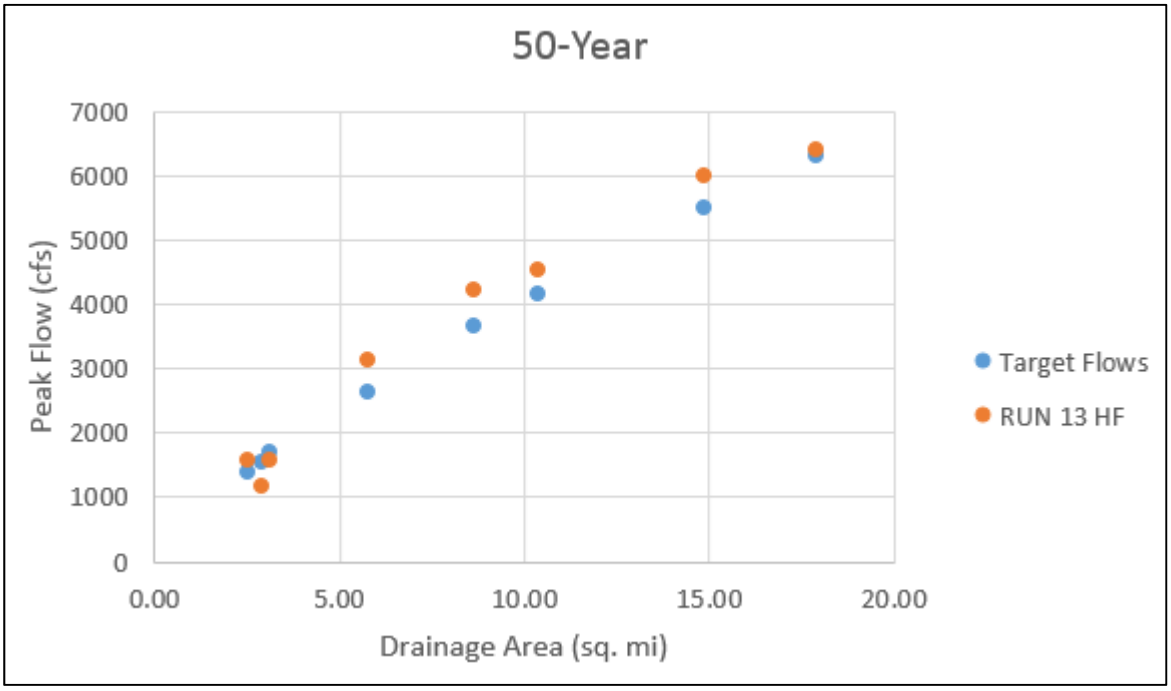


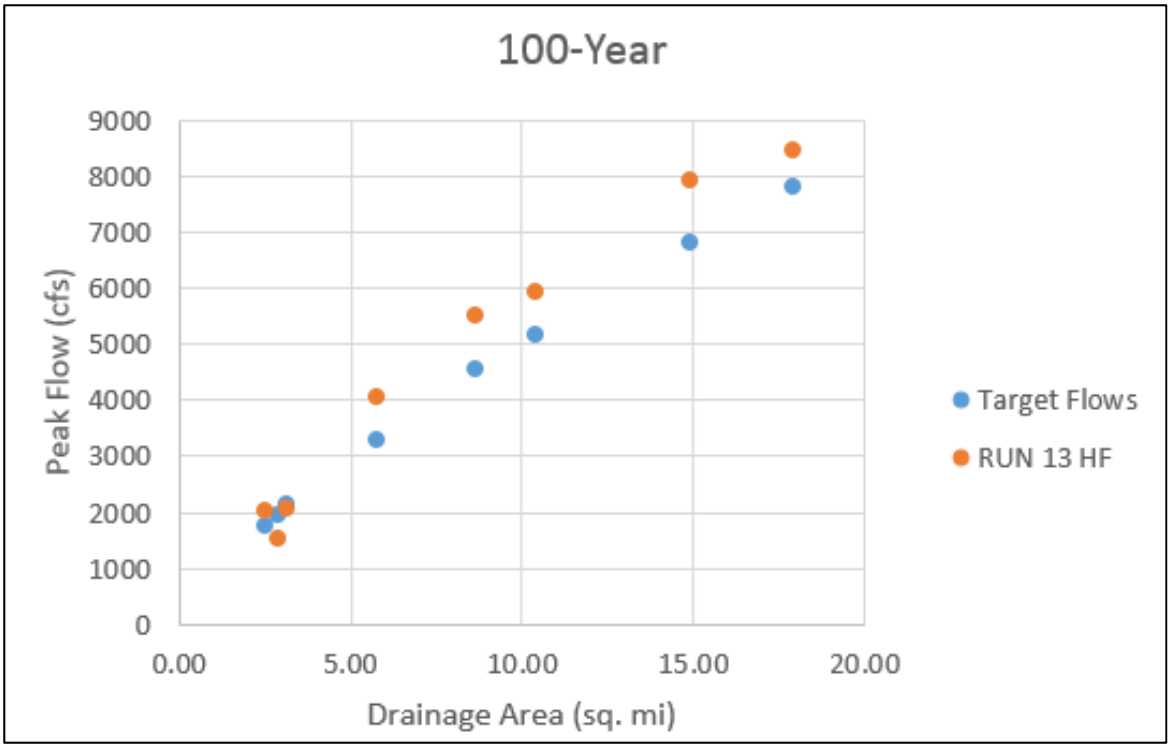
Final Calibrated Results





Final Calibrated Results





May 31, 2018

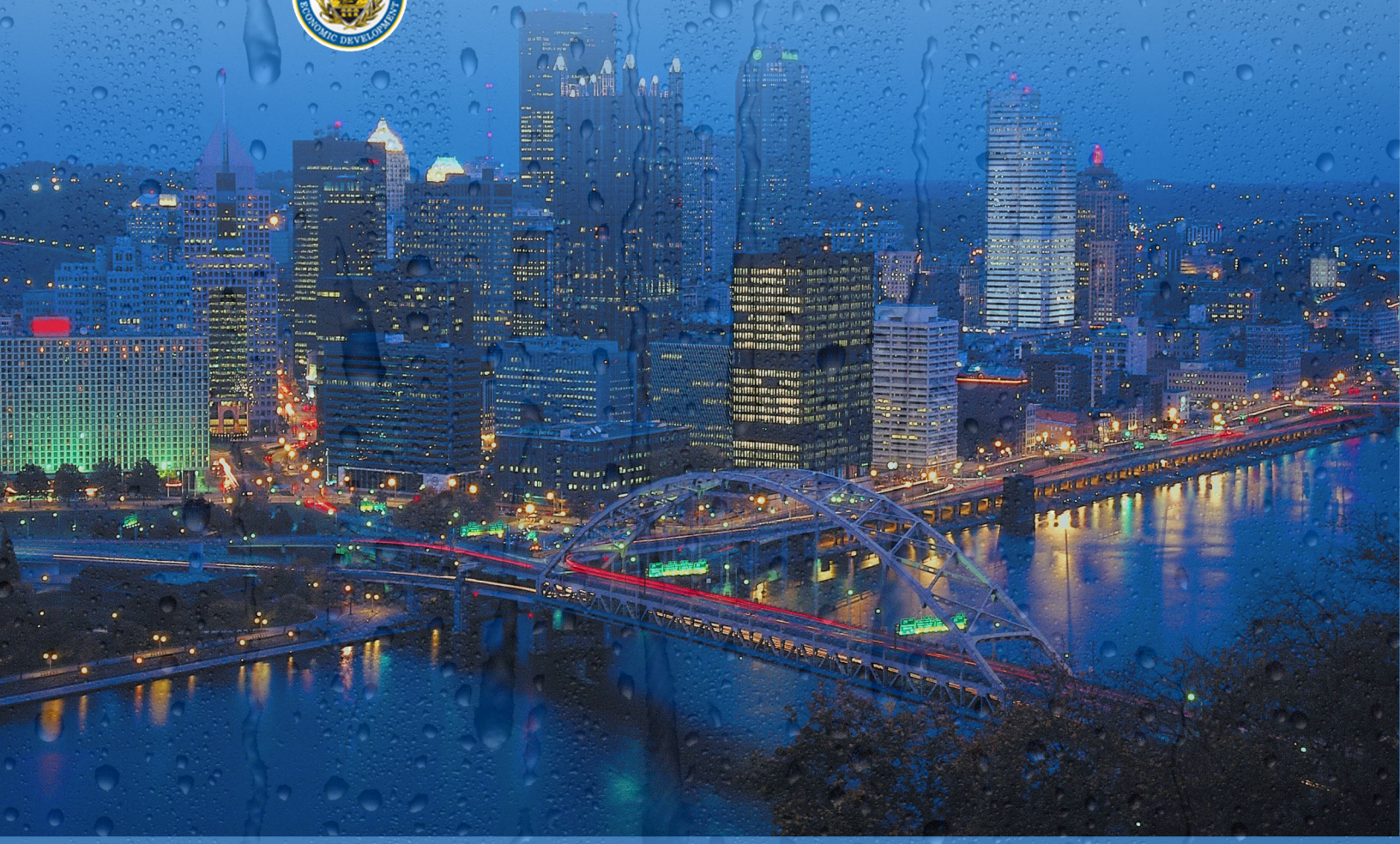
Appendices B, C, D, & E

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

Allegheny County Department of Economic Development
One Chatham Center
112 Washington Place, Suite 900
Pittsburgh, PA 15219

Michael Baker International, Inc.
100 Airside Drive
Moon Township, PA 15108

Michael Baker
INTERNATIONAL

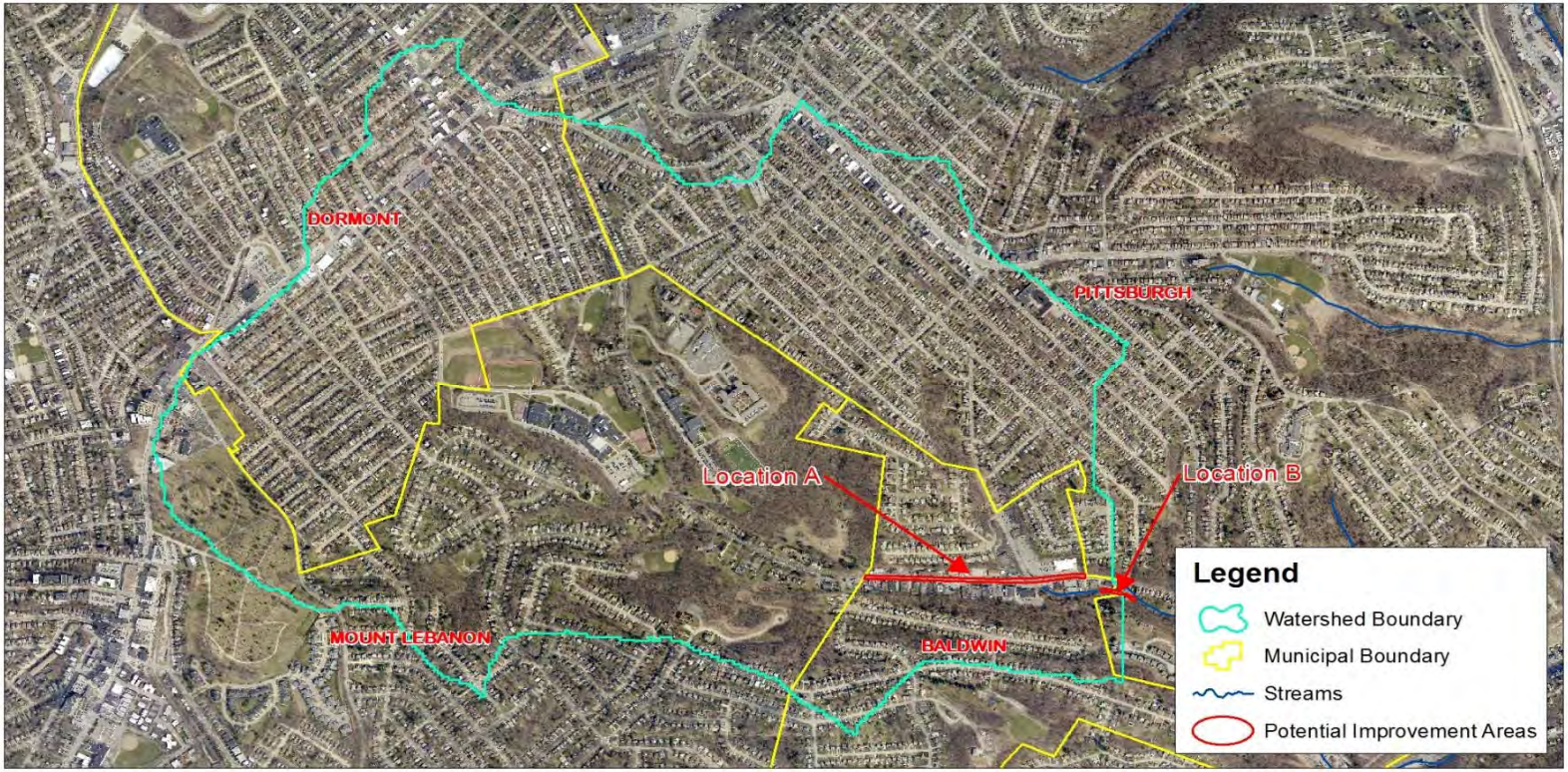


APPENDIX B

PROBLEM AREA CONCEPTUAL SOLUTIONS

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #1

Allegheny County Act 167 Plan



Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 1, Baldwin Township 1	Baldwin Township	Tributary to Sawmill Run	Verify capacity of inlets and stream to carry flows

Description: Flooding along the length McNeilly Road within Baldwin Township caused by runoff and obstructions in the stream channel. There is a stream enclosure that runs parallel to McNeilly Road that drains the majority of the watershed. Surface flooding is directed to a limited number of catch basins along the road. It is recommended that the existing inlets' capacity to capture stormwater be observed during storm conditions. Residential and industrial development in the watershed appears to be constructed prior to current stormwater management standards and is likely contributing to flooding issue. Debris within the stream channel causing damming of water downstream was also noted.

PROBLEM AREA #1-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 1, Baldwin Township 1	Inspected By/Date:	JLB of Sci-Tek / 7/2/2015
Municipality:	Baldwin Township	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Flooding - Inadequate drainage system; Bridge/culvert/other obstructions; Sediment/debris		





Roadway with limited number of catch basins (left). Debris within the stream channel causing damming of water (right).

Potential Solutions

1) Verify the capacity of existing inlets along McNeilly Road to intercept runoff and the capacity of the stream enclosure that runs parallel to the road. Develop an improvements plan, if necessary. Location A

2) Clean and remove debris from the stream enclosure and channel along McNeilly Road. Location B

3) Evaluate the potential to install source reduction (infiltration) best management practices (BMPs) in upstream municipalities with the goal of attenuating peak flow to problem location

Regional Basin Modeling Results

Drainage Area	1.39 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	101 cfs		
10-Year	247 cfs		
50-Year	421 cfs		
100-Year	507 cfs		

Cost Estimate

1) $30,000	4)
2) $ 95,000	5)
3) $ 25,000	6)

*Insufficient information available to determine cost estimate

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #2

Allegheny County Act 167 Plan



Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution (note multiple solutions/problems)
Map_ID 2, Ben Avon	Ben Avon Borough	Spruce Run	1) Remove debris used to construct stream ford.

Description: Problem area #2 is on Spruce Run near the confluence of the Ohio River. Development in the floodplain obstructs flow and reduces water storage. Flow velocities are subsequently high during storm events which has caused stream bank and retaining wall erosion. Four sections of retaining walls have collapsed since 1996 costing the Ben Avon Borough over $300,000. Four homes within the floodplain experience basement and first floor flooding. Five to six industrial buildings have also experienced flooding. Municipality reports that stormwater retention ponds near I-279 have reduced storage capacity due to lack of maintenance.

PROBLEM AREA #2-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 2, Ben Avon	Inspected By/Date:	JLB of Sci-Tek/6/11/2015
Municipality:	Ben Avon Borough	Checked By/Date:	JS - Michael Baker 7/2016

Type of Problem(s): Inadequate culvert/bridge; Development w/l floodplain; Sediment/Debris; Streambank erosion.





Illegal fill dumped in stream (left) to provide a ford in the location of a washed out culvert. Development in the floodplain (right) obstructs flow, decreases storage, and increases stream velocities during periods of high rainfall. Structures are located within the current floodplain.

Potential Solutions

1. Remove makeshift, unstable stream ford in Spruce Run and replace it with a culvert or eliminate crossing at this location

2. Mitigate some flooding by moving municipal maintenance facilites outside of floodplain.

3. Implement a maintenance and cleaning program for the stormwater retention pond on I-279; and remove debris from stream within flooding area.

4. Conduct streambank stabilization.

5. Follow recommendations of the Allegheny County Hazard Mitigation Plan. Action Item 12 of the Hazard Mitigation Plan is specific to Ben Avaon Borough and sets forth that websites and newsletters be used to encourage residents in low lying areas to consider flood insurance.

Regional Basin Modeling Results

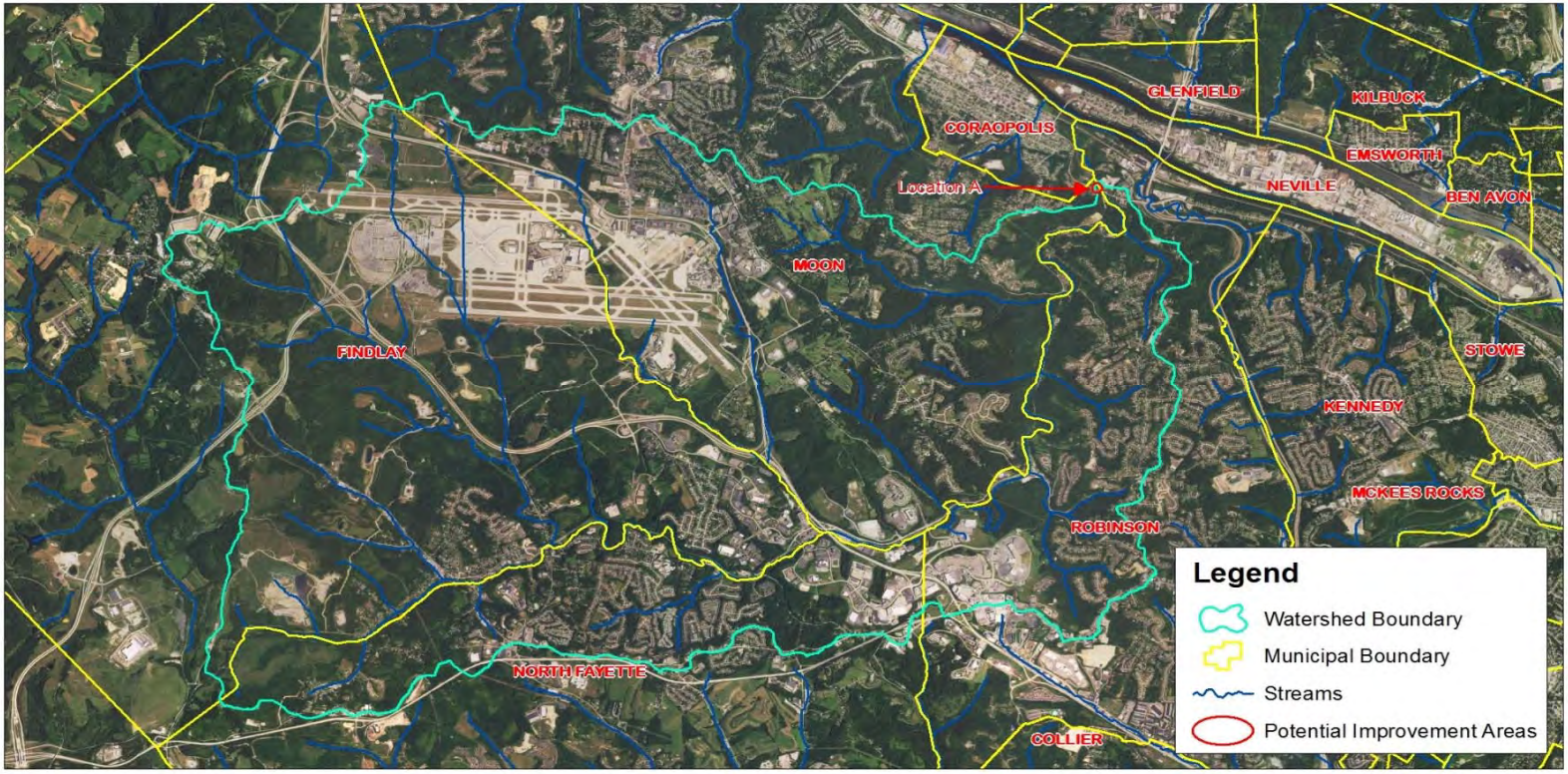
Drainage Area	2.05 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	147 cfs		
50-Year	610 cfs		

Cost Estimate

1) $10,000	4) $200,000
2) $200,000	5) Programatic to Hazard Mitigation Plan
3) $75,600	

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #42

Allegheny County Act 167 Plan



Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 42, Coraopolis-6	Coraopolis	Montour Run	Evaluate installing upstream BMPs to reduce flows

Description: Flooding on private property adjacent to Montour Run caused by runoff, an inadequate abandoned railroad bridge, and the backup from the Ohio River. No restrictions to flow were noted at the time of the site visit. There is a Sewage lift station that may be within the flooding area approximately 4,000 feet upstream of the confluence with the Ohio River.

PROBLEM AREA #42-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 42, Coraopolis-6	Inspected By/Date:	JLB of Sci-Tek / 7/14/2015
Municipality:	Coraopolis	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Flooding-Inadequate culvert/bridge; Development w/I floodplain		





Montour Run looking downstream on abandoned P & L-E Railroad bridge (left photo). Sewage lift station looking towards route 51 (right).

Potential Solutions

1) Evaluate the potential to install infiltration best management practices (BMPs) in upstream municipalities with the goal of attenuating peak flow to problem location during high frequency events.

2) Flood-proof private structures within the floodplain.

3) If being flooded, flood-proof the sewage lift station. Location A

Regional Basin Modeling Results

Drainage Area	36.1 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	1530 cfs		
10-Year	3290 cfs		
50-Year	5220 cfs		
100-Year	6150 cfs		

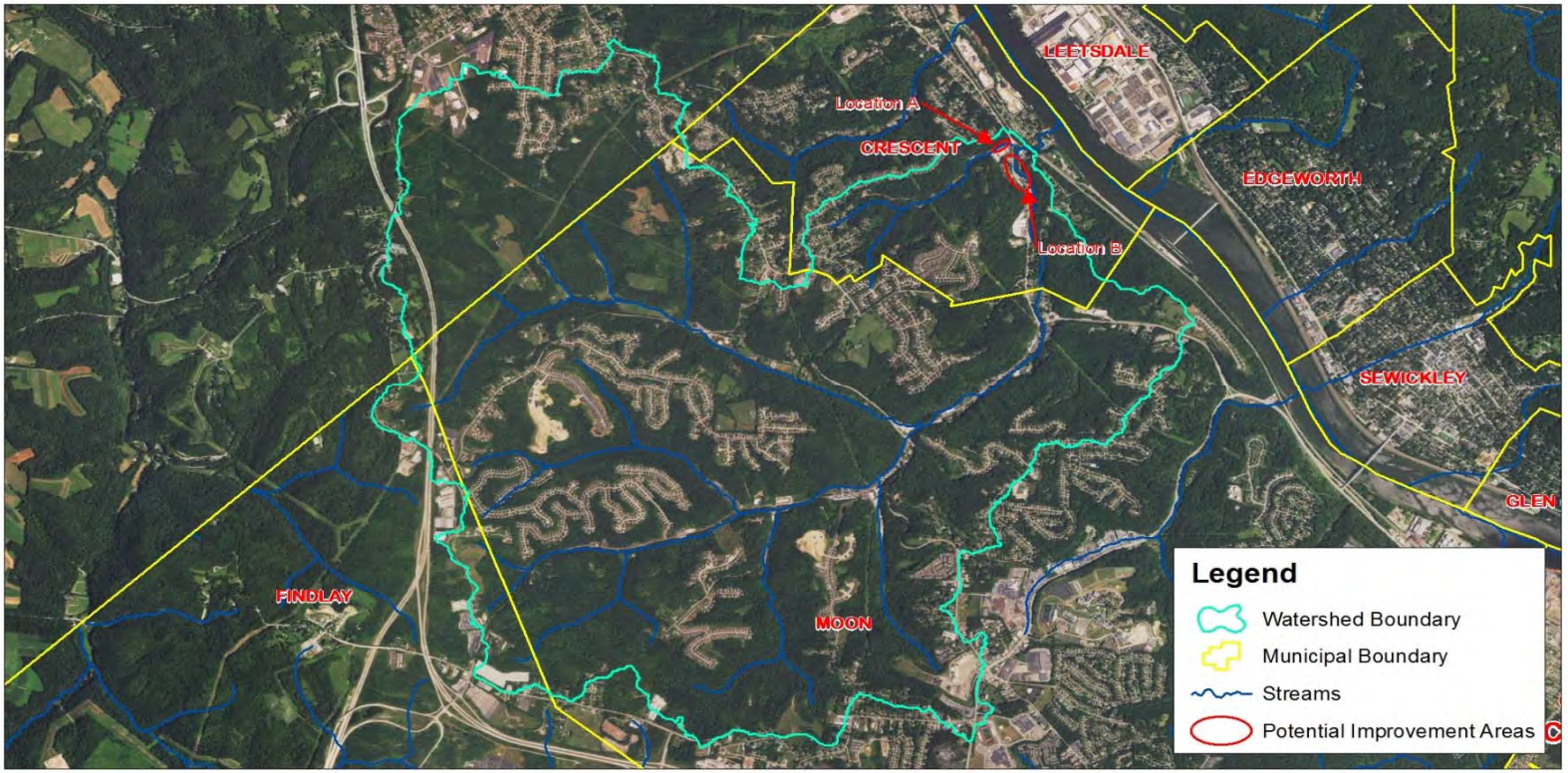
Cost Estimate

1) $50,000	4)
2) $ *	5)
3) $ 21,000	6)

*Insufficient information available to determine cost estimate

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #50

Allegheny County Act 167 Plan



Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 50, Cresent 2	Cresent Township	Flaugherty Run	Stabilize banks/roadway upstream of problem area

Description: Flooding on private property adjacent to Flaugherty Run caused by stormwater runoff and from the backup of the Ohio River. Roadway is impassable at times during high water events and must be closed to vehicles. Private residences with flood damages are located at the bottom of relatively steep wooded slope which likely contributes to flooding at the structures. Urban development in the watershed appears to be constructed prior to current stormwater management standards and may present an opportunity to add or retrofit existing stormwater control features. Joining Flaugherty Run at this roadway intersection is a tributary with inadequate channel and culvert causing overtopping and roadway flooding (problem area 52).

PROBLEM AREA #50-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 50, Crescent 2	Inspected By/Date:	JLB of Sci-Tek / 6/17/2015
Municipality:	Cresent Township	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Sediment/debris accumulation; Streambank erosion		





Flood Prone Area adjacent to Flaugherty Run (left). Flaugherty Run at confluence with the Ohio River(right).

Potential Solutions

1) Conduct stream restoration to repair eroded banks and remove accumulated sediment.

2) Stabilize banks/roadway upstream of problem area to reduce erosion. Location A

3) As funding becomes available, acquire, elevate, or flood proof structures in the flood zones as described in the Allegheny County 2015 Hazard Mitigation Plan. Location B

4) Implement maintenance program to periodically clean/maintain the channel, crossings and any additional measures implemented.

5) Perform engineering study to assess stormwater management in upper watershed for opportunities to retrofit or add stormwater management features with the goal of attenuating peak flow to Flaugherty Run

Regional Basin Modeling Results

Drainage Area	8.8 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	840 cfs		
10-Year	2535 cfs		
50-Year	3851 cfs		
100-Year	5191 cfs		

Cost Estimate

1) $ *	4) $ 20,000
2) $ 20,000-50,000	5) $ 75,000
3) Programatic to Hazard Mitigation Plan	6)

*Insufficient information available to determine cost estimate

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #56

Allegheny County Act 167 Plan



Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 56, Edgeworth 3	Edgeworth Borough	Little Sewickley Creek	Stream restoration

Description: Runoff from large upstream watershed with highly erodible soils desposits sediment in streams, exposes infrastructure, undermines trees, and blocks bridge structures. High velocity stormwater erodes stream banks. Hillside drainage causes landslide erosion. It is noted that the most landslide prone location is west of Little Sewickley Creek Road, yet the adjacent hillside is sparsely developed. There is limited roadside drainage along Little Swickley Creek Road which sits between the hill and Little Swickley Creek. It is recommended that the capacity of the existing inlets to capture stormwater be observed during storm conditions.

PROBLEM AREA #56-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 56, Edgeworth 3	Inspected By/Date:	JLB of Sci-Tek/6/11/2015
Municipality:	Edgeworth Borough	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Streambank Erosion; Sediment/debris accumulation		





Sediment that has accumulated in the stream channel (left). In-stream erosion undermines the stream bank and exposes tree roots (right).

Potential Solutions

1) Natural stream restoration for streambank protection. Install check dams to mitigate sediment transport.

2) Observe the capacity of existing inlets along Little Sewickley Creek Road to intercept hillside runoff. Develop an improvements plan, if necessary.

3) Evaluate the potential to install infiltration best management practices (BMPs) in upstream municipalities with the goal of attenuating peak flow to Little Sewickley Creek.

4) Implement maintenance program to periodically clean/maintain catch basins, culvert/drainage pipe, and any additional measures implemented.

Regional Basin Modeling Results

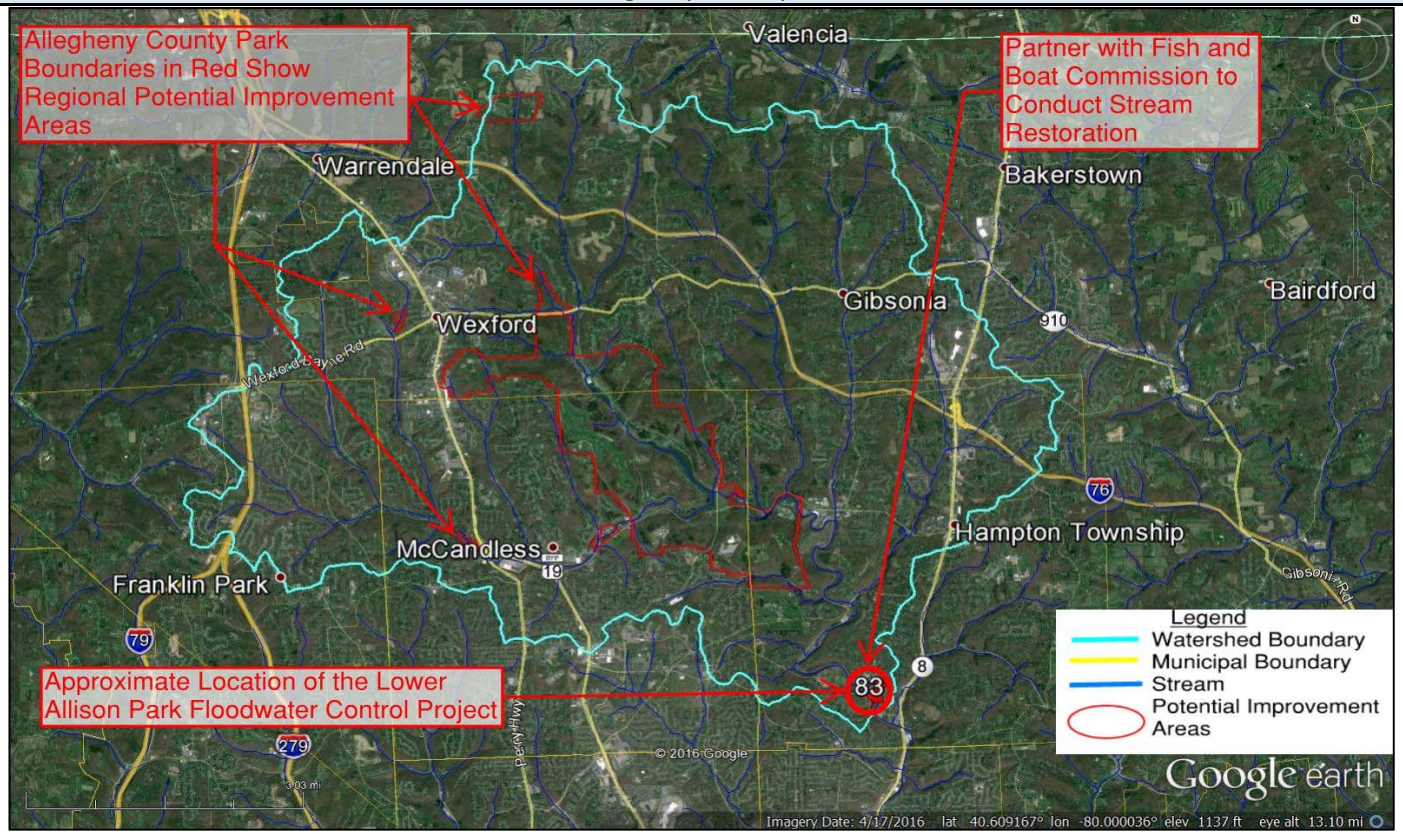
Drainage Area	9.51 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	512 cfs		
10-Year	1170 cfs		
50-Year	1910 cfs		
100-Year	2270 cfs		

Cost Estimate

1) $73,000	4) $ 12,500
2) $ 20,000	
3) $ 25,000	

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #83

Allegheny County Act 167 Plan



Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 83, Hampton 3	Hampton Township	Pine Creek	Integrate all Programatic Solutions Defined

Description: Upstream development has increased runoff to Pine Creek. Development in the floodplain has decreased storage capacity in the floodplain and has increased downstream flooding. Frequent flooding occurs at the Hampton Township wastewater treatment plant when stormwater volume exceeds stream capacity. Buildings and site are damaged after storm events causing the treatment plant to be taken off-line for several days after flooding.

PROBLEM AREA #83-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 83, Hampton 3	Inspected By/Date:	JLB of Sci-Tek/6/11/2015
Municipality:	Hampton Township	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Flooding - development within floodplain; Streambank erosion		





Bank cribbing that was installed by the Fish and Boat Commission in Pine Creek to protect the streambanks (left). The Hampton Township Water Pollution Control Plant is approximately 3 feet above the stream elevation here. Looking upstream at Pine Creek from bridge at entrance to the plant (right). The right bank of the stream is constrained by the railroad.

Potential Solutions

1) Partner with the Fish and Boat Commission to conduct stream restoration to reduce streambank erosion.

2) Plan for flood control with the next wastewater treatment plant upgrade.

3) Perform engineering study to assess stormwater management in upper watershed for opportunities to retrofit or add stormwater management featureswith the goal of attenuating peak flow to Pine Creek. Some potential areas for regional storage are highlighted on the preceding page.

4) Follow recommendations of the Allegheny County Hazard Mitigation Plan. Action Item 32 of the Hazard Mitigation Plan is specific to Hampton Township and states that a regional stormwater management facility shall be installed and that the Township aquire and demolish structures within the floodplain.

5) Follow Action Item 19 of the Hazard Mitigation Plan and conduct Phase 2 of the Lower Allison Park flood retention project.

6) Follow action Item 65 of the Hazard Mitigation Plan and implement a 5-year maintenance program for existing flood retention and detention ponds.

7) Ensure that upstream stormwater manangement controls are properly maintained.

Regional Basin Modeling Results

Drainage Area	43.5 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	1,610 cfs		
10-Year	3,500 cfs		
50-Year	5,800 cfs		
100-Year	6,980 cfs		

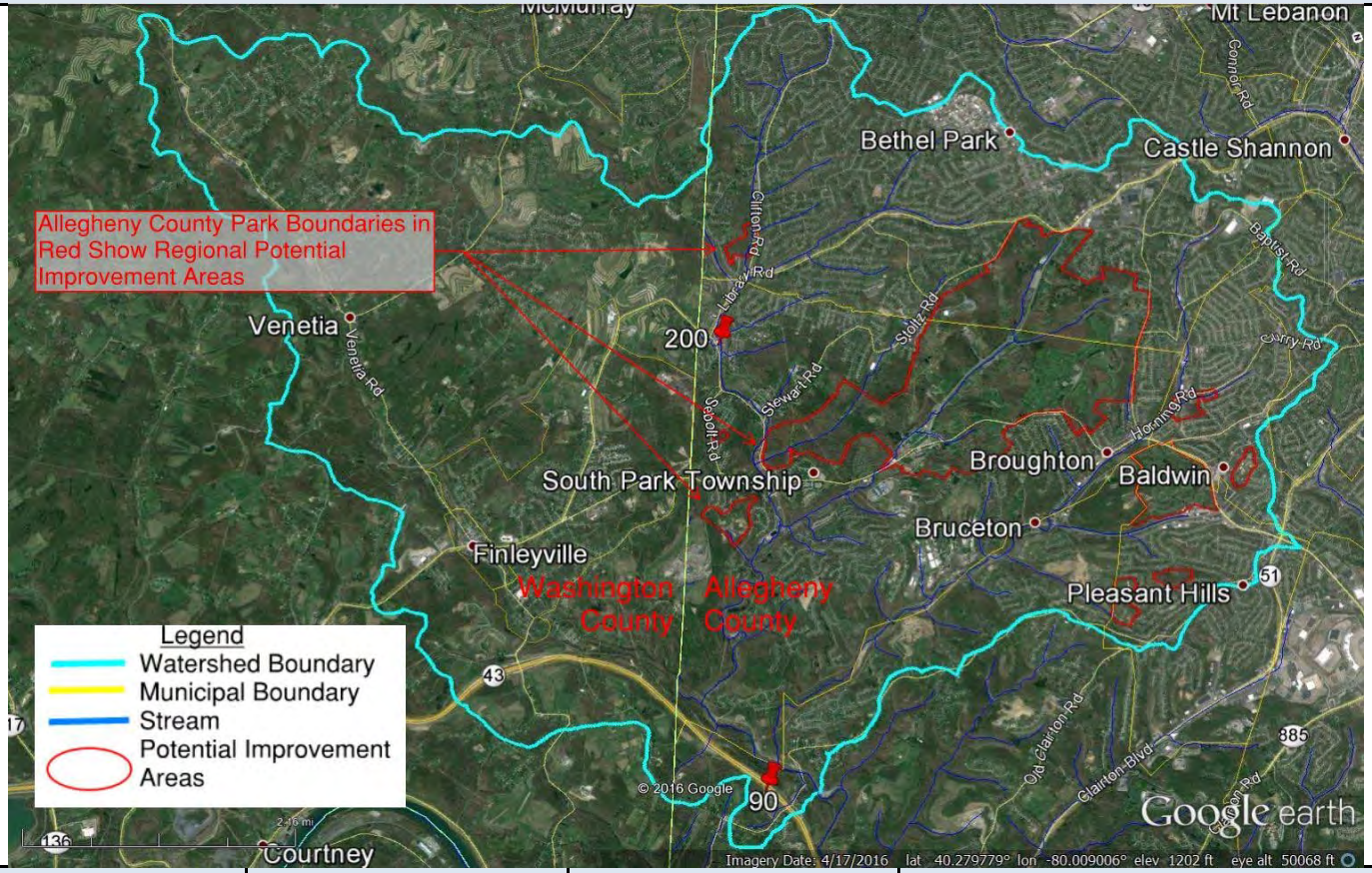
Cost Estimate

1) N/A*	5) Programatic to Hazard Mitigation Plan
2) N/A*	6) Programatic to Hazard Mitigation Plan
3) $300,000-$500,000 for engineering analysis	7) $30,500-$53,000 annually per acre-foot of storage
4) Programatic to Hazard Mitigation Plan	

*Insufficient information available to determine cost estimate

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #90

Allegheny County Act 167 Plan



Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 90, Jefferson Hills 2	Jefferson Hills Borough	Peters Creek	Regional Stormwater Detention

Description: Located near the outlet of a large watershed, Peters Creek Road experiences frequent flooding due to inadequate stream capacity which is in part caused by upstream development. Additionally, unknown pathogens and acid mine drainage impact the water quality. Potential locations where BMPs could be installed to slow upstream runoff are outlined in red.

PROBLEM AREA #90-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 90, Jefferson Hills 2	Inspected By/Date:	JLB of Sci-Tek-7/15/2015
Municipality:	Jefferson Hills Borough	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Flooding - development within floodplain; Streambank erosion; Acid mine drainage		





High water during flood events. Bank erosion can be observed in the photograph on the left. The right photograph shows the stream flowing at capacity during a storm on 07/15/15.

Potential Solutions

1) Commission a detailed study to:

a) Determine source of pollution and to determine mitigation options. Assess activity in the area and ensure adequate water quality protection is in place.

b) Assess stormwater management in upper watershed for opportunities to retrofit or add stormwater management features. Some potential areas for regional storage are highlighted on the preceding page

2) Conduct stream restoration to repair eroded banks.

3) Follow recommendations of the Allegheny County Hazard Mitigation Plan and implement Action Item 14 which states that critical road drainage concerns and landslide-prone areas must be identified.

Regional Basin Modeling Results

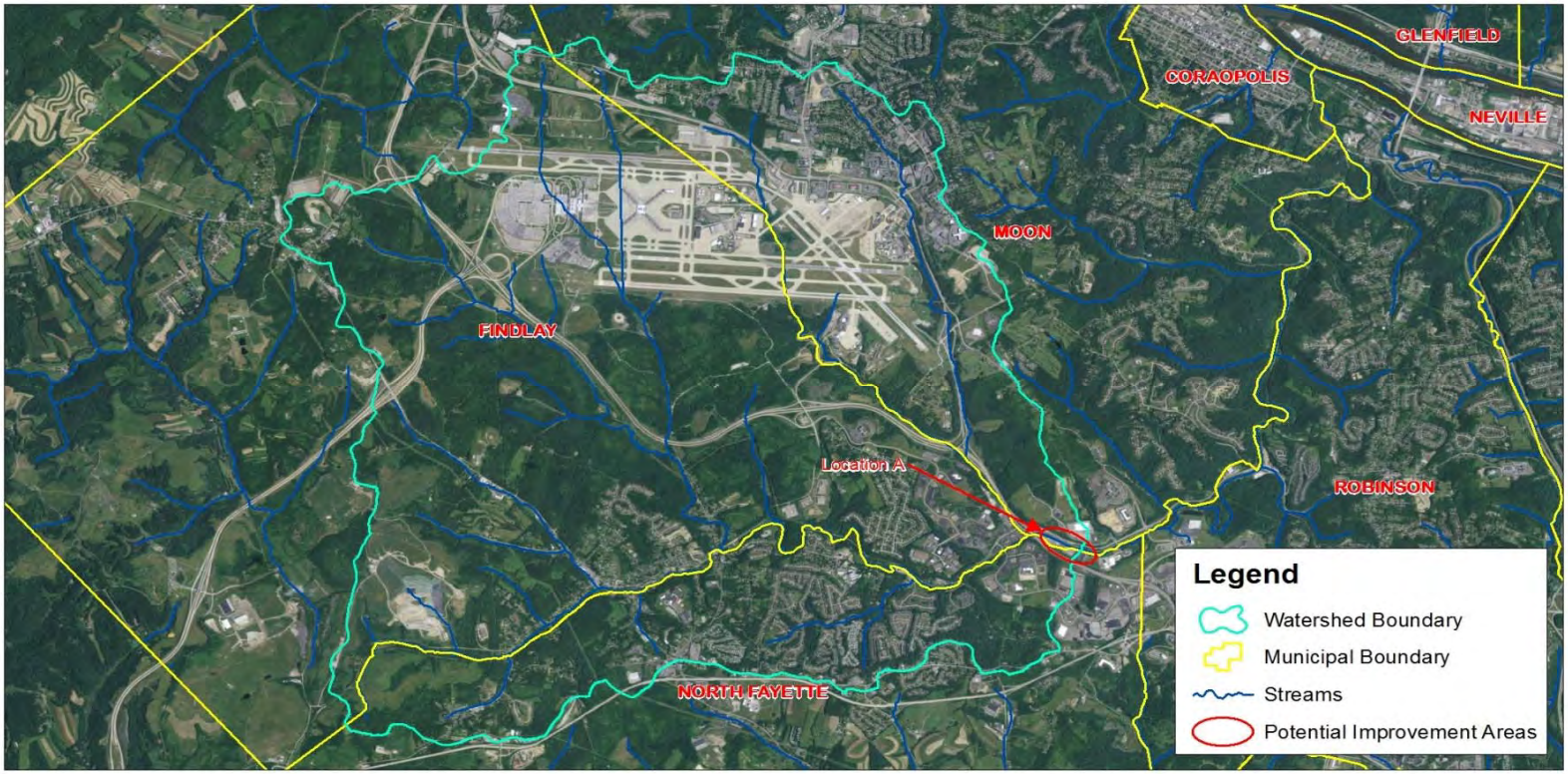
Drainage Area	38.5 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	1,450 cfs		
10-Year	3,180 cfs		
50-Year	5,280 cfs		
100-Year	6,360 cfs		

Cost Estimate

1) $650,000 -$1,000,000+	
2) $300,000-$400,000	
3) Programatic to Allegheny Hazard Mitigation Plan	

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #96

Allegheny County Act 167 Plan



Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 96, Moon 1	Moon Township	Montour Run	Flood Proof Private Structures

Description: Flooding on private property adjacent to Montour Run caused by runoff beyond the capacity of the stream channel to convey. The stream is generally wide and straight with no restrictions to flow noted between Cliff Mine Road and Fed Ex Road at the time of the site visit. There are private driveways crossing the stream that may lead to overflows. No significant debris was observed.

PROBLEM AREA #96-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 96, Moon 1	Inspected By/Date:	JLB of Sci-Tek / 7/13/2015
Municipality:	Moon Township	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Flooding - Development within the floodplain		





Montour Run looking downstream of private crossing (left). Problem Area adjacent to Montour Run(right).

Potential Solutions

1) Flood proof the private structures within the problem area. Location A

2) Evaluate the potential to install infiltration best management practices (BMPs) in upstream municipalities with the goal of attenuating peak flow to problem location during high frequency events.

Regional Basin Modeling Results

Drainage Area	25.0 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	1120 cfs		
10-Year	2440 cfs		
50-Year	3900 cfs		
100-Year	4600 cfs		

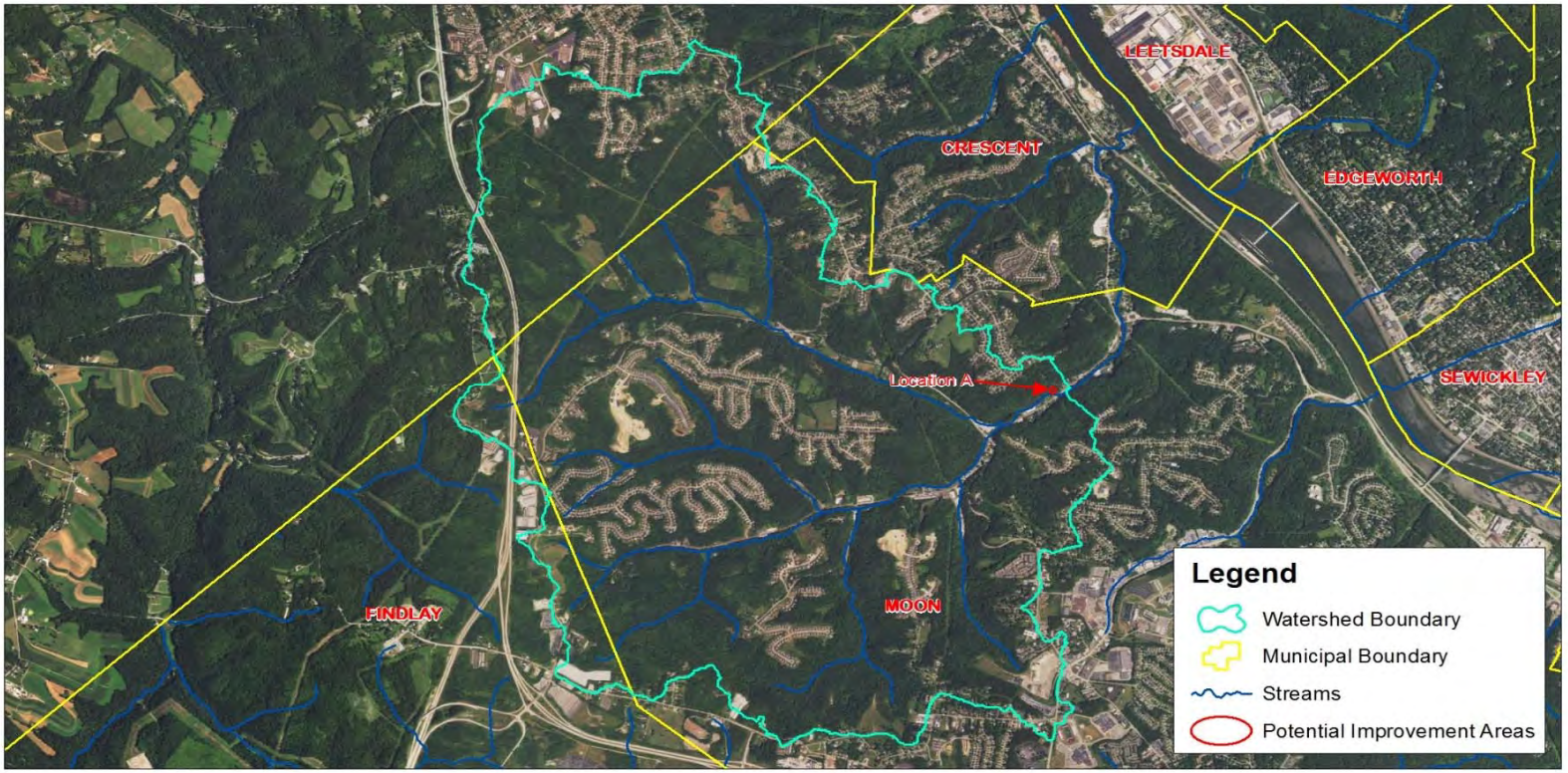
Cost Estimate

1) $ *	4)
2) $ 50,000	5)
3)	6)

*Insufficient information available to determine cost estimate

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #97

Allegheny County Act 167 Plan



Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 97, Moon 19	Moon Township	Flaugherty Run	Assess stormwater management in upper watershed

Description: Accelerated erosion and flooding occur along Flaugherty Run upstream of the junkyard at this location. The junkyard and the homes in this vicinity are built close to the stream and are likely within the floodplain. Based on historical imagery, the bridge at the junkyard was replaced between 2008 and 2010. The current bridge should not impede normal flow. Urban development in the watershed appears to be constructed prior to current stormwater management standards and may present an opportunity to add or retrofit existing stormwater control features.

PROBLEM AREA #97-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 97, Moon 19	Inspected By/Date:	JLB of Sci-Tek / 6/17/2015
Municipality:	Moon Township	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Flooding - development within floodplain; Streambank erosion		





Landslide along Flaugherty Run (left). Looking downstream at Flaugherty Run road bridge(right).

Potential Solutions

1) Conduct stream restoration to repair eroded banks. Location A

2) As funding becomes available, acquire, elevate, or flood proof structures in the flood zones as described in the Allegheny County 2015 Hazard Mitigation Plan.

3) Perform engineering study to assess stormwater management in upper watershed for opportunities to retrofit or add stormwater management features with the goal of attenuating peak flow to Flaugherty Run

Regional Basin Modeling Results

Drainage Area	7.2 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	787 cfs		
10-Year	2324 cfs		
50-Year	3487 cfs		
100-Year	4662 cfs		

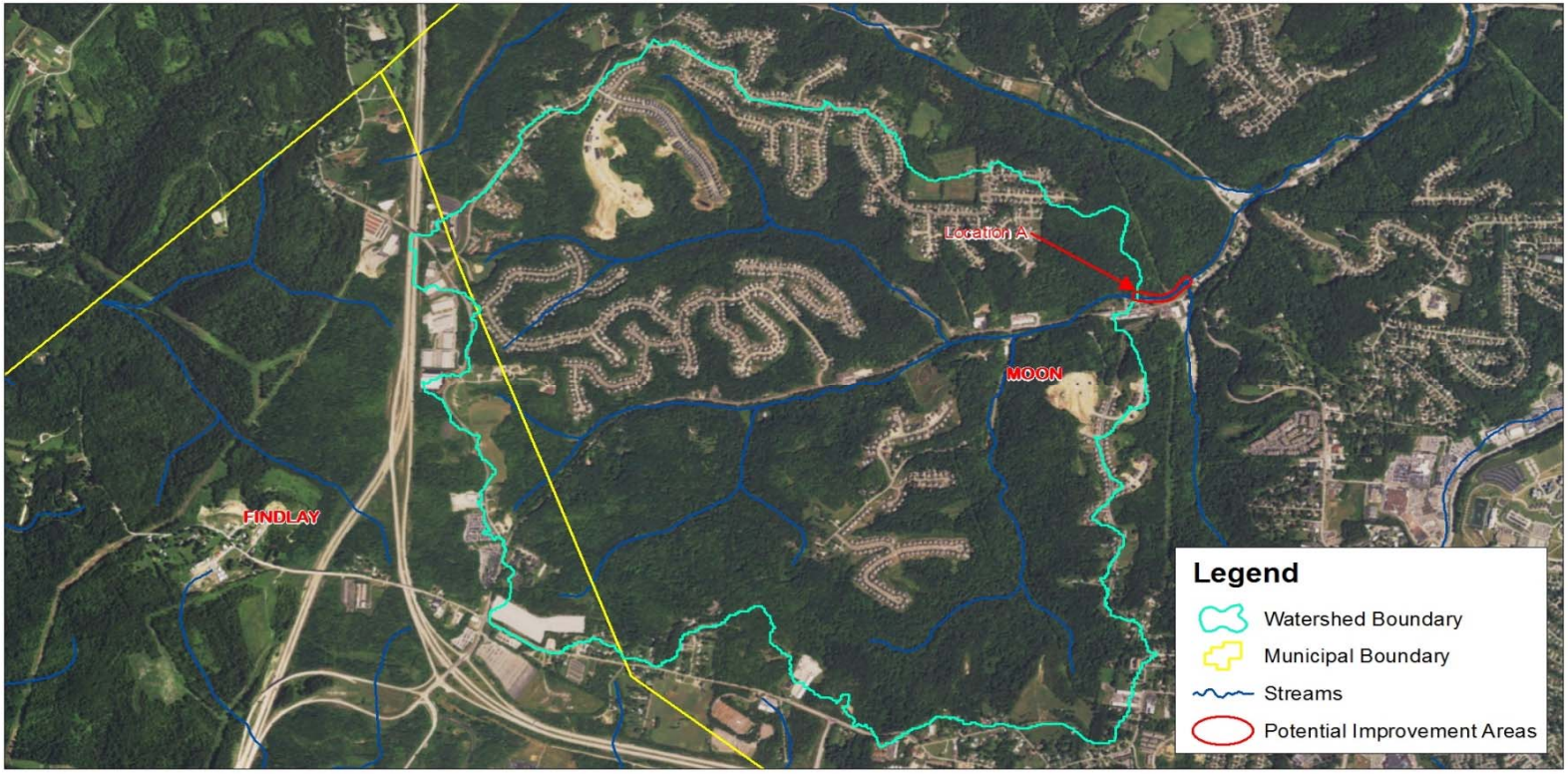
Cost Estimate

1) $ *	4)
2) Programatic to Hazard Mitigation Plan	5)
3) $ 50,000	6)

*Insufficient information available to determine cost estimate

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #100

Allegheny County Act 167 Plan



Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 100, Moon 22	Moon Township	Flaugherty Run	Assess stormwater management in upper watershed

Description: Flooding and accelerated erosion has occurred at several locations along the Flaugherty Run Road corridor including the Brodhead Trailer Park. A site inspection revealed excess sediment in the channel at this location. The trailer park and the other dwellings in this vicinity are built close to the stream and are likely within the floodplain. Urban development in the watershed appears to be constructed prior to current stormwater management standards and may present an opportunity to add or retrofit existing stormwater control features.

PROBLEM AREA #100-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 100, Moon 22	Inspected By/Date:	JLB of Sci-Tek / 6/17/2015
Municipality:	Moon Township	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Flooding - development within floodplain; Streambank erosion		





Landslide along Flaugherty Run (left). Flaugherty Run looking downstream at the problem location(right).

Potential Solutions

1) Conduct stream restoration to repair eroded banks. Location A

2) As funding becomes available, acquire, elevate, or flood proof structures in the flood zones as described in the Allegheny County 2015 Hazard Mitigation Plan.

3) Perform engineering study to assess stormwater management in upper watershed for opportunities to retrofit or add stormwater management features with the goal of attenuating peak flow to Flaugherty Run

Regional Basin Modeling Results

Drainage Area	3.0 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	386 cfs		
10-Year	1081 cfs		
50-Year	1597 cfs		
100-Year	2113 cfs		

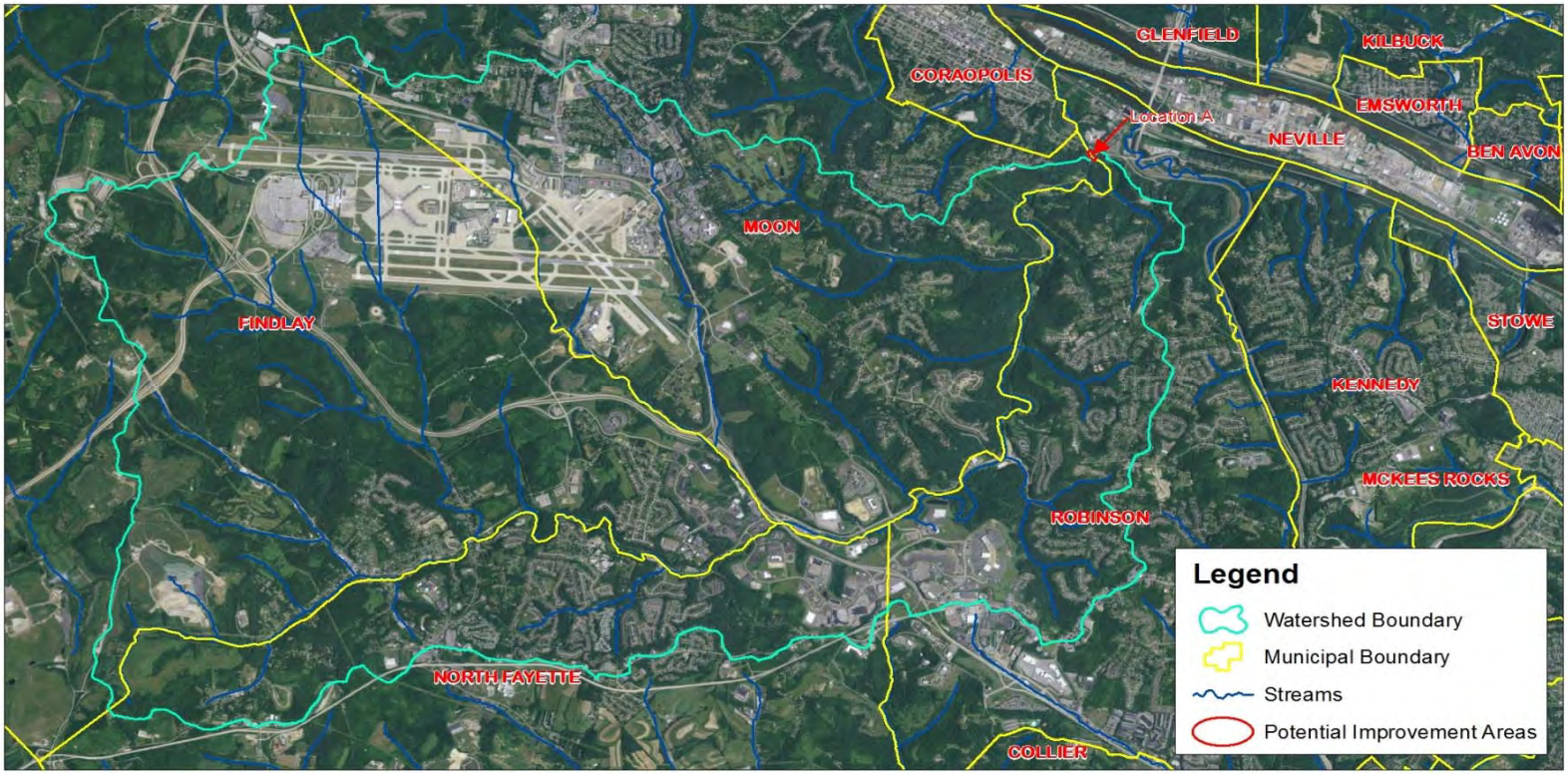
Cost Estimate

1) $ *	4)
2) Programatic to Hazard Mitigation Plan	5)
3) $ 25,000	6)

*Insufficient information available to determine cost estimate

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #101

Allegheny County Act 167 Plan



Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 101, Moon 23	Moon Township	Montour Run	Stabilize Stream Bank

Description: Flooding and accelerated erosion and has occurred along Montour Run adjacent to properties on Montour Coketown Road off of Route 51 and near the beginning of the Montour Trail. Flooding is caused by runoff and from the backup of the Ohio River. No restrictions to flow were noted at the time of the site visit. The Trail Association has worked to minimize erosion of the trail area.

PROBLEM AREA #101 – POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 101, Moon 23	Inspected By/Date:	JLB of Sci-Tek / 7/14/2015
Municipality:	Moon Township	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Streambank erosion and flooding		





Montour Run looking downstream (left). Montour Run looking upstream (right).

Potential Solutions

1) Stabilize the left stream bank in the vicinity of the Montour Trail with rip rap, gabions, etc. Location A

2) Evaluate the potential to install infiltration best management practices (BMPs) in upstream municipalities with the goal of attenuating peak flow to problem location during high frequency events.

Regional Basin Modeling Results

Drainage Area	36.1 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	1520 cfs		
10-Year	3290 cfs		
50-Year	5220 cfs		
100-Year	6150 cfs		

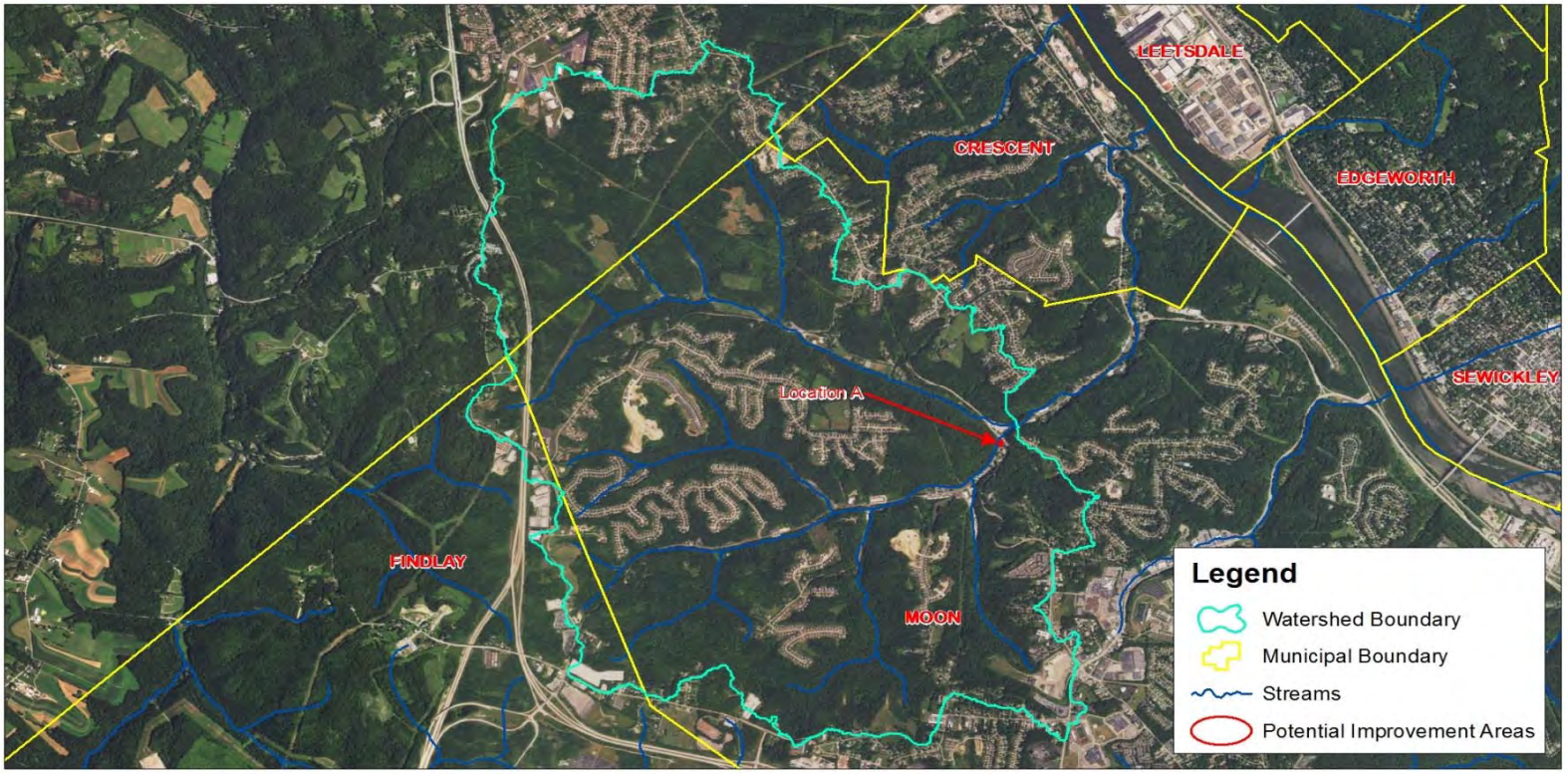
Cost Estimate

1) $4,800	4)
2) $ 50,000	5)
3)	6)

*Insufficient information available to determine cost estimate

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #115

Allegheny County Act 167 Plan



Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 115, Moon 2	Moon Township	Flaugherty Run	Extend Gabion Walls

Description: Flooding at various properties at the corner of Brodhead and Flaugherty Run Roads and along several properties upstream and downstream of this location. The Stream channel was likely diverted for bridge construction thus adversely affecting natural flow characteristics. Streambank erosion appears to be causing pavement failures upstream of the bridge. Flooding was discussed with tenants at the time of the site visit and they indicated that the last flooding occurred during Hurricane Ivan and was likley addressed by the bridge replacement circa 2012. Urban development in the watershed appears to be constructed prior to current stormwater management standards and may present an opportunity to add or retrofit existing stormwater control features.

PROBLEM AREA #115-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 115, Moon 2	Inspected By/Date:	JLB of Sci-Tek / 6/17/2015
Municipality:	Moon Township	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Streambank erosion		





Erosin adjacent to Flaugherty Run Road (left). Flaugherty run looking downstream on Broad Head Road. Note gabion wall downstream of bridge.(right).

Potential Solutions

1) As funding becomes available, acquire, elevate, or flood proof structures in the flood zones as described in the Allegheny County 2015 Hazard Mitigation Plan.

2) Extend Gabion Walls to protect the slope and pavement upstream of the bridge. Location A

3) Perform engineering study to assess stormwater management in upper watershed for opportunities to retrofit or add stormwater management features with the goal of attenuating peak flow to Flaugherty Run

Regional Basin Modeling Results

Drainage Area	7.0 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	778 cfs		
10-Year	2290 cfs		
50-Year	3431 cfs		
100-Year	4579 cfs		

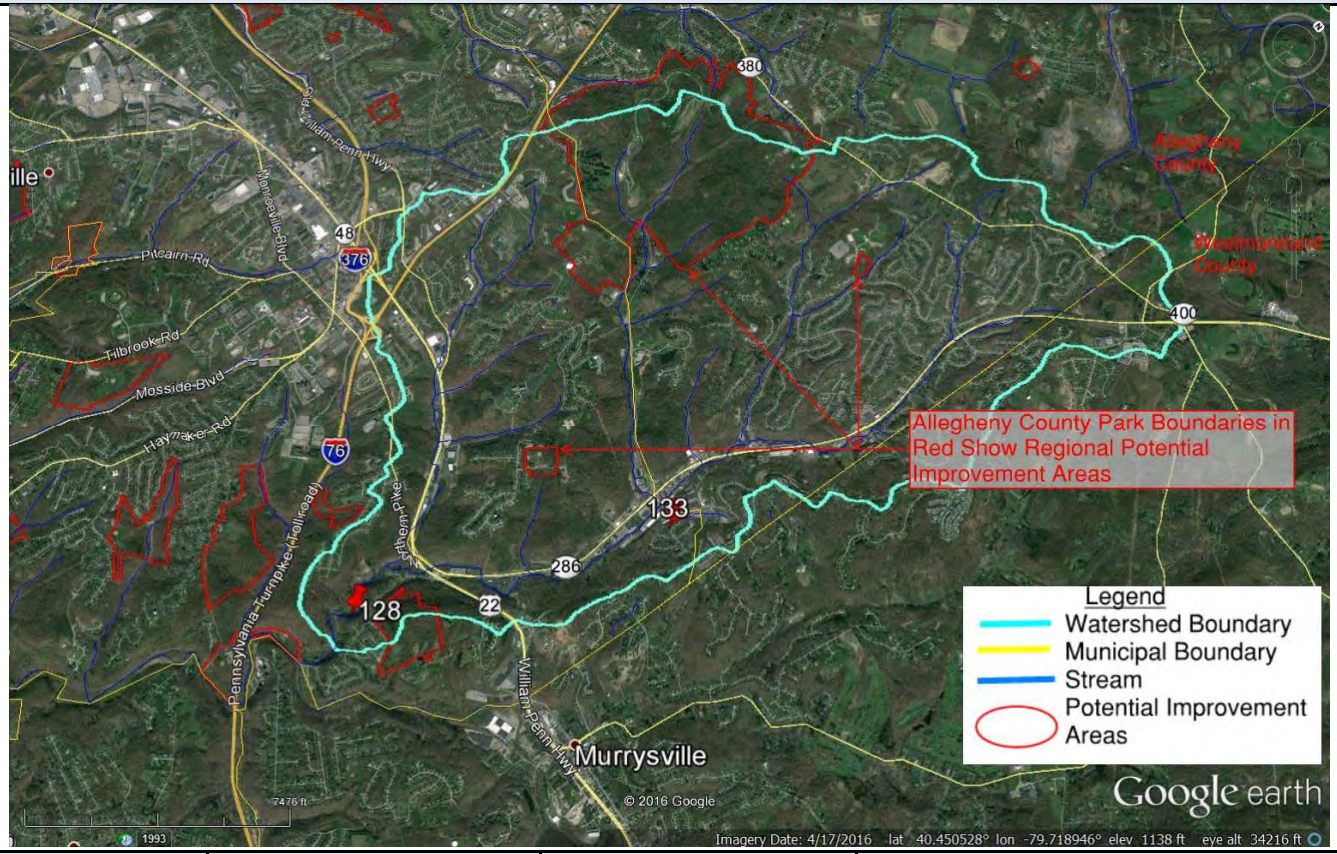
Cost Estimate

1) Programatic to Hazard Mitigation Plan	4)
2) $ 15,000-30,000	5)
3) $ 50,000	6)

*Insufficient information available to determine cost estimate

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #128

Allegheny County Act 167 Plan



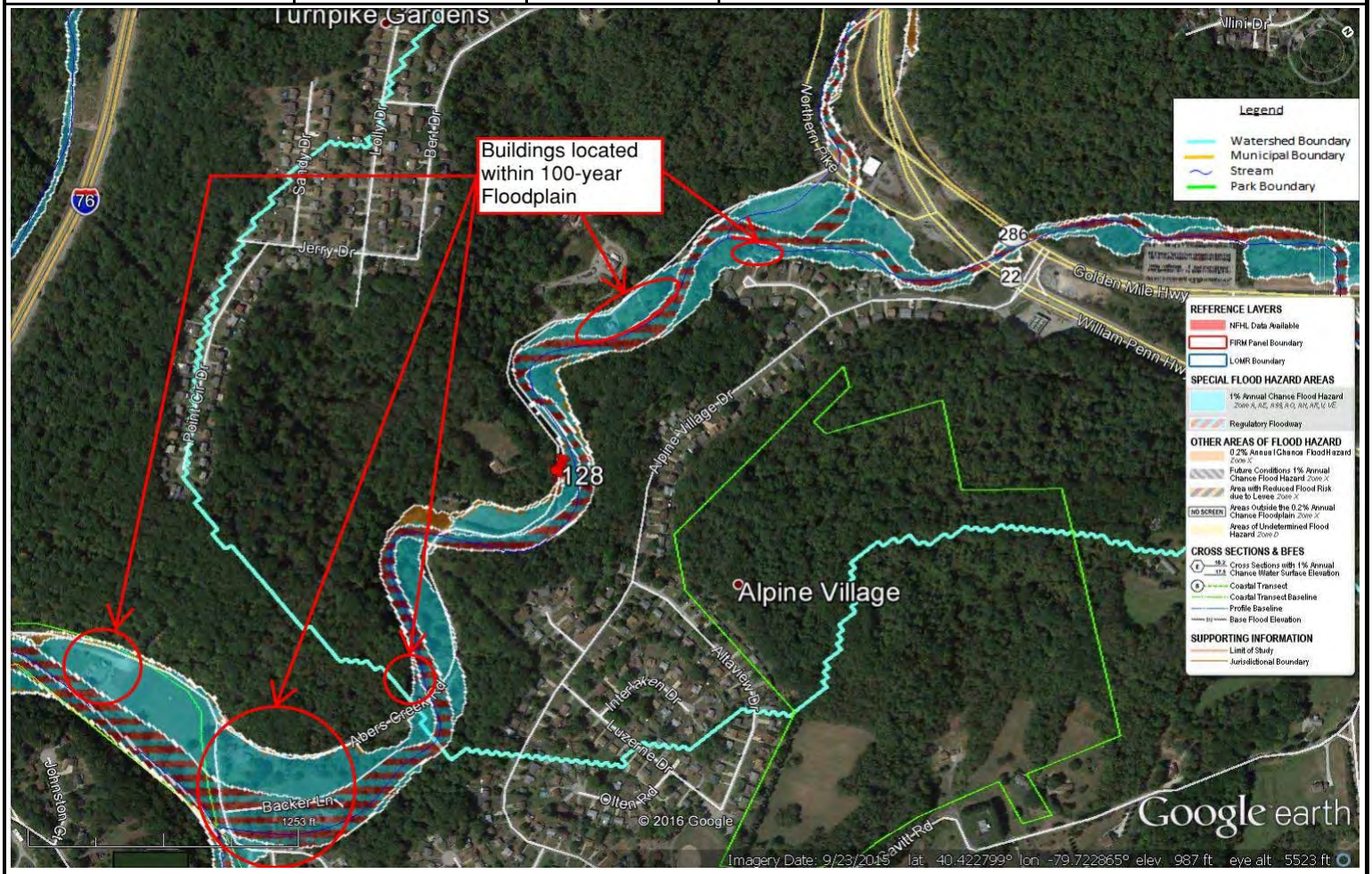
Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 128, Monroeville-8	Monroeville	Abers Creek	Upstream stormwater management

Description: Located at the eastern edge of Allegheny County in the Turtle Creek Watershed, the area around the location of Map_ID 128, along Abers Creek Road, experiences roadway flooding during large storm events which reportedly poses a danger to motorists and causes property damage. This watershed includes Problem Area Map_ID 133, Monroeville 9, and extends into Plum Borough. The stream is in good condition in a valley able to support a large drainage area. Much of Abers Creek Road is built in the Abers Creek floodplain and stream overbank area. Most of the residential and industrial development in the watershed appears to be constructed prior to current stormwater management standards and may present an opportunity to add or retrofit existing stormwater control features.

PROBLEM AREA #128-POTENTIAL IMPROVEMENT LOCATION DETAIL

Allegheny County Act 167 Plan

Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 128, Monroeville-8	Monroeville	Abers Creek	Upstream stormwater management

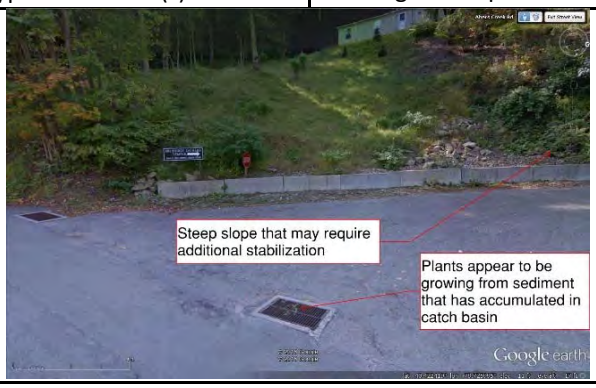


The areas circled in red experience flooding and the buildings located there should be assessed for either removal or flood protection in accordance with Allegheny County 2015 Hazard Mitigation Plan.

PROBLEM AREA #128-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	128, Monroeville-8	Inspected By/Date:	JLB of Sci-Tek 6/11/2015
Municipality:	Monroeville	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Flooding-development In floodplain & inadequate bridge; Sediment accumulation		





Catch basins (left) along Abers Creek Road at the entrance to Sri Shirdi Sai Baba Temple that appear to be filled with sediment as evidenced by vegetation growing through the basin grates. Looking upstream (right) at sediment accumulation within Abers creek.

Potential Solutions

1) Conduct engineering study to assess:

a) Stormwater management in upper watershed for opportunities to retrofit or add stormwater management features. Some potential areas for regional storage are highlighted on the preceding page.

b) Restrictions at bridges and replacement as needed. Ensure bridges are appropriately sized for large/intense runoff events.

c) Feasability of removing accumulated sediment, reconnecting the stream to the floodplain.

d) Downstream impacts of proposed changes to ensure outflow is not increased.

2) Stabilize banks upstream of problem area to reduce erosion and sediment transport, add green stormwater infrastructure, bioretention, or detention features where possible to reduce peak flow and improve water quality.

3) Clean catch basins along Abers Creek Road and upstream of problem area.

4) As funding become available, acquire, elevate, or flood proof structures in the flood zones as described in the Allegheny County 2015 Hazard Mitigation Plan.

5) Implement maintenance program to periodically clean/maintain catch basins and maintain any additional measures implemented.

Regional Basin Modeling Results

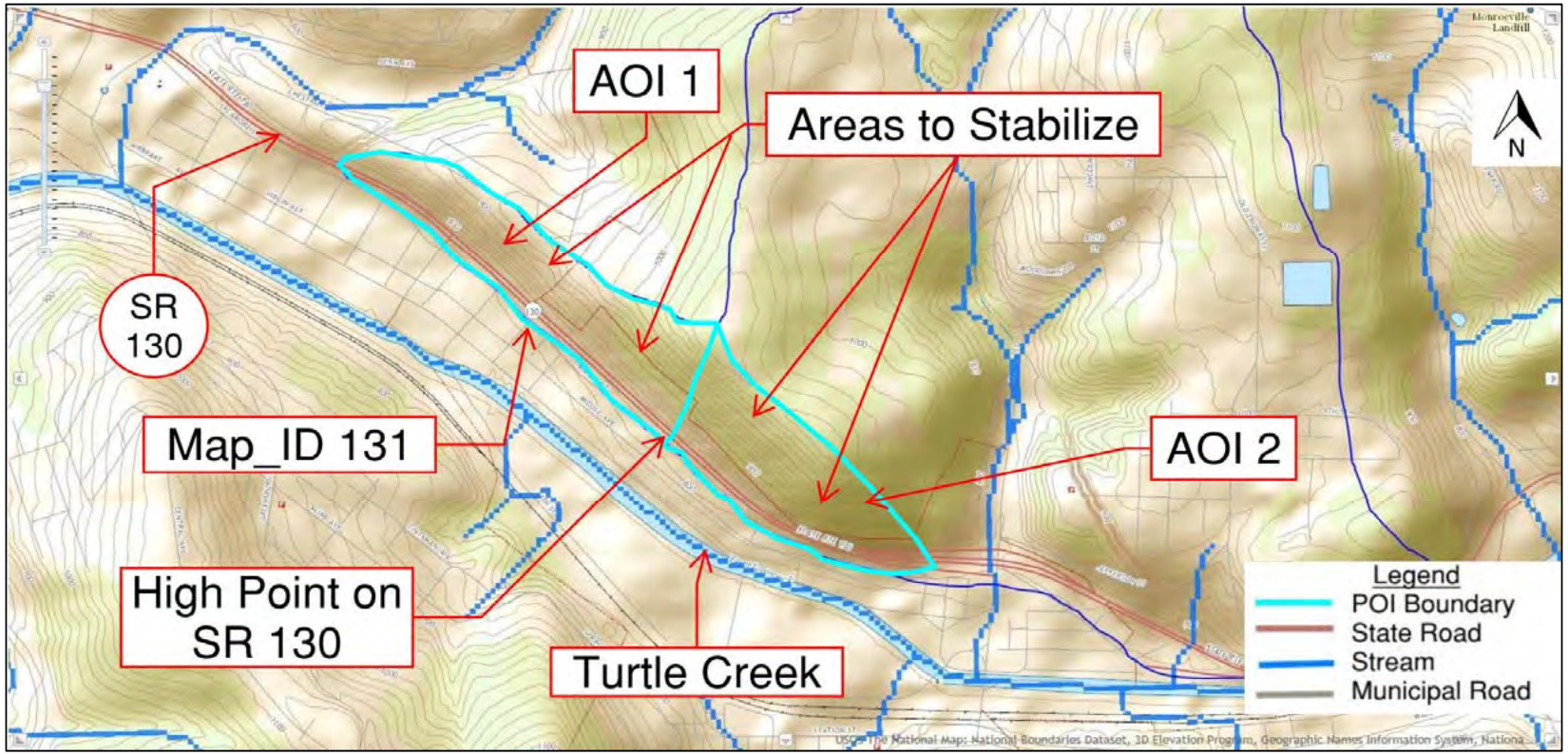
Drainage Area	10.6 mi^2	Storm Frequency	Existing Peak Discharge (cfs)
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	489		
10-Year	1140		
50-Year	1950		
100-Year	2380		

Cost Estimate

1) $125,000-$300,000 for engineering analysis	4) Programatic to Hazard Mitigation Plan
2) $700,000 to $1,000,000+	5) $30,500-$53,000 annually per acre-foot of storage
3) $2,500 per four catch basins	

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #131

Allegheny County Act 167 Plan

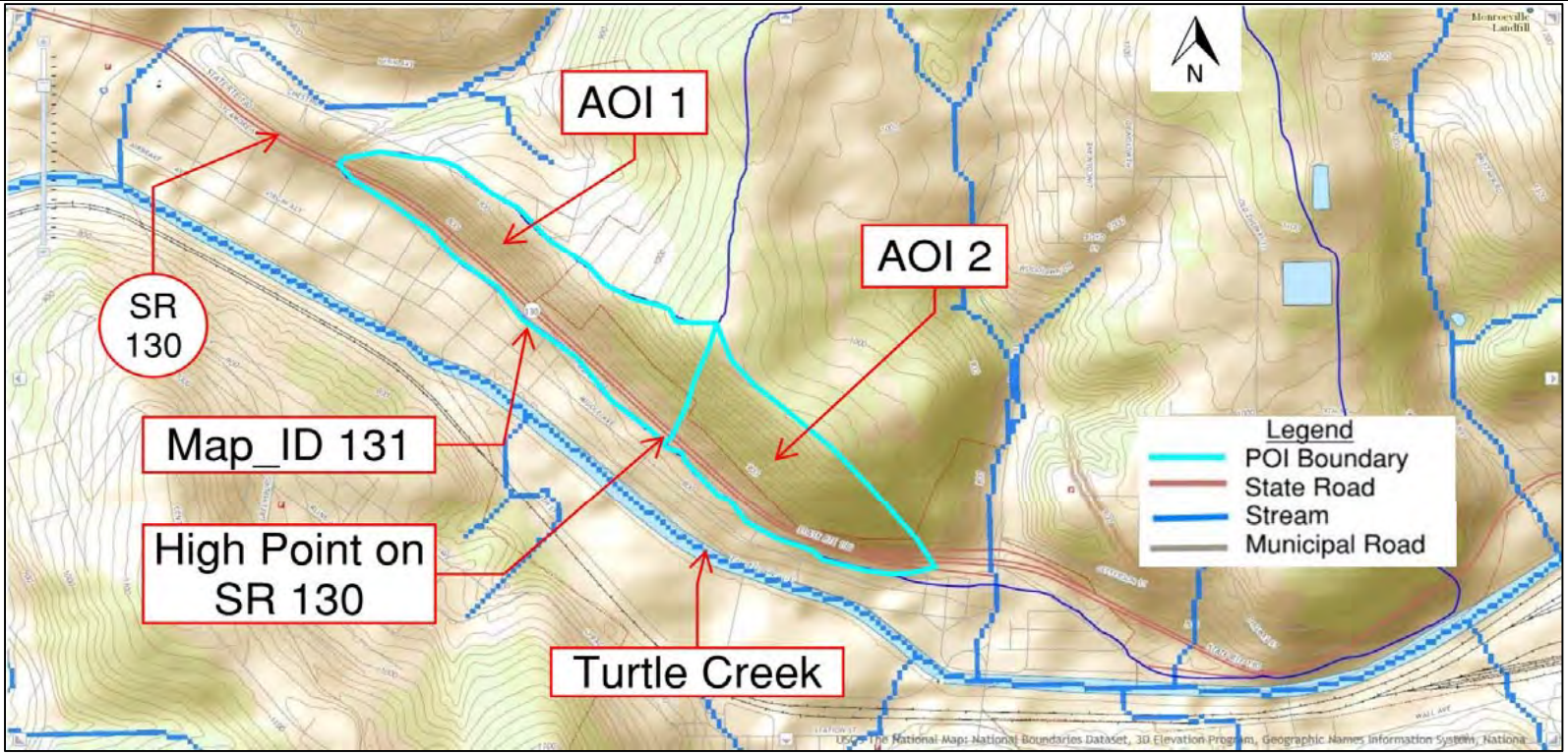


Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 131, Monroeville - 4	Monroeville	Turtle Creek	Drainage Improvements

Description: Located in the Tri-Borough area of Turtle Creek, Monroeville and Wilmerding Boroughs within the Turtle Creek Watershed. The area around the location of Map_ID 131, along SR 130 Tri-Boro Expressway, experiences roadway flooding during storm events posing a danger to motorists, and forcing the road to be closed. This roadway is bordered by a steep, forested slope to the north, and to the south an urban area with very little evidence of stormwater management. Catchments along the road clog with sediment which contributes to the roadway flooding. Hillside erosion is also evident. The steep, lightly wooded slope above SR 130 appears to drain directly onto SR 130. In order to assess runnoff and discharge, the problem area was divided into two areas of interest (AOIs), which were delineated based on the high point on SR 130.

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #131

Allegheny County Act 167 Plan



The steep, lightly wooded slope above SR 130 appears to drain directly onto SR 130. In order to assess runnoff and discharge, the problem area was divided into two area of interests (AOIs), which were delineated based on the high point on SR 130.

PROBLEM AREA #131-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 131, Monroeville - 4	Inspected By/Date:	JLB of Sci-Tek/6/11/2015
Municipality:	Monroeville	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Flooding-inadequate or lack of drainage system & maintenance; sediment accumulation		





Sediment accumulation in the catch basin (left) precludes roadside drainage contributing to roadway flooding during storm events. Hillside erosion (right) contributes to sediment accumulation at catch basins.

Potential Solutions

1) Conduct engineering study to assess:

a) Stability of hillside above problem area and stabilize to reduce erosion and sediment transport. Consider adding diversion swales and/or contour ditches along hillside and roadside.

b) Possibility of installing additional inlets and improving storm sewer/culvert system.

c) Ensure downstream impacts of proposed changes do not increase outflow.

2) Clean catch basins along SR 130.

3) Implement maintenance program to frequently clean/maintain catch basins.

Regional Basin Modeling Results

Total Drainage Area	0.07 mi^2		
AOI1 Drainage Area	0.04 mi^2	AOI 2 Drainage Area	0.03 mi2
Storm Frequency	Existing Peak Discharge (cfs)	Storm Frequency	Existing Peak Discharge (cfs)
2-Year	6.7	2-Year	6.7
50-Year	46.4	50-Year	42.8

*Discharge refers to overland runoff

Cost Estimate

1) $ 20,000 for engineering analysis	
2) $2,500 per four catch basins	
3) $30,500-$53,000 annually per acre-foot of storage	

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #133

Allegheny County Act 167 Plan



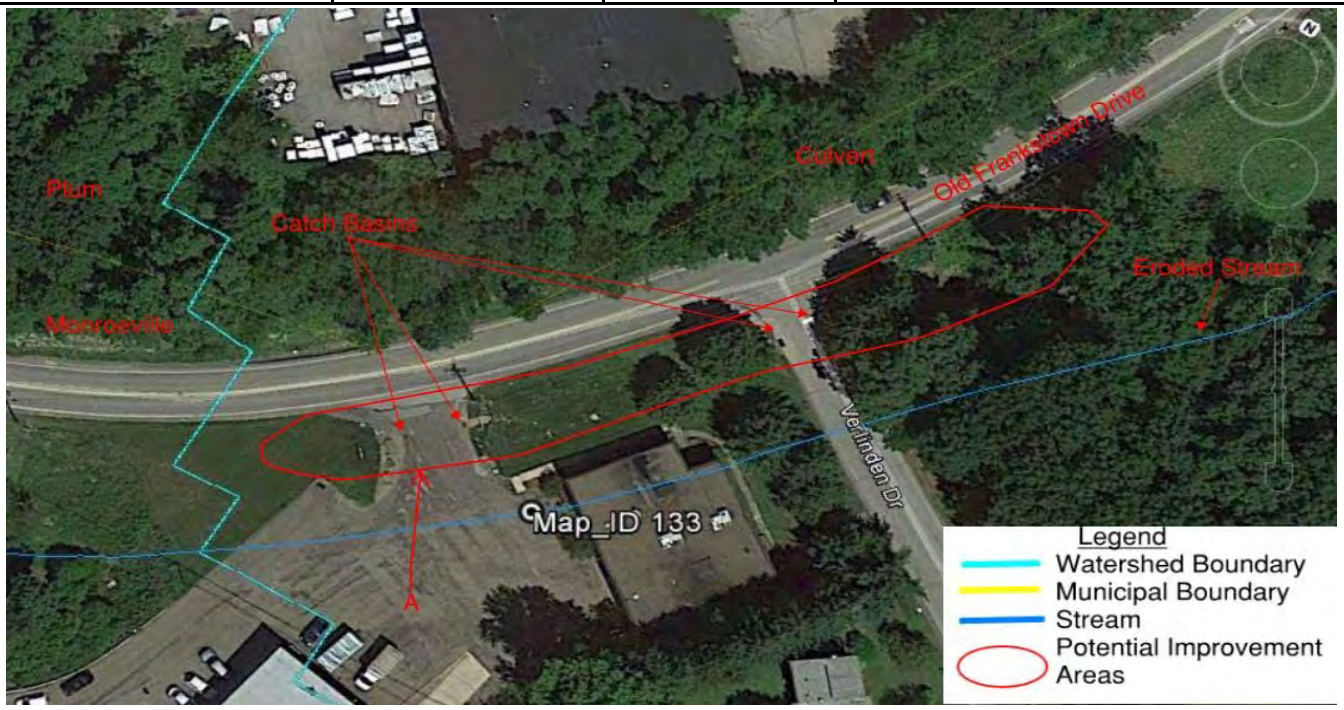
Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 133, Monroeville - 9	Monroeville	UNT to Abers Creek	Replace culvert, upstream detention/retention

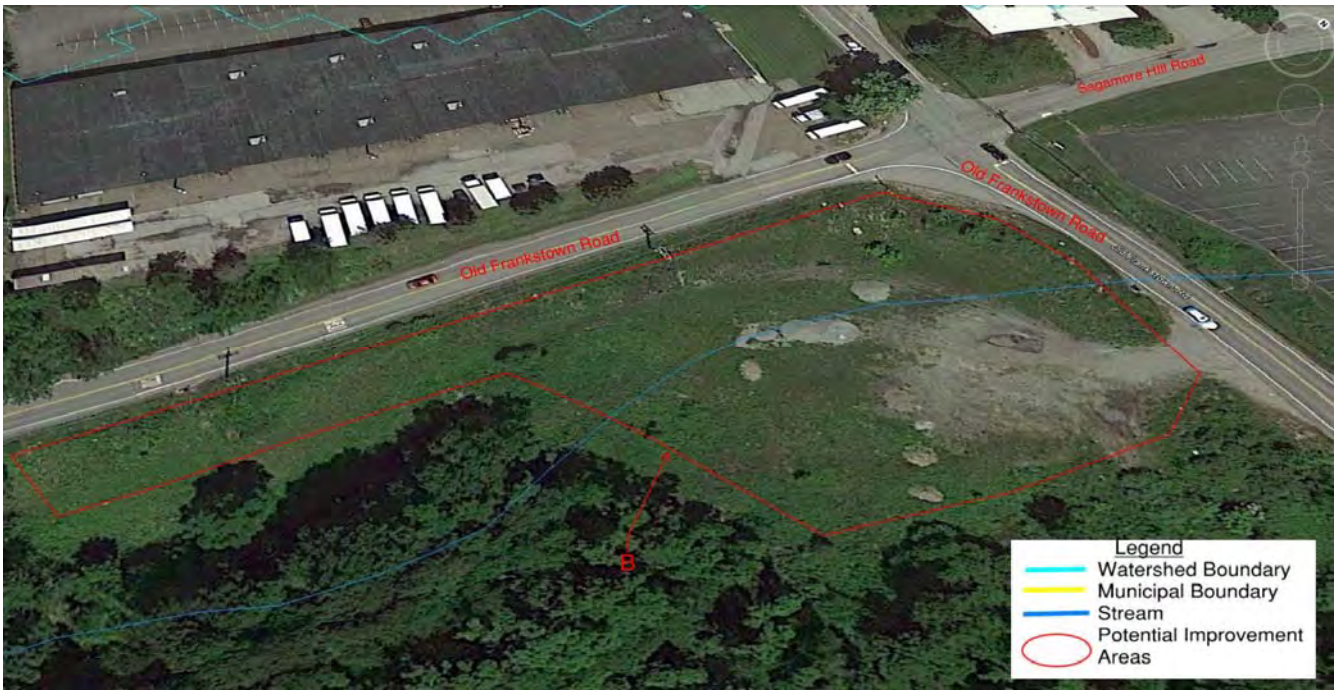
Description: Located at the eastern edge of Allegheny County in the Turtle Creek Watershed, the area around the location of Map_ID 133, where Old Frankstown Road meets Verlinden Drive, experiences roadway flooding during storm events which poses a danger to motorists and causes property damage. A failed private culvert/drainage pipe located at the intersection of Old Frankstown Road and Verlinden Drive exhibits excessive sediment accumulation, contributing to the roadway flooding. Urban development in the watershed appears to be constructed prior to current stormwater management standards and may present an opportunity to add or retrofit existing stormwater control features.

PROBLEM AREA #133-POTENTIAL IMPROVEMENT LOCATION DETAIL

Allegheny County Act 167 Plan

Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 133, Monroeville - 9	Monroeville	UNT to Abers Creek	Replace culvert, upstream regional detention





PROBLEM AREA #133-POTENTIAL IMPROVEMENT LOCATION DETAIL

Allegheny County Act 167 Plan

Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 133, Monroeville - 9	Monroeville	UNT to Abers Creek	Upstream Regional Detention





PROBLEM AREA #133-POTENTIAL IMPROVEMENT LOCATION DETAIL

Allegheny County Act 167 Plan

Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 133, Monroeville - 9	Monroeville	UNT to Abers Creek	Upstream Regional Detention





PROBLEM AREA #133-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	133, Monroeville-9	Inspected By/Date:	JLB of Sci-Tek/6/11/2015
Municipality:	Monroeville	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s):	Flooding-inadequate culvert/bridge (maintenance); Sediment accumulation; Stream erosion		





Sediment accumulation in the culvert/drainage pipe (left) precludes the necessary water volume from flowing through it leading to roadway flooding during storm events. Upstream erosion (right) contributes to sediment accumulation at culvert.

Potential Solutions

1) Conduct engineering study to assess:
a) Stormwater management upstream of the culvert/drainage pipe for opportunities to retrofit or add stormwater management features to reduce peak flow and improve water quality. Potential locations B-F have been identified.
b) Original culvert/storm drain design and determine if culvert/storm drain is appropriately sized. As needed, replace culvert/storm drain with appropriately sized pipe and/or just remove sediment if existing culvert/storm drain is in good repair and appropriately sized. Location A on Overview Map.
c) Downstream impacts of proposed changes to ensure outflow is not increased. Bioretention areas or basins may have to be added if culvert/stormdrain opening is enlarged through either replacement or cleaning.
2) Stabilize upstream from culvert to reduce erosion and sediment transport.
3) Clean catch basins along Verlinden Drive and Old Frankstown Road.
4) Implement maintenance program to periodically clean/maintain catch basins, culvert/drainage pipe, and any additional measures implemented.

Regional Basin Modeling Results

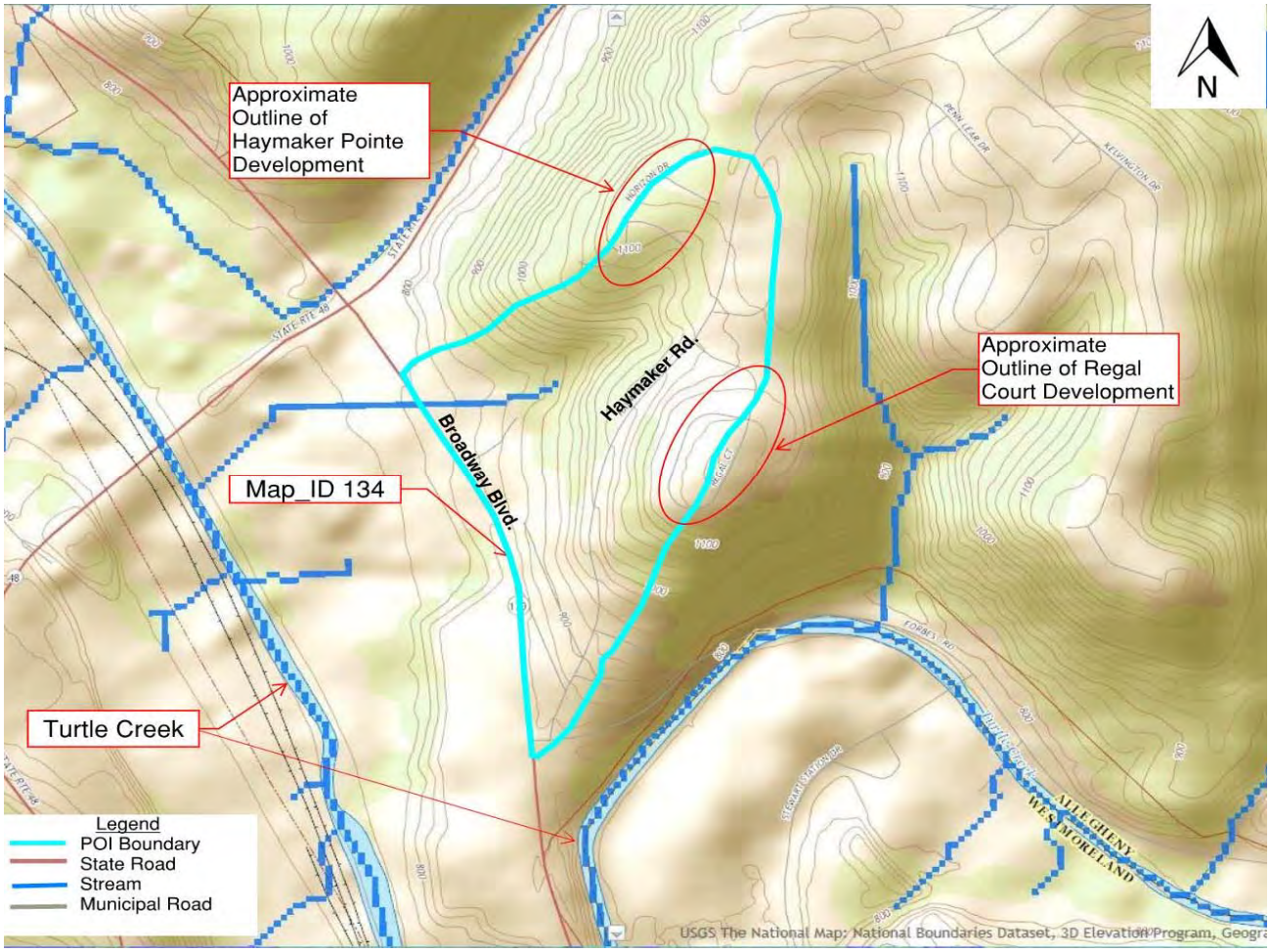
Drainage Area	0.15 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	13.4	13.31	0.09
10-Year	38.2	13.31	24.89
50-Year	73.3	13.31	59.99
100-Year	92.4	13.31	79.09

Cost Estimate

1) $20,000 for engineering analysis	3) $2,500 to clean four basins
2) $350,000	4) $30,500-$53,000 annually per acre-foot of storage

TOPOGRAPHIC MAP OF PROBLEM AREA #134

Allegheny County Act 167 Plan



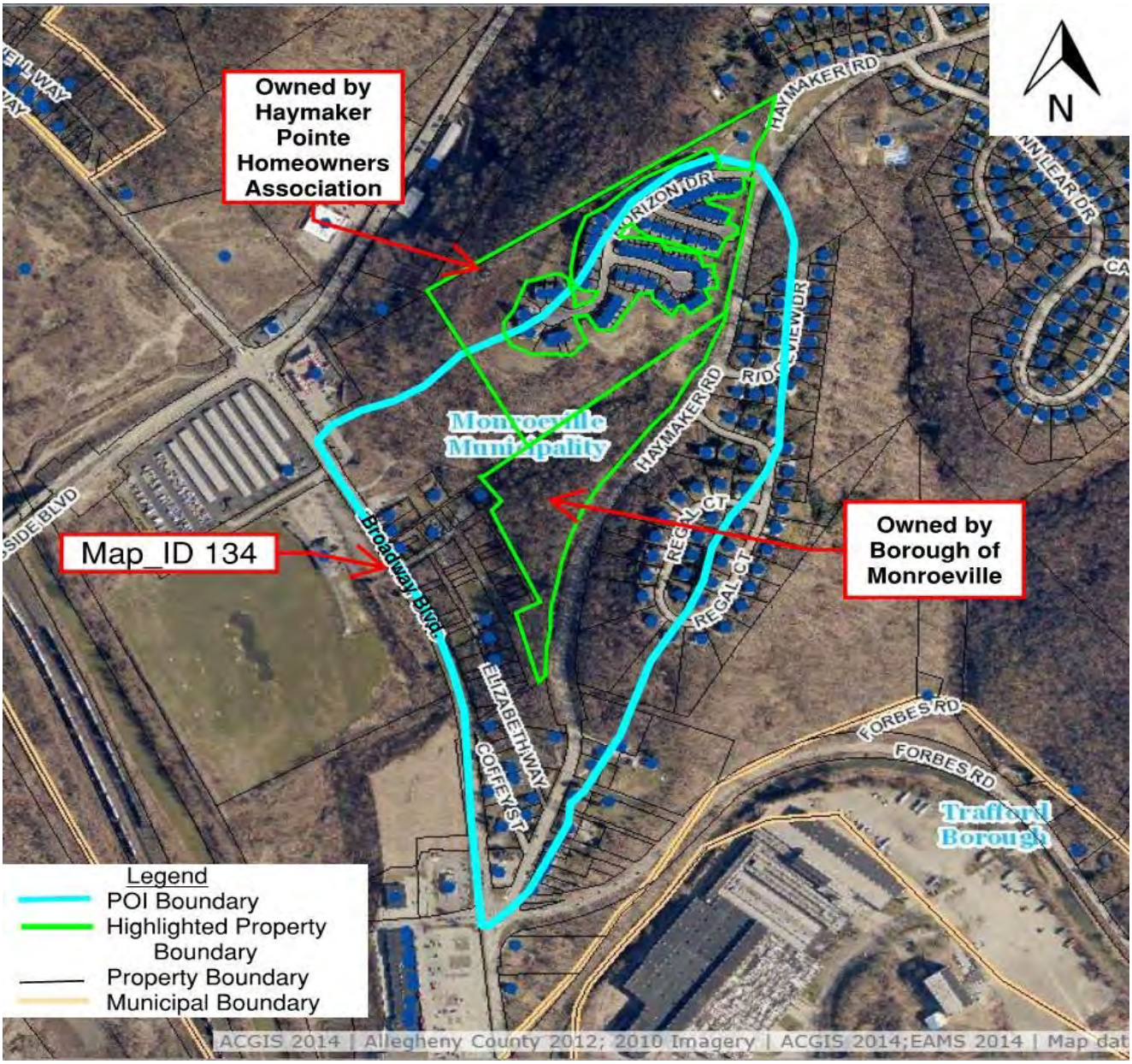
Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 134, Monroeville - 7	Monroeville	Turtle Creek	Further evaluation needed

Description: Located at the eastern edge of Allegheny County, the area around the location of Map_ID 134 is where Broadway Boulevard (Route 130) meets Haymaker Drive. This area experiences roadway flooding and landslides during storm events which poses a danger to motorists and causes property damage. Runoff along Haymaker Road and from the Regal Court Development (contructed before 1993), are likely contributing to the problem. Runoff from Haymaker Pointe Development (constructed from 2006-2011) may be contributing to the problem, particularly if water is diverted towards Haymaker Road. Further study of this location is needed to determine the cause of and solution to flooding.

PROBLEM AREA #134-POTENTIAL IMPROVEMENT LOCATION AREAS

Allegheny County Act 167 Plan

Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 134, Monroeville-7	Monroeville	Turtle Creek	Assess areas for additional stormwater controls



The parcel map above shows landownership of potential locations of additional stormwater control measures.

PROBLEM AREA #134-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	134, Monroeville-7	Inspected By/Date:	JLB of Sci-Tek-06/10/2015
Municipality:	Monroeville	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Landslide-slope drainage; Flooding - inadequate drainage system; Sediment accumulation		





Sediment accumulation and washout along the Broadway Blvd (left) covers the inlet leading to roadway flooding during storm events. Erosion gully (right) formed from uncontrolled hillside runoff directly contributing to sediment accumulation.

Potential Solutions

1) Conduct engineering study to assess:
a) Stormwater management uphill from problem area and along Haymaker Road for opportunities to retrofit or add stormwater management features, including green stormwater infrastructure, bioretention, or detention features where possible to reduce peak runoff and improve water quality. A parcel map with potential areas for improvements are highlighted on the preceding page.
b) Stability of hillside above problem area and stabilize strategies to reduce erosion.
c) Efficacy of Haymaker Pointe Development's stormwater management to determine if BMPs are performing as designed.
d) Possiblility of installing catch basin outside of curb on Broadway Boulevard to allow stormwater to enter the storm sewer system before overflowing on to the curb
e) Downstream impacts of proposed changes to ensure outflow is not increased.
2) Clean catch basins along Haymaker Drive and Broadway Boulevard.
3) Implement maintenance program to periodically clean/maintain catch basins, culverts, and any additional measures implemented.

Regional Basin Modeling Results

Drainage Area	0.12 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	12.7*		
50-Year	73.9*		
*estimated for AOI			

Cost Estimate

1) $ 20,000 for engineering analysis	3) $30,500-$53,000 per acre-foot of storage
2) $ 2,500 to clean four basins	

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #145

Allegheny County Act 167 Plan



Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 145, North Fayette 2	North Fayette	Tributary to Robison Run	BMPs in upstream area

Description: Flooding on private property adjacent to stream caused by stormwater runoff from Route 22/30 and overall stormwater flow from the Hankey Farms development. At the time of the site visit, no retention basins were identified as controlling highway runoff. North of Route 22/30 the flow path has been relocated/modified by development. The stream meanders through farmland south of Route 22/30 and the flows apparently exceed the capacity of the stream channel. It was reported that a culvert was blown out downstream of the farm during hurricane Ivan and has since been replaced with a larger culvert. No significant debris was observed in this location.

PROBLEM AREA #145-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 145, North Fayette 2	Inspected By/Date:	JLB of Sci-Tek / 7/13/2015
Municipality:	North Fayette	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Flooding - development within floodplain exceeds capacity of stream		





Stream looking upstream of private crossing (left). Problem Area adjacent to Stream(right).

Potential Solutions

1) Evaluate the potential to install infiltration best management practices (BMPs) in upstream area with the goal of attenuating peak flow to the problem locations during high frequency events. Location A.

2) Flood-proof the private structures within the problem area.

Regional Basin Modeling Results

Drainage Area	0.6 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	108 cfs		
10-Year	220 cfs		
50-Year	375 cfs		
100-Year	456 cfs		

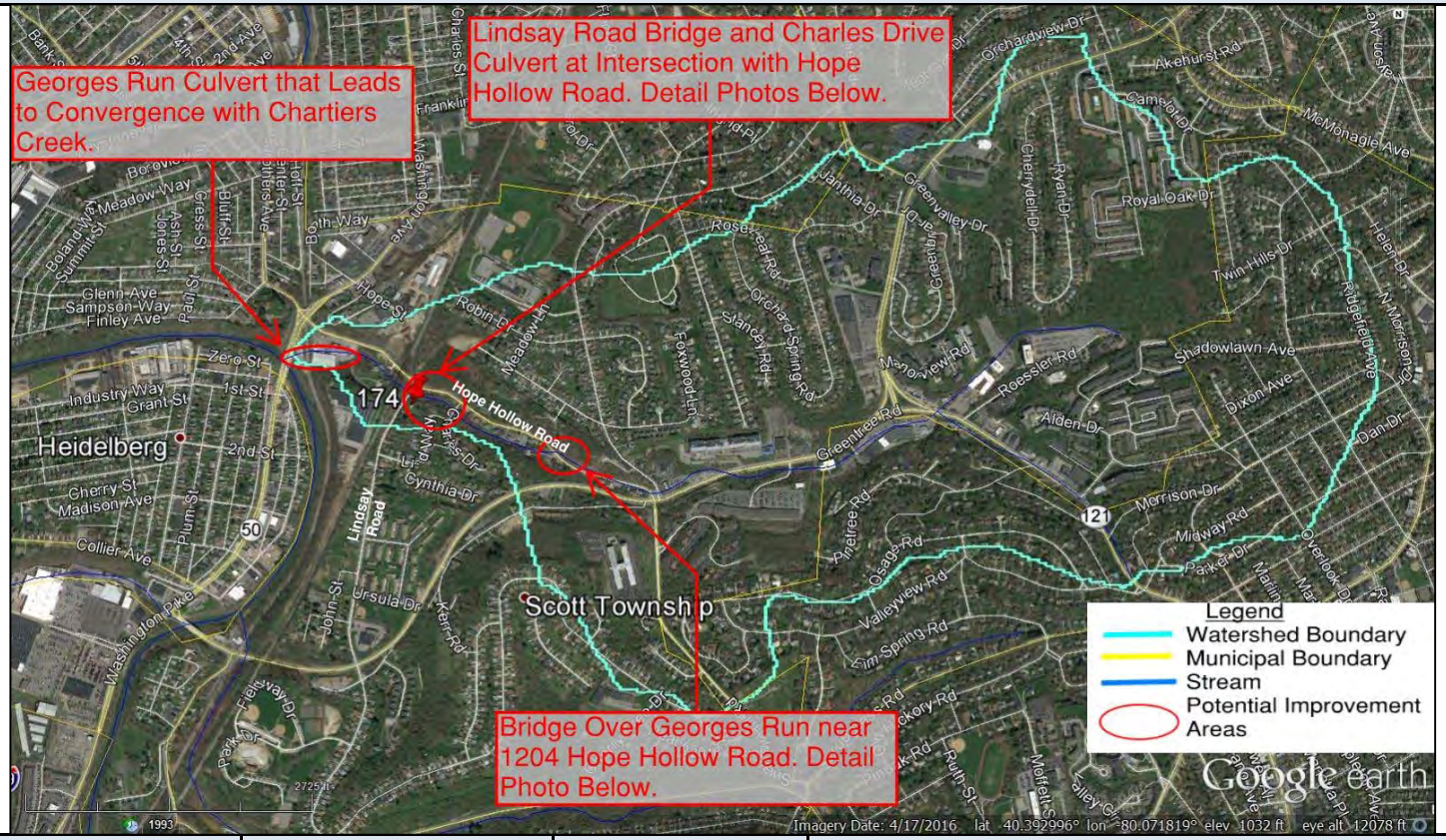
Cost Estimate

1) $ 25,000	4)
2) $ *	5)
3)	6)

*Insufficient information available to determine cost estimate

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #174

Allegheny County Act 167 Plan



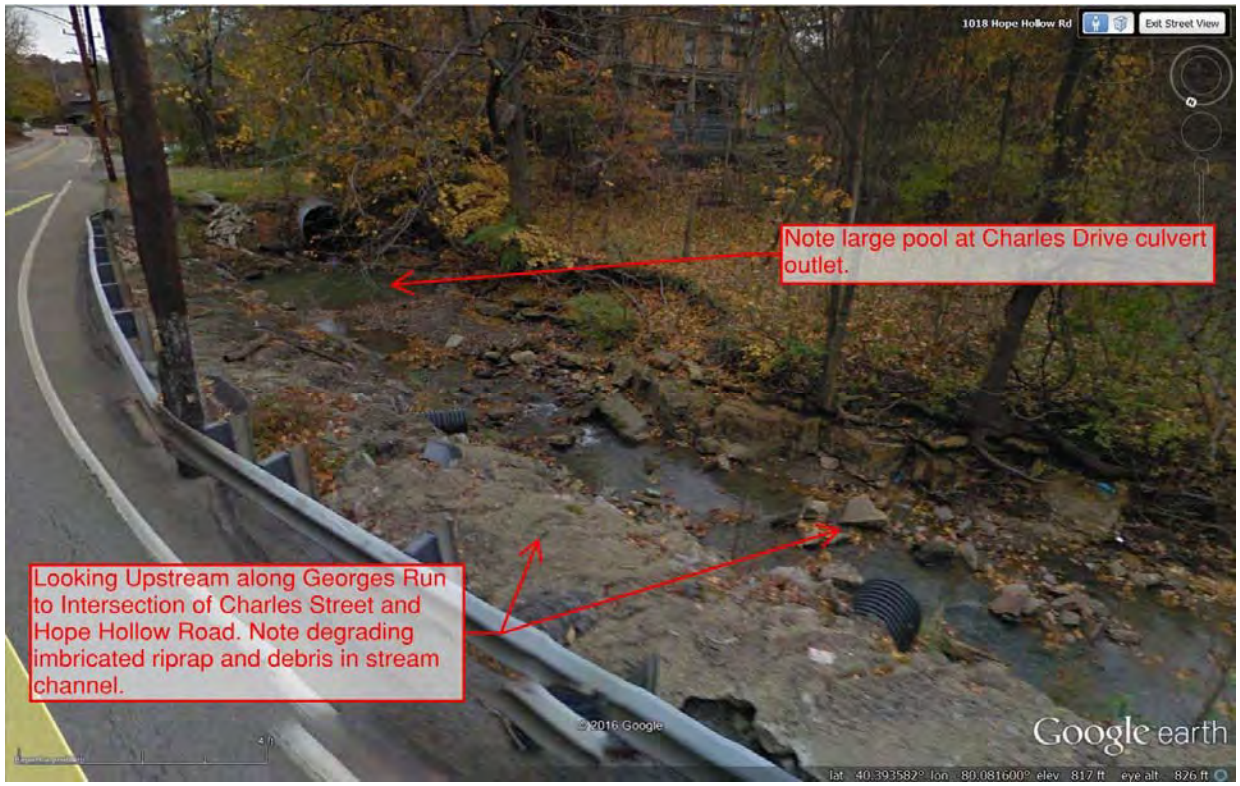
Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 174, Scott-23	Scott Township	Georges Run	Bridge replacement, stormwater management, Streambank restorati

Description: Located in the southwest area of Allegheny County in the Chartiers Creek Watershed, the area around the location of Map_ID 174, along Hope Hollow Road, experiences roadway flooding during large storm events which poses a danger to motorists and causes property damage. Georges Run crosses Hope Hollow Road multiple times before it outlets into Chartiers Creek. Georges Run has been constricted through development and, at some points, is enclosed. Bridge alignments along Hope Hollow Road create unnatural stream turns for Georges Run. Low bridge clearance contributes to frequent roadway flooding. Development along the stream has disconnected the stream from its floodplain. Upstream development appears to have been constructed prior to modern stormwater standards.

PROBLEM AREA #174-POTENTIAL IMPROVEMENT LOCATION DETAIL

Allegheny County Act 167 Plan

Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 174, Scott-23	Scott Township	Georges Run	Upstream Stormwater Management, Stream Bank Restoration





PROBLEM AREA #174-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 174, Scott-23	Inspected By/Date:	GVB of Sci-Tek 6/25/2015
Municipality:	Scott Township	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Flooding - inadequate culvert/bridge/channel; Sediment accumulation;		





Utilities run along the bridge on Lindsay Road where it meets Hope Hollow Road (left) that has low clearance and experiences frequent flooding. Sediment accumulation (right) along Georges Run indicates erosion along stream.

Potential Solutions

1) Conduct engineering study to assess:

a) Stormwater management in upper watershed for opportunities to retrofit or add stormwater management features, including stream stabilization, green stormwater infrastructure, bioretention, or detention features to reduce peak flow and improve water quality.

b) Bridge constrictions and stream alignment. Ensure bridges are appropriately sized for large/intense runoff events. Identify opportunities to straighten and/or re-enforce stream alignment.

c) Feasability of reconnecting stream to floodplain.

d) Downstream impacts of proposed changes to ensure outflow is not increased.

2) Review original culvert design leading to the convergance of Georges Run and Chartiers Creek. Determine if culvert is appropriately sized. Replace culvert with appropriately sized pipe or, if existing culvert is in good repair and is appropriately sized, remove any excessive sediment accumulation.

3) Review upstream land management practices and upstream stockpile locations. Educate businesses and residents about stockpile locations and proper stream bank protection.

4) Assess buildings in floodplain and remove or protect in accordance with Allegheny County 2015 Hazard Mitigation Plan. As directed by Action Item 89, reduce possibility of damage and loss of function to community-identified critical facilities in the floodplain.

5) Implement maintenance program to periodically inspect and maintain any additional measures implemented.

Regional Basin Modeling Results

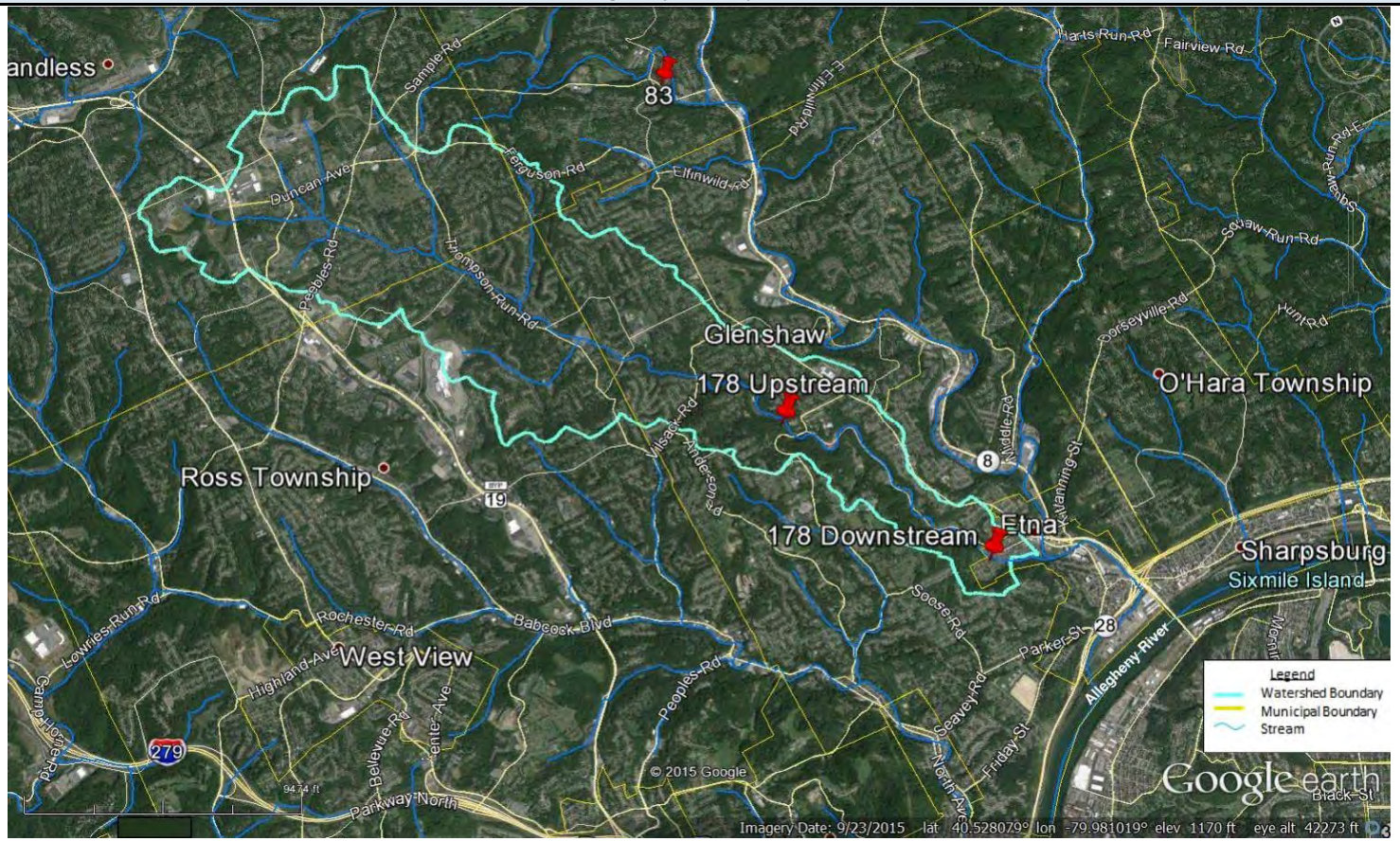
Drainage Area	1.34 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	104		
10-Year	256		
50-Year	439		
100-Year	531		

Cost Estimate

1) $75,000-$150,000 for engineering analysis	4) Programatic to Hazard Mitigation Plan
2) $10,000-$25,000	5) $30,500-$53,000 annually per acre-foot of storage
3) $1,000-$5,000	

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #178

Allegheny County Act 167 Plan



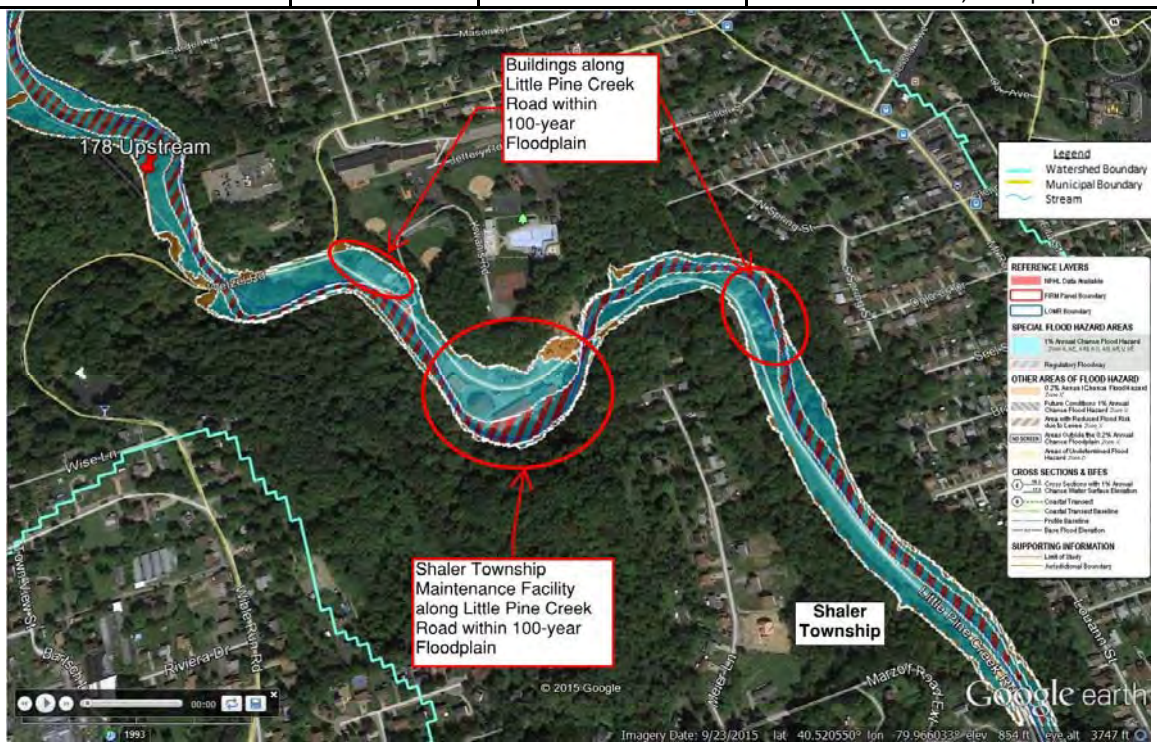
Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 178, Shaler-3 & 4	Etna Borough, Shaler Township	Little Pine Creek West	Upstream Stormwater Management, Stream Bank Restoration, Floodplain Restoration

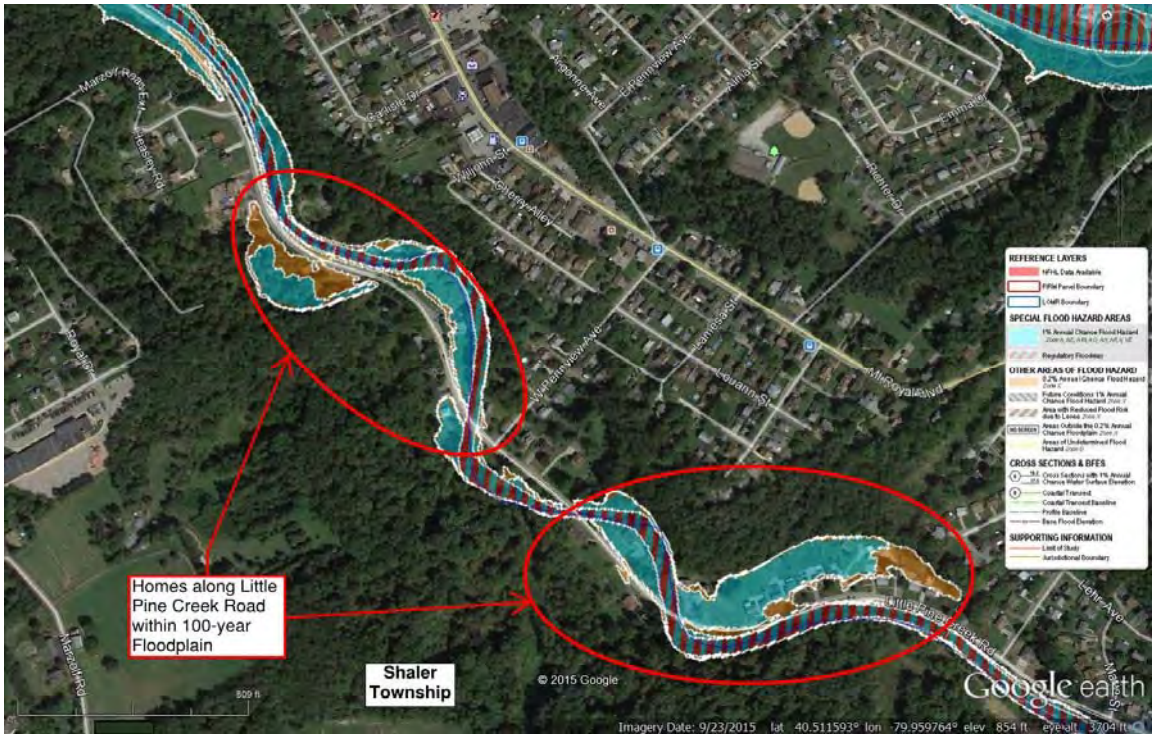
Description: Located within the Pine Creek Watershed in the north central area of Allegheny County, the area around the location of Map_ID 178, along Little Pine Creek West, experiences flooding during large storm events, making some bridges that span the creek impassible. The long, narrow watershed is characterized by hilly terrain, and suburban/urban development. Development within the floodplain, particularly in the downstream area of Shaler Township and Etna Borough has disconnected the stream from its floodplain and greatly reduced both the channel width as well as the floodplain storage capacity. Concrete bank protection in the downstream portion is experiencing undercutting and is in need of restoration and maintenance.

PROBLEM AREA #178-POTENTIAL IMPROVEMENT LOCATION DETAIL

Allegheny County Act 167 Plan

Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 178, Shaler-3 & 4	Shaler Township	Little Pine Creek West	Upstream Stormwater Management, Stream Bank Restoration, Floodplain Restoration



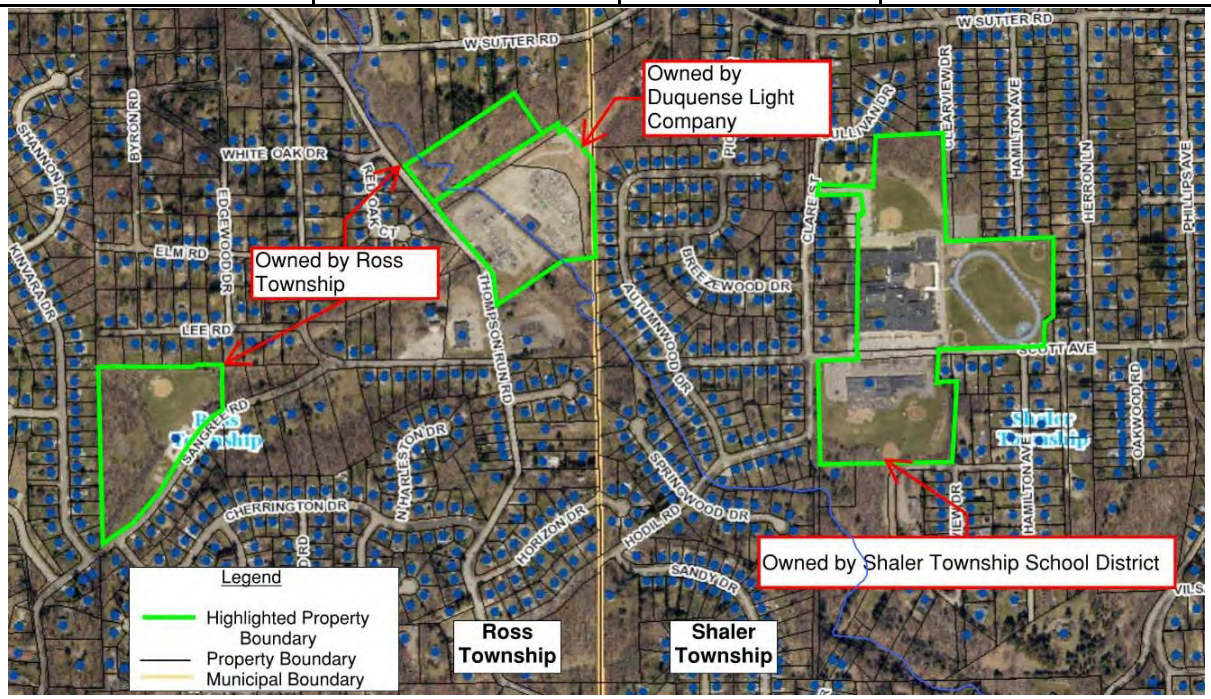


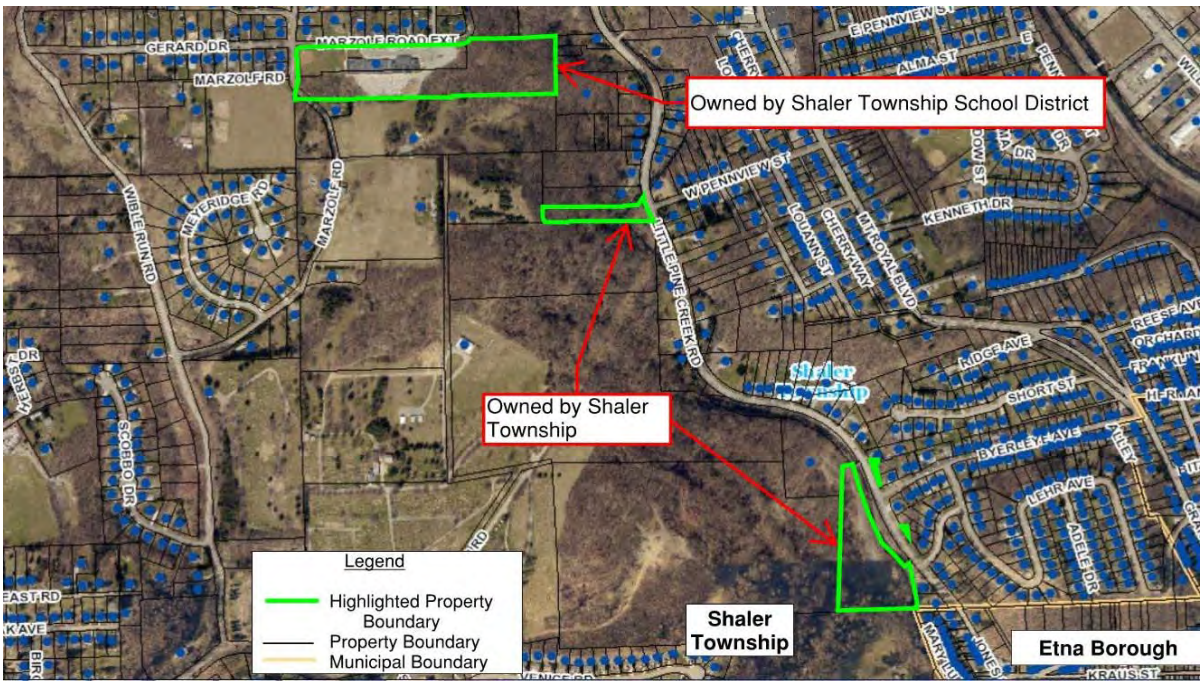
The areas circled in red experience flooding and the buildings located there should be assessed for either removal or flood protection in accordance with Allegheny County 2015 Hazard Mitigation Plan.

PROBLEM AREA #178-POTENTIAL IMPROVEMENT LOCATION DETAIL

Allegheny County Act 167 Plan

Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 178, Shaler-3 & 4	Etna Borough, Shaler Township, Ross Township	Little Pine Creek West	Upstream Stormwater Management, Stream Bank Restoration, Floodplain Restoration



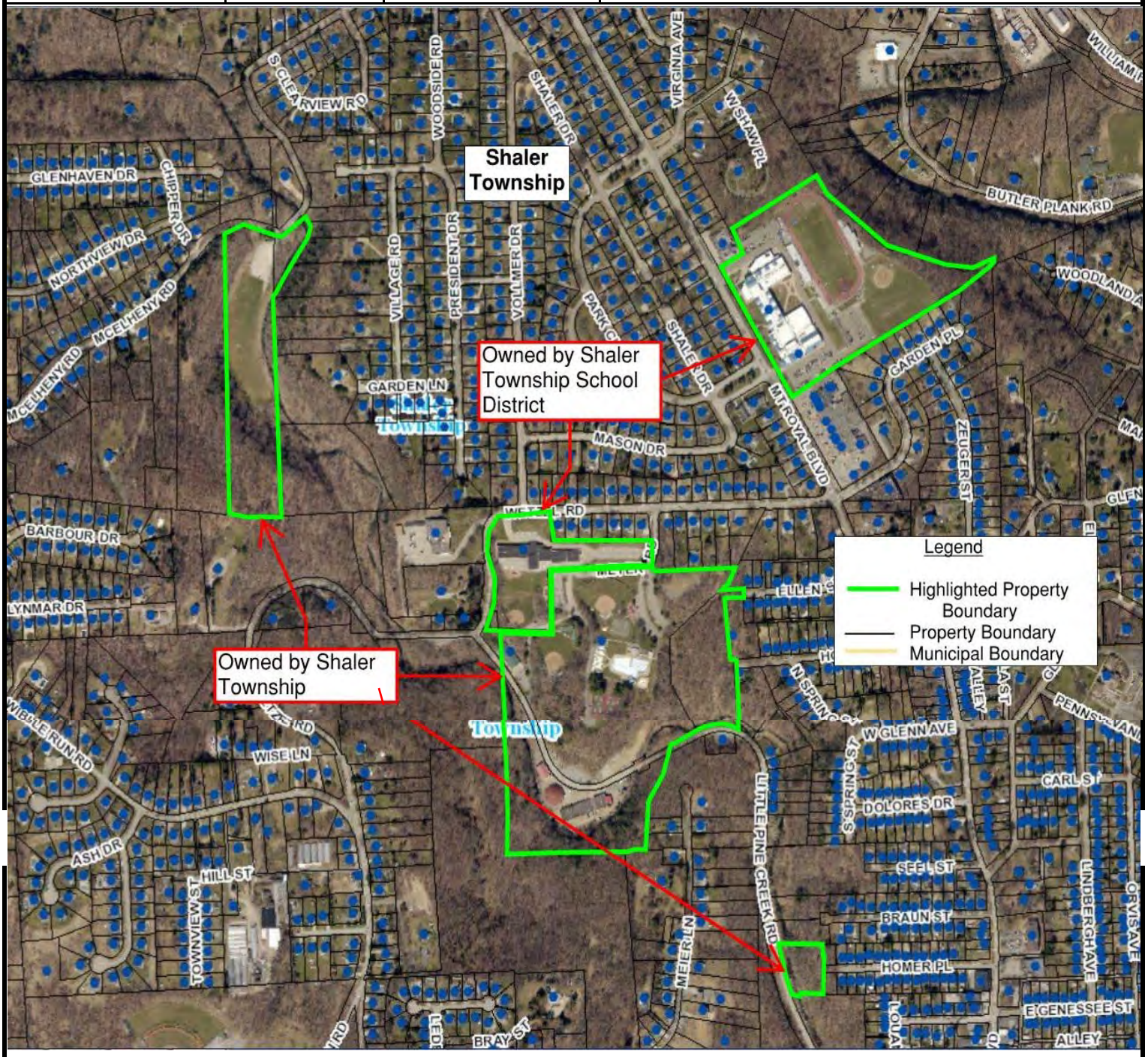


Areas in green are parcels where potential municipal BMPs could be located.

PROBLEM AREA #178-POTENTIAL IMPROVEMENT LOCATION DETAIL

Allegheny County Act 167 Plan

Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 178, Shaler-3 & 4	Shaler Township	Little Pine Creek West	Upstream Stormwater Management, Stream Bank Restoration, Floodplain Restoration

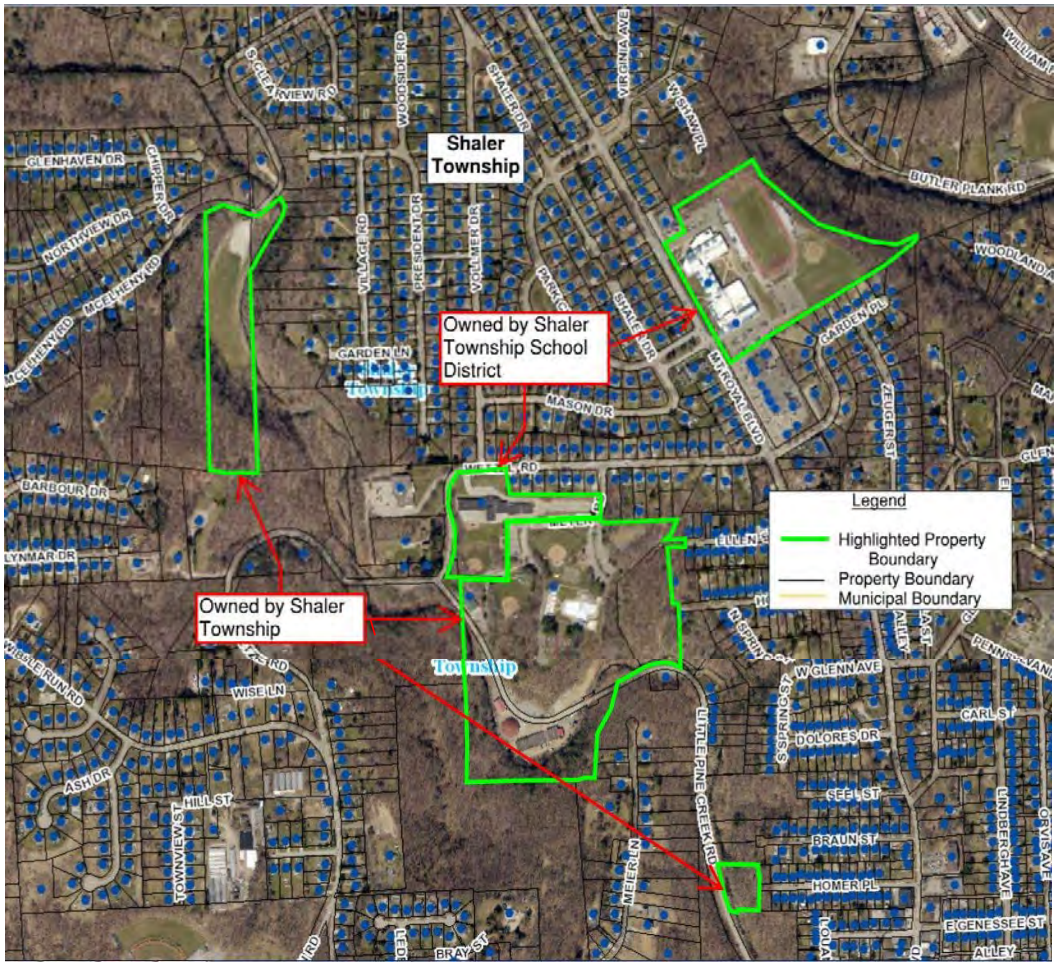


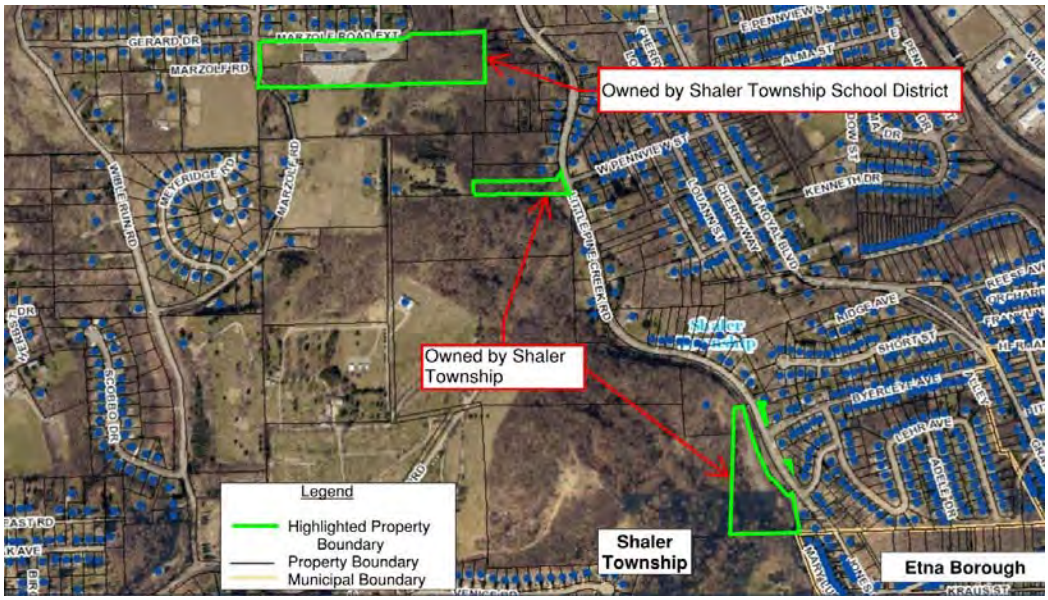
Areas in green are parcels where potential municipal BMPs could be located.

PROBLEM AREA #178-POTENTIAL IMPROVEMENT LOCATION DETAIL

Allegheny County Act 167 Plan

Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 178, Shaler-3 & 4	Shaler Township	Little Pine Creek West	Upstream Stormwater Management, Stream Bank Restoration, Floodplain Restoration



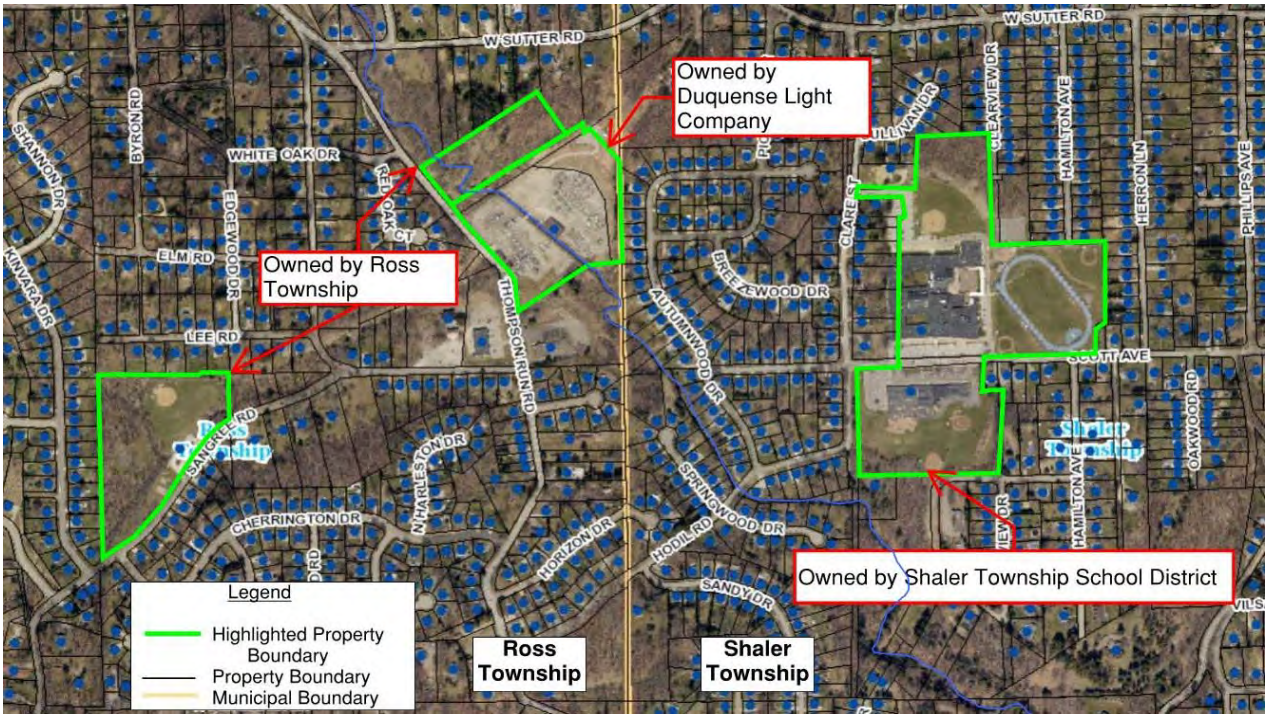


Areas in green are parcels where potential municipal BMPs could be located.

PROBLEM AREA #178-POTENTIAL IMPROVEMENT LOCATION DETAIL

Allegheny County Act 167 Plan

Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 178, Shaler-3 & 4	Shaler Township, Ross Township	Little Pine Creek West	Upstream Stormwater Management, Stream Bank Restoration, Floodplain Restoration



Areas in green are parcels where potential municipal BMPs could be located.

PROBLEM AREA #178-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 178, Shaler-3 & 4	Inspected By/Date:	GVB of Sci-Tek 6/25/2015
Municipality:	Etna Borough, Shaler Township	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Flooding - inadequate bridge; Streambank erosion, Sedimentation		





Concrete bank lining in need of restoration and maintenance is being under cut (left) and limiting flood plain. Concrete encased sewer pipes (right) and buried gas lines along Little Pine Creek limit the amount of sediment available to be removed during restoration.

Potential Solutions

1) Conduct engineering study to assess:
a) Stormwater management in upper watershed for opportunities to retrofit or add stormwater management features including green infrastructure, bioretention, and regional detention facilities to reduce peak flow and improve water quality. Potential land parcels to use for on or offline BMPs are highlighted in preceding pages.
b) Channel restrictions at bridges.
c) Feasability of removing accumulated sediment, reconnecting stream to floodplain.
d) Address stream undercutting of retaining wall/levee.
e) Downstream impacts of proposed changes to ensure outflow is not increased.
2) Assess and implement, as needed, flood protection for substation along Litte Pine Creek Road to ensure station is floodproof. Options including moving, thesubstation, raising the base elevation several feet, or building a dyke to ensure runoff from larger or intense storm events bypass the facility.

3) Instruct Shaler Township to find new location for waste materials. Remove dumped debris from stream banks and restore banks (note encased sewer and gas lines run along stream bed).

4) Commission engineering study to assess feasibility of reconnecting stream to floodplain near Shaler Township maintenance facility and in Etna. Potentially relocate maintenance facility.

5) Assess buildings/facilities in floodplain and remove or protect in accordance with Allegheny County 2015 Hazard Mitigation Plan. As funds become available, demolish houses in floodprone areas as described in Action Item 28. Reduce possibility of damage and loss of function to community-identified critical facilities in the floodplain according to Action Item 89.

6) Implement maintenance program to periodically clean/maintain catch basins as well as any other current BMPs and additional measures implemented.

Regional Basin Modeling Results

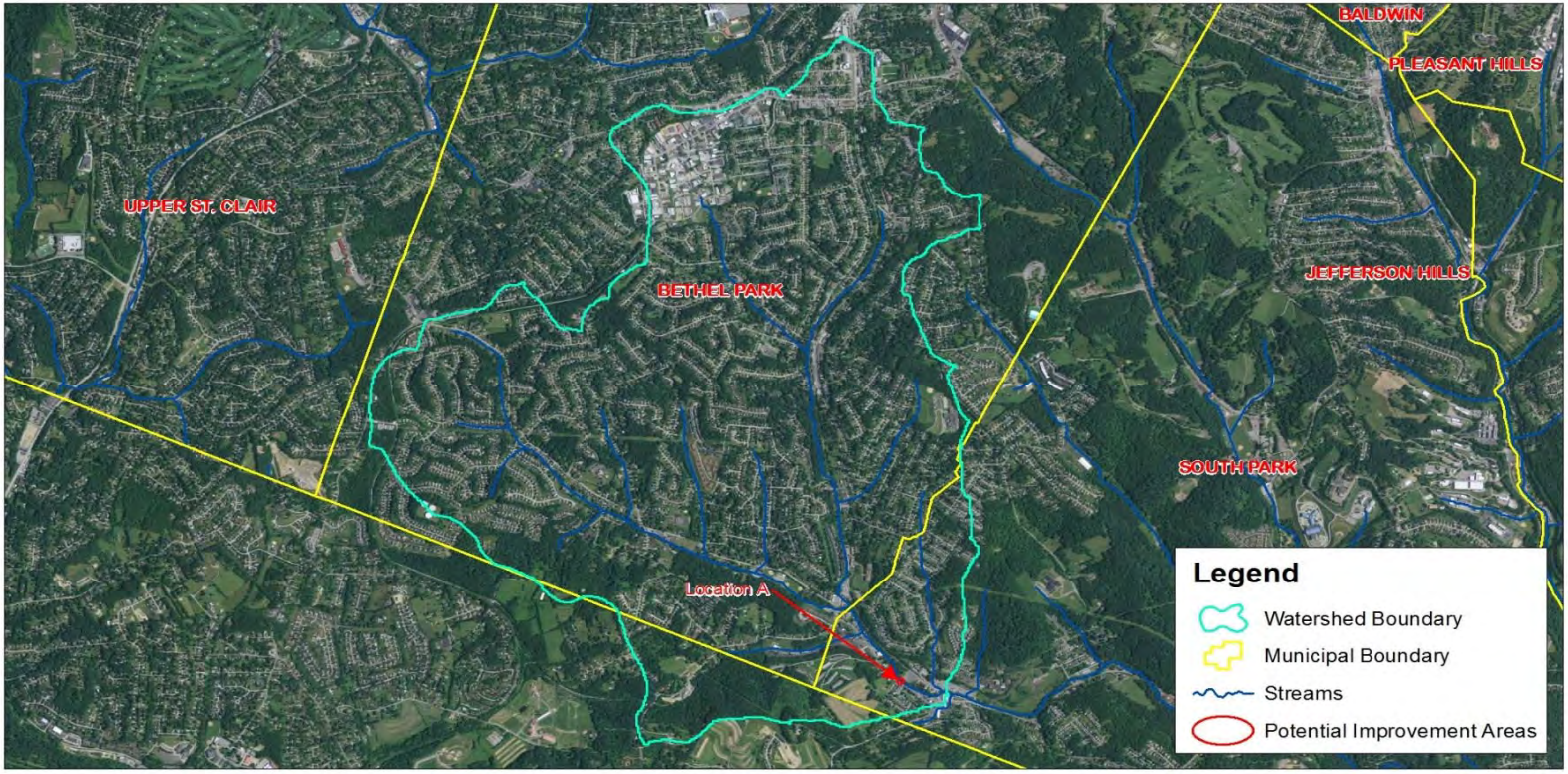
Drainage Area	6.77 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	335		
10-Year	796		
50-Year	1380		
100-Year	1690		

Cost Estimate

1) $125,000-$300,000 for engineering analysis	4) $75,000-$150,000 for engineering analysis
2) $20,000 for engineering analysis	5) Programatic to Hazard Mitigation Plan
3) $10,000-15,000	6) $30,500-$53,000 annually per acre-foot of storage

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #200

Allegheny County Act 167 Plan



Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 200, South Park 2	South Park Township	Tributary to Piney Fork	Replace/maintain culverts; Install Backflow Preventers

Description: Flooding along Tributary to Piney Fork near the intersection of Pleasant Street and Church Street caused by stormwater runoff in the stream channel. Stormwaters flood the roadways and backup storm sewers into the basements of multiple private properties. Flooding has also been noted at the Park and Ride lot downstream of this location. One of the culverts under the unnamed road to the church parking lot is partially filled with debris and does not have water flowing through it at normal pool. Residential and industrial development in the watershed appears to be constructed prior to current stormwater management standards and is likely contributing to flooding issue.

PROBLEM AREA #200-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 200, South Park 2	Inspected By/Date:	JLB of Sci-Tek / 6/15/2015
Municipality:	South Park Township	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Flooding - inadequate culvert (or maintenance); Sedimentation		





Culverts under unnamed road to church parking lot (left). Low lying area photo near auto repair shop looking towards the T(trolley) tracks and park and ride (right).

Potential Solutions

1) Install backflow preventers in the sewer lines being flooded by stormwaters.

2) Clean and remove debris from the culverts under the unnamed road to the church parking lot.
Location A

3) Evaluate the potential to install infiltration best management practices (BMPs) in upstream municipalities with the goal of attenuating peak flow to problem location.

Regional Basin Modeling Results

Drainage Area	5.35 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	275 cfs		
10-Year	659 cfs		
50-Year	1150 cfs		
100-Year	1410 cfs		

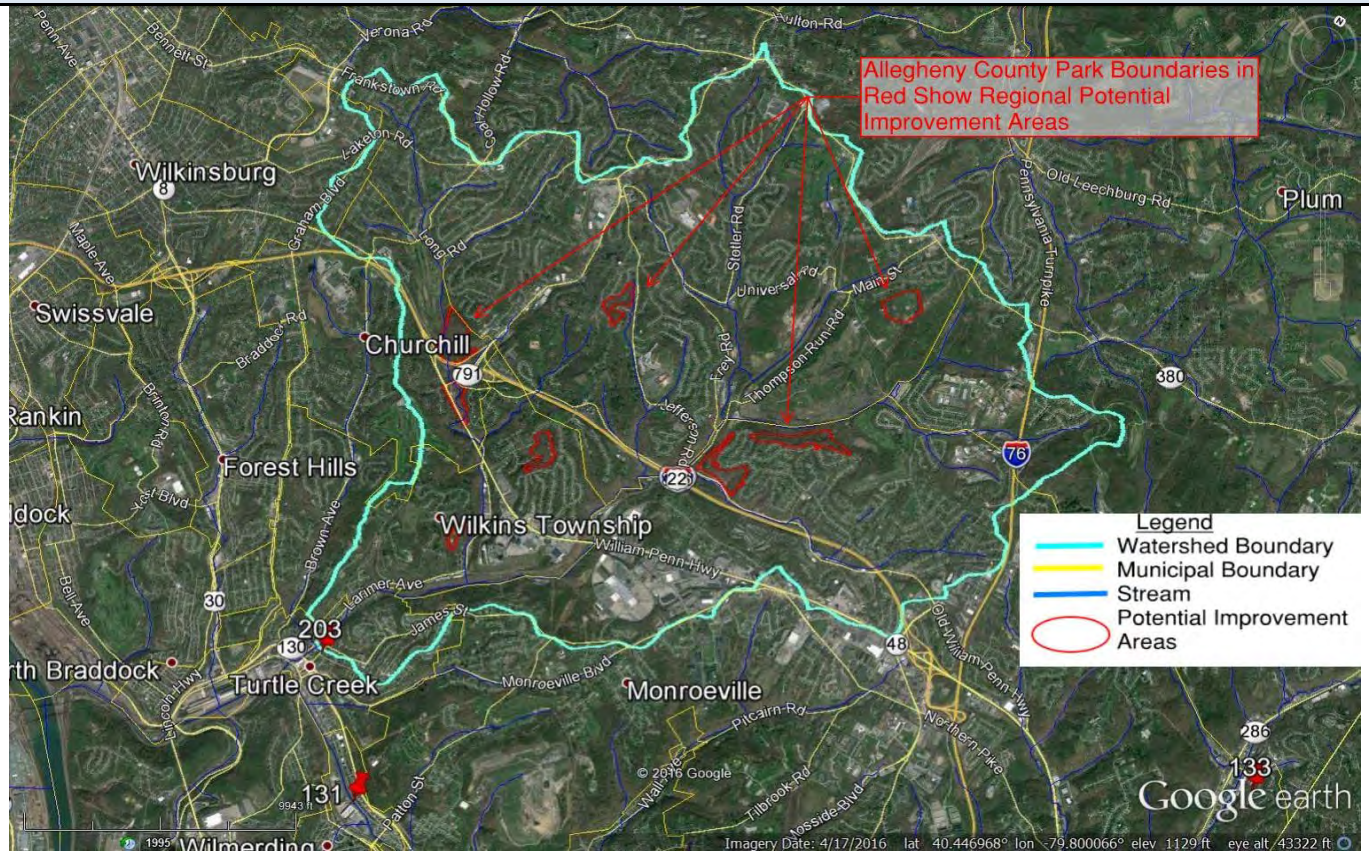
Cost Estimate

1) $*	4)
2) $ 35,000	5)
3) $ 25,000	6)

*Insufficient information available to determine cost estimate

POTENTIAL IMPROVEMENT LOCATIONS FOR PROBLEM AREA #203

Allegheny County Act 167 Plan



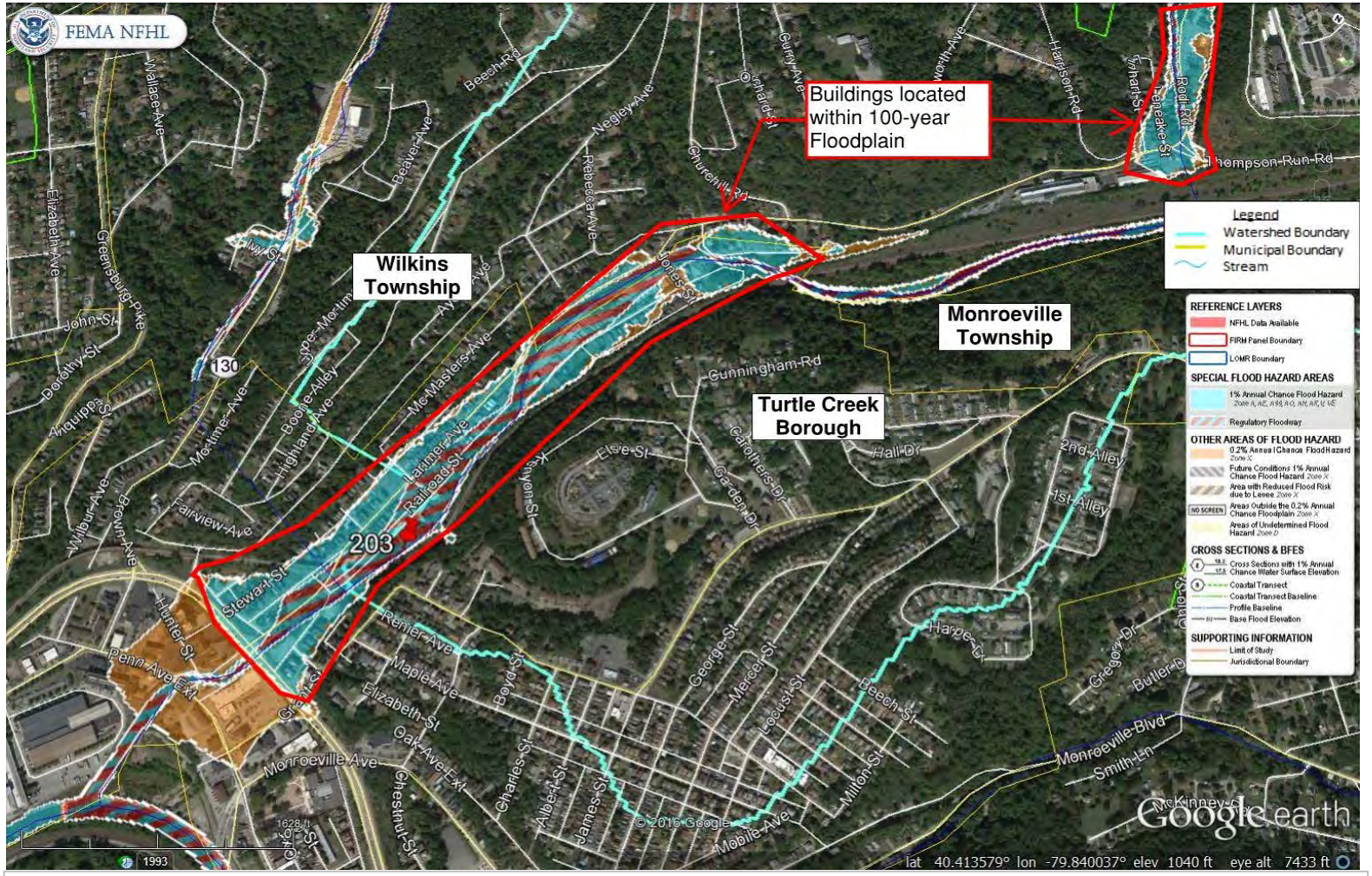
Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 203, Turtle Creek-1	Turtle Creek Borough	Thompson Run	Upstream stormwater management, Stream restoration

Description: Located at the eastern edge of Allegheny County in the Turtle Creek and Thompson Run Watersheds, the area around the location of Map_ID 203, in Turtle Creek, floods roadways during large storm events, which reportedly poses a danger to motorists and causes property damage. This watershed extends into Wilkins, Churchill, Monroeville, and Penn Hills Municipalities. Most of the development in the problem area is built in the floodplain. Most of the residential and industrial development in the watershed appears to be constructed prior to current stormwater management standards and may present an opportunity to add or retrofit existing stormwater control features.

PROBLEM AREA #203–POTENTIAL IMPROVEMENT LOCATION DETAIL

Allegheny County Act 167 Plan

Problem Area(s) - Map ID	Municipality	Stream Name	Preferred Solution
Map_ID 203, Turtle Creek-1	Turtle Creek Borough	Thompson Run	Upstream Stormwater Management, Stream Bank Restoration



The areas circled in red are at risk of flooding and the buildings located there should be assessed for flood protection in accordance with Action Item 5 of the Allegheny County 2015 Hazard Mitigation Plan.

PROBLEM AREA #203-POTENTIAL IMPROVEMENT DETAIL

Act 167 Plan

Problem Area(s) - Map ID:	Map_ID 203, Turtle Creek-1	Inspected By/Date:	GVB of Sci-Tek 6/25/2015
Municipality:	Turtle Creek Borough	Checked By/Date:	JS - Michael Baker 7/2016
Type of Problem(s)	Flooding-roadway & development w/i floodplain ; Streambank erosion;		





Sediment accumulation in the stream (left) indicates constriction at bridge. Concrete wall (right) is degrading and sediment accumulation is evident.

Potential Solutions

1) Conduct engineering study to assess:

a) Stormwater management in upper watershed for opportunities to retrofit or add stormwater management features. Some potential areas for regional storage are highlighted on the preceding page.

b) Floodwall and energy dissipator/spillway design, and channel restrictions at bridges.

c) Feasability of removing accumulated sediment, reconnecting stream to floodplain

d) Downstream impacts of proposed changes to ensure outflow is not increased.

2) Stabilize stream upstream of location (approx. 4,000 LF) to reduce erosion and sediment transport, adding green stormwater infrastructure, bioretention, or detention features where possible to reduce peak flow and improve water quality.

3) Assess buildings/facilities in floodplain and remove or protect in accordance with Allegheny County 2015 Hazard Mitigation Plan. As funds become available, identify properties in the community at high risk of flooding for purposes of property protection as described in Action Item 5.

4) Implement maintenance program to periodically clean/maintain catch basins in watershed and any additional measures implemented

Regional Basin Modeling Results

Drainage Area	10.6 mi^2		
Potential Storage			
Storm Frequency	Existing Peak Discharge (cfs)	Mitigated Peak Discharge (cfs)	Difference (cfs)
2-Year	685		
5-Year	1170		
10-Year	1560		
50-Year	2660		
100-Year	3220		

Cost Estimate

1) $125,000-$300,000 for engineering analysis	3) Programatic to Hazard Mitigation Plan
2) $700,000 to $1,000,000+	4) $30,500-$53,000 annually per acre-foot of storage

APPENDIX C

PROBLEM AREAS AND OBSTRUCTIONS

APPENDIX C-1

Information Request Forms Sent to Municipalities

ALLEGHENY COUNTY WATERSHEDS ACT 167
Stormwater Management Plan

Information Request Form

PLEASE COMPLETE THE FOLLOWING AND RETURN THE FORM (email preferred) AND MARKED UP MAP TO:			
Chad Davis			
Michael Baker Jr. Inc.			
100 Airside Drive			
Moon Township, PA 15108			
Email: cdavis@mbakercorp.com Phone: 412.375.3077			
Person completing form			
Watershed			
Municipality			
Name			
Phone			
e-mail			
1. Does your municipality have the following?			
*For the Regulations / Ordinances listed, please list where the Regulation / Ordinance is found in the "Location" column.			
Use the following abbreviations for the "Location" column: CP = comprehensive plan BC = building code SL = subdivision/land development ordinance ZO = zoning ordinance SO = separate ordinance			
	Yes	No	Location/Date
Comprehensive Plan	☐	☐	
Zoning Ordinance	☐	☐	
Subdivision/Land Development Ordinance	☐	☐	
Floodplain Regulations *	☐	☐	
Stormwater Management Regulations *	☐	☐	
Erosion Control Regulations *	☐	☐	
Drainage Regulations *	☐	☐	

2. Is your Municipality considered a small MS4 Municipality under the current NPDES Phase II stormwater regulations? (CIRCLE ONE)

Yes	No

If yes, is your small MS4 Municipality currently in compliance with the NPDES Phase II Permit?

Yes	No

3. The Watershed Plan will address five key stormwater considerations. These five are listed below. Please indicate how important you believe it is to address each consideration.

Consideration		Very Important 5	4	3	2	Not Important 1
Peak Flow	Increased flows from stormwater runoff contribute to stream erosion, localized ponding and flooding, may cause damage to infrastructure (roads, sewers, etc.).	☐	☐	☐	☐	☐
Water Quality	Dissolved and un-dissolved pollutants washed off the land surface - negative impacts to recreation, aesthetics and in-stream habitat.	☐	☐	☐	☐	☐
Groundwater Recharge	Increased runoff decreases amount of rain that becomes groundwater; decreased groundwater supplies may have negative effects on well water supplies and decrease or dry up stream base flow in dry periods.	☐	☐	☐	☐	☐
Stream Erosion	Eroding banks and beds may undercut roads and utilities, damages in-stream habitat, clog culverts and bridges.	☐	☐	☐	☐	☐
Flooding	Larger scale overbank flows such as the 100-year flood associated with extreme storm events	☐	☐	☐	☐	☐

4. Would you like to see information on any of the following presented at a Watershed Plan Advisory Committee meeting?

	Yes	Maybe	No
Best Management Practices	☐	☐	☐
Model/Implemented Ordinances	☐	☐	☐
Information on Act 167 reimbursements	☐	☐	☐

Other topics you would like to have considered: _____

5. What is the most important stormwater related issue to your municipality?
5A. Do you work with neighboring municipalities regarding stormwater issues/problems? If so which ones?

6. Would you suggest any other agencies or organizations that should be included on the Watershed Plan Advisory Committee? If so, please give contact information below:	
Name	
Organization	
Address	
Phone	
e-mail	

7. Please provide any input you feel is relevant regarding current watershed management procedures.

8. Please complete problem area maps for your municipality which will aid us in developing a plan to address the issues you raise.

FORM A - STORMWATER PROBLEM AREAS SHEET_____ OF _____

WATERSHED	FORM COMPLETED BY	Before Filling Out Form, See Instructions On Website
Name:	Name:	
Municipality:	Telephone:	For County Use:
County: Allegheny	Date:	

Point Name												
Types of Stormwater Problems												
Flooding												
Accelerated Erosion												
Sedimentation												
Landslide												
Groundwater												
Water Pollution												
Other (Explain)												
Explanation Line No. (On Back)												
Cause (s)												
Stormwater Volume												
Stormwater Velocity												
Stormwater Direction												
Water Obstruction												
Other (Explain)												
Explanation Line No. (On Back)												
Frequency												
Year Most Recent Occurred												
Year First Known Occurred												
Regularity												
More Than 1 Year												
Less Than 1 Year												
Only During Ivan												
Only During Agnes												
Duration (If Applicable)												
Less Than 1 Day												
1 Day + (Enter Days)												
Property Damage												
Loss of Life/Vital Services												
Private												
More Than One Owner												
Types of Properties												
Number of Properties												
Public (List Types)												
Explanation Line No. (On Back)												
Solutions												
Suggested												
Explanation Line No. (On Back)												
Formally Proposed												
Explanation Line No. (On Back)												

INSTRUCTIONS

Begin with A.1 as the first map number to identify the first' storm water problem area. Illustrate the defined problem on the watershed map provided, and identify it with its map number.

For each storm water problem area within your municipality, enter the map identification number at the head of the column. Describe the problem by placing a check (4 in the appropriate blocks of the column under this map identification number.

When an additional explanation is required, write the line number(s) used in the column marked "Explanation Line No. (s)".Example 1, 2-3, etc.

If storm water problem occurred during and after Agnes, describe the frequency of the problem after Agnes.

Use the explanation lines to list the types of public property damages ,e.g.roadways, hospitals, etc.

Enter the line no. (s) used to list the map ID no. (s) for the proposed facilities.



Definitions

Storm Water Problem Area
An area that defines the farthest extent of a storm water problem, including any area that experiences property damage, inundation, accelerated erosion, surface water pollution, groundwater pollution, landslides, or any other problem as a result of storm water runoff.

Groundwater
Water in the ground below the water table.

Accelerated Erosion
The removal of the surface of the land through the combined action of man's activities and the natural processes at a rate greater than would occur because of the natural process alone.

Sedimentation
The process by which soil or other surface materials, transported by surface water, is deposited on stream bottoms.

Water Obstruction
Any dike, bridge, culvert, wall, wingwall, fill, pier, wharf, embankment, abutment, or other structure located in, along, across, or projecting into any watercourse, floodway, or body of water.

EXPLANATION LINES (continued)

APPENDIX C-2

Summary of Information Provided by Municipalities

Information Request Form

Questions associated with the Information Request Form (Information Provided in Table A)

Question 1. Does your Municipality have:_____?
Question 2. Is your Municipality considered a small MS4 Municipality under the current NPDES Phase II stormwater regulations? (Yes or No)
Question 3. The Watershed Plan will address five key stormwater considerations. These five are listed below. Please indicate how important you believe it is to address each consideration. (5-Very Important) to (1-Not Important)
Question 4. Would you like to see information on any of the following presented at the WPAC meeting?
Question 5. What is the most important stormwater related issue to your Municipality?
Question 5A. Do you work with neighboring municipalities on stormwater issues/problems? (Yes or No)

Table A - Summary Table of Municipality Information Provided Through the Information Request Form (2011)

Municipality	Q1							Q2	Q3					Q4			Q5	Q5A
	Comprehensive Plan	Zoning Ordinance	SALDO	Floodplain Regulations	Stormwater Regulations	Erosion Control Regulations	Drainage Regulations	Is municipality a small MS4 under current NPDES Phase	Peak Flow	Water Quality	Groundwater Recharge	Stream Erosion	Flooding	See info on BMP's	See info on model / implementing ordinances	See info on ACT 167 reimbursements	Filled out most important issue question	Do you work with neighboring municipalities
Aleppo Township	Information Not Provided																	
Aspinwall Borough	N	Y	Y	Y	N	N	N	Y	3	2	1	4	4	Y	Y	Y	Y	N
Avalon Borough	Information Not Provided																	
Baldwin Borough	Information Not Provided																	
Baldwin Township	N	Y	Y	N	Y	Y	Y	Y	5	5	5	5	5	N	Y	Y	Y	N
Bell Acres Borough	Y	Y	Y	N	Y	Y	Y	Y	2	4	2	4	4	Y	N	Y	Y	Y
Bellevue Borough	Information Not Provided																	
Ben Avon Borough	N	Y	N	Y	Y	Y	Y	Y	5	4	3	5	5	Y	Y	Y	Y	Y
Ben Avon Heights Borough	Information Not Provided																	
Blawnox Borough	Information Not Provided																	
Brackenridge Borough	Information Not Provided																	
Braddock Borough	N	Y	N	Y	N	N	N	Y	4	2	1	1	5	Y	Y	Y	Y	N
Braddock Hills Borough	N	Y	Y	Y	Y	Y	Y	Y	5	3	3	5	4	Y	Y	Y	Y	N
Bradford Woods Borough	Y	Y	Y	Y	Y	Y	Y	Y	5	2	2	2	4	Y	Y	N	Y	Y
Brentwood Borough	N	Y	Y	Y	Y	Y	Y	Y	4	3	1	2	1	Y	Y	N	Y	Y
Bridgeville Borough	Information Not Provided																	
Carnegie Borough	Information Not Provided																	
Castle Shannon Borough	Information Not Provided																	
Chalfant Borough	N	Y	N	Y	Y	N	N	Y	3	1	1	4	4	Y	Y	Y	Y	N
Cheswick Borough	N	Y	Y	Y	Y	Y	Y	Y	5	4	4	3	5	Y	Y	N	Y	N
Churchill Borough	Information Not Provided																	
City of Duquesne	N	Y	Y	Y	Y	N	N	Y	3	1	1	4	3	Y	N	N	Y	N
City of McKeesport	Information Not Provided																	
City of Pittsburgh	N	Y	Y	Y	Y	N	Y	N	4	4	4	3	3	N	Y	N	Y	N
Clairton City	Information Not Provided																	
Collier Township	Y	Y	Y	Y	Y	Y	Y	Y	5	5	3	5	4	Y	N	N	Y	Y
Coraopolis Borough	N	Y	N	Y	Y	N	N	Y	5	2	1	1	2	Y	Y	N	Y	Y
Crafton Borough	N	Y	Y	Y	N	N	N	N	5	3	1	2	1	Y	Y	Y	Y	Y
Crescent Township	Y	Y	Y	Y	Y	Y	Y	Y	5	3	2	4	5	Y	Y	Y	Y	Y
Dormont Borough	Y	Y	Y	N	Y	Y	N	Y	5	3	4	1	3	N	N	Y	Y	N
Dravosburg Borough	N	Y	N	Y	Y	N	N	Y	4	2	1	4	5	Y	Y	Y	Y	N

Table A - Summary Table of Municipality Information Provided Through the Information Request Form (2011)

Municipality	Q1							Q2	Q3					Q4			Q5	Q5A
	Comprehensive Plan	Zoning Ordinance	SALDO	Floodplain Regulations	Stormwater Regulations	Erosion Control Regulations	Drainage Regulations	Is municipality a small MS4 under current NPDES Phase	Peak Flow	Water Quality	Groundwater Recharge	Stream Erosion	Flooding	See info on BMP's	See info on model / implementing ordinances	See info on ACT 167 reimbursements	Filled out most important issue question	Do you work with neighboring municipalities
East Deer Township	Information Not Provided																	
East McKeesport Borough	N	Y	N	N	Y	N	N	Y	5	3	1	5	1	N	Y	N	Y	N
East Pittsburgh Borough	Y	Y	N	Y	Y	N	N	Y	3	2	1	2	5	Y	N	N	Y	N
Edgewood Borough	Y	Y	Y	N	Y	Y	Y	Y	4	5	4	4	4	Y	N	N	Y	Y
Edgeworth Borough	Y	Y	Y	Y	Y	Y	Y	Y	5	3	2	4	4	Y	Y	Y	Y	Y
Elizabeth Borough	Information Not Provided																	
Elizabeth Township	N	Y	Y	Y	Y	Y	Y	Y	5	5	5	5	5	Y	Y	Y	Y	N
Emsworth Borough	Information Not Provided																	
Etna Borough	Y	Y	N	Y	Y	Y	Y	Y	5	4	3	5	5	Y	Y	N	Y	Y
Fawn Township	Information Not Provided																	
Findlay Township	Y	Y	Y	Y	Y	Y	Y	Y	3	3	3	3	3	N	N	N	Y	Y
Forest Hills Borough	Y	Y	Y	Y	Y	Y	Y	Y	5	4	2	3	4	Y	Y	N	Y	Y
Forward Township	Information Not Provided																	
Fox Chapel Borough	Y	Y	Y	Y	Y	Y	Y	Y	4	2	4	4	1	Y	N	N	Y	Y
Franklin Park Borough	Y	Y	Y	Y	Y	Y	Y	Y	4	3	4	3	2	Y	N	N	Y	N
Frazer Township	Y	Y	Y	Y	Y	Y	Y	Y	5	5	5	5	5	N	N	Y	Y	N
Glassport Borough	Information Not Provided																	
Glen Osborne Borough	Y	Y	Y	Y	Y	Y	Y	Y	5	4	4	5	5	Y	Y	Y	Y	Y
Glenfield Borough	Information Not Provided																	
Green Tree Borough	Information Not Provided																	
Hampton Township	Y	Y	Y	Y	Y	Y	N	Y	5	4	3	5	5	Y	Y	Y	Y	Y
Harmar Township	Y	Y	Y	Y	Y	Y	Y	Y	5	5	5	5	5	Y	Y	Y	Y	
Harrison Township	Y	Y	Y	Y	Y	Y	Y	Y	5	4	2	3	3	N	N	Y	Y	N
Haysville Borough	Information Not Provided																	
Heidelberg Borough	Y	Y	N	Y	Y	Y	Y	Y	5	3	2	3	5	N	Y	N	Y	Y
Homestead Borough	Y	Y	Y	N	Y	N	N	Y	4	2	1	4	3	Y	Y	Y	Y	N
Indiana Township	Information Not Provided																	
Ingram Borough	N	Y	N	N	Y	N	N	Y	4	2	2	2	4	Y	N	N	Y	Y
Jefferson Hills Borough	Information Not Provided																	
Kennedy Township	Y	Y	Y	Y	Y	Y	Y	N	5	3	5	5	5	Y	Y	N	Y	Y
Kilbuck Township	Information Not Provided																	

Table A - Summary Table of Municipality Information Provided Through the Information Request Form (2011)

Municipality	Q1							Q2	Q3					Q4			Q5	Q5A
	Comprehensive Plan	Zoning Ordinance	SALDO	Floodplain Regulations	Stormwater Regulations	Erosion Control Regulations	Drainage Regulations	Is municipality a small MS4 under current NPDES Phase	Peak Flow	Water Quality	Groundwater Recharge	Stream Erosion	Flooding	See info on BMP's	See info on model / implementing ordinances	See info on ACT 167 reimbursements	Filled out most important issue question	Do you work with neighboring municipalities
Leet Township	Information Not Provided																	
Leetsdale Borough	Information Not Provided																	
Liberty Borough	N	Y	Y	Y	N	N	N	Y	5	1	1	4	4	Y	Y	Y	Y	N
Lincoln Borough	N	Y	Y	Y	Y	Y	N	Y	4	3	4	5	4	N	Y	N	Y	N
Marshall Township	Y	Y	Y	Y	Y	Y	Y	Y	5	4	4	5	4	Y	N	N	Y	Y
McCandless Township	Y	Y	Y	Y	Y	Y	Y	Y	5	4	4	4	5	Y	Y	Y	Y	Y
McDonald Borough	Information Not Provided																	
McKees Rocks Borough	Information Not Provided																	
Millvale Borough	Information Not Provided																	
Moon Township	Y	Y	Y	Y	Y	Y	Y	Y	5	3	2	5	4	Y	Y	Y	Y	N
Mount Oliver Borough	Y	Y	Y	N	Y	Y	Y	Y	5	4	3	4	5	Y	Y	Y	Y	Y
Munhall Borough	Information Not Provided																	
Municipality of Bethel Park	Y	Y	Y	Y	Y	Y	Y	Y	5	2	2	4	5	Y	N	Y	Y	Y
Municipality of Monroeville	Y	Y	Y	Y	Y	Y	Y	Y	5	3	3	3	4	Y	Y	Y	Y	N
Municipality of Mount Lebanon	Y	Y	Y	Y	Y	Y	Y	Y	5	3	3	4	4	Y	N	Y	Y	Y
Municipality of Penn Hills	Information Not Provided																	
Neville Township	Information Not Provided																	
North Braddock Borough	Y	Y	N	Y	Y	N	N	Y	3	2	1	3	5	Y	Y	Y	Y	N
North Fayette Township	Y	Y	Y	Y	Y	Y	Y	Y	5	5	5	5	5	Y	Y	Y	Y	Y
North Versailles Township	N	Y	Y	Y	Y	N	N	Y	5	3	1	5	5	Y	Y	Y	Y	N
Oakdale Borough	Information Not Provided																	
Oakmont Borough	Y	Y	Y	Y	Y	Y	Y	Y	5	4	2	5	5	Y	Y	Y	Y	Y
O'Hara Township	Y	Y	Y	N	Y	N	N	Y	4	4	2	4	4	Y	N	N	Y	Y
Ohio Township	Y	Y	Y	Y	Y	N	N	Y	2	2	2	2	4	Y	Y	N	Y	Y
Pennsbury Village Borough	N	N	N	N	N	N	N	Y	5	4	4	5	5	Y	Y	Y	N	N
Pine Township	Information Not Provided																	
Pitcairn Borough	N	Y	N	N	N	N	N	Y	4	5	3	3	5	Y	Y	Y	Y	Y
Pleasant Hills Borough	Y	Y	Y	Y	Y	Y	Y	Y	5	4	3	4	5	Y	Y	Y	Y	Y
Plum Borough	Y	Y	Y	Y	Y	Y	Y	Y	5	3	3	5	4	Y	Y	N	Y	N
Port Vue Borough	Information Not Provided																	
Rankin Borough	Information Not Provided																	

Table A - Summary Table of Municipality Information Provided Through the Information Request Form (2011)

Municipality	Q1							Q2	Q3					Q4			Q5	Q5A
	Comprehensive Plan	Zoning Ordinance	SALDO	Floodplain Regulations	Stormwater Regulations	Erosion Control Regulations	Drainage Regulations	Is municipality a small MS4 under current NPDES Phase	Peak Flow	Water Quality	Groundwater Recharge	Stream Erosion	Flooding	See info on BMP's	See info on model / implementing ordinances	See info on ACT 167 reimbursements	Filled out most important issue question	Do you work with neighboring municipalities
Reserve Township	N	Y	N	Y	Y	Y	N	Y	5	5	5	5	5	N	Y	N	Y	Y
Richland Township	Information Not Provided																	
Robinson Township	Information Not Provided																	
Ross Township	Information Not Provided																	
Rosslyn Farms Borough	Information Not Provided																	
Scott Township	Information Not Provided																	
Sewickley Borough	Y	Y	Y	Y	Y	Y	Y	Y	4	3	4	5	5	Y	Y	N	Y	Y
Sewickley Heights Borough	Y	Y	Y	Y	Y	Y	N	Y	5	5	5	5	5	N	N	Y	Y	N
Sewickley Hills Borough	Information Not Provided																	
Shaler Township	N	Y	Y	Y	Y	Y	Y	Y	5	4	3	4	5	Y	Y	Y	Y	Y
Sharpsburg Borough	N	Y	Y	Y	N	N	N	N	5	5	4	5	5	Y	Y	Y	Y	Y
South Fayette Township	Y	Y	Y	Y	Y	Y	N	Y	5	5	5	5	5	Y	Y	Y	Y	N
South Park Township	Y	Y	Y	Y	Y	Y	N	Y	5	3	1	3	3	Y	Y	N	Y	Y
South Versailles Township	Information Not Provided																	
Springdale Borough	Information Not Provided																	
Springdale Township	Information Not Provided																	
Stowe Township	Information Not Provided																	
Swissvale Borough	N	Y	Y	Y	Y	N	N	Y	5	3	1	5	3	Y	Y	Y	Y	N
Tarentum Borough	Y	Y	N	N	N	N	N	Y	5	5	4	5	5	Y	Y	Y	Y	N
Thornburg Borough	Information Not Provided																	
Trafford Borough	N	Y	Y	Y	Y	N	N	Y	4	2	1	4	5	Y	Y	Y	Y	N
Turtle Creek Borough	Information Not Provided																	
Upper St. Clair Township	Y	Y	Y	Y	Y	Y	Y	Y	3	5	4	4	4	Y	Y	Y	Y	Y
Verona Borough	Y	Y	Y	Y	N	N	Y	Y	4	4	4	2	3	N	Y	N	Y	Y
Versailles Borough	Y	Y	N	Y	Y	N	N	Y	5	3	2	3	5	Y	N	Y	Y	N
Wall Borough	Information Not Provided																	
West Deer Township	Y	Y	Y	Y	Y	Y	Y	Y	4	3	2	3	4	Y	Y	N	Y	N
West Elizabeth Borough	N	N	N	Y	N	N	N	N	5	2	2	5	3	Y	Y	N	Y	N
West Homestead Borough	Information Not Provided																	
West Mifflin Borough	Y	Y	Y	Y	Y	Y	Y	Y	5	4	4	5	0	Y	Y	Y	Y	N
West View Borough	N	Y	Y	Y	Y	N	N	Y	4	3	1	5	5	Y	Y	Y	Y	N

Table A - Summary Table of Municipality Information Provided Through the Information Request Form (2011)

Municipality	Q1							Q2	Q3					Q4			Q5	Q5A
	Comprehensive Plan	Zoning Ordinance	SALDO	Floodplain Regulations	Stormwater Regulations	Erosion Control Regulations	Drainage Regulations	Is municipality a small MS4 under current NPDES Phase	Peak Flow	Water Quality	Groundwater Recharge	Stream Erosion	Flooding	See info on BMP's	See info on model / implementing ordinances	See info on ACT 167 reimbursements	Filled out most important issue question	Do you work with neighboring municipalities
Whitaker Borough	N	Y	Y	Y	Y	N	N	Y	5	5	5	5	5	Y	Y	N	Y	Y
White Oak Borough	Information Not Provided																	
Whitehall Borough	N	Y	Y	N	Y	Y	Y	Y	5	4	2	2	5	Y	N	N	Y	Y
Wilkins Township	Y	Y	Y	Y	Y	Y	Y	Y	5	5	5	5	5	N	Y	Y	Y	N
Wilkinsburg Borough	Y	Y	Y	Y	Y	N	N	Y	5	3	2	5	3	Y	Y	Y	Y	Y
Wilmerding Borough	N	Y	N	Y	Y	N	N	Y	4	1	1	5	5	Y	Y	Y	Y	N

Table B - Form A Summary Table for Municipality-Identified Stormwater Problem Areas (2011)

Point ID	Municipality	Description
P1	Baldwin Township	Roadway Flooding
P2	Ben Avon Borough	Flooding, streambank erosion, and landslides along Spruce Run
P3	Ben Avon Heights Borough	Flooding and accelerated erosion
P4	Bradford Woods Borough	Flooding
P5		Flooding of private property
P6		Flooding, accelerated erosion, and sedimentation
P7		Sedimentation and water pollution of local pond
P8		Sedimentation from runoff deposits onto private property
P9	Cheswick Borough	Groundwater infiltration into sanitary sewer
P10	City of Pittsburgh	Auto entrapment
P11		Basement flooding
P12		Creek overflows flooding roadway
P13		Flooding
P14		Flooding and auto entrapment
P15		Flooding and auto entrapment
P16		Home flooding
P17		Landslide onto roadway
P18		Roadway flooding
P19		Roadway flooding
P20		Roadway flooding
P21		Roadway flooding
P22		Roadway flooding
P23		Roadway flooding
P24		Roadway flooding
P25		Roadway flooding
P26		Roadway flooding
P27		Roadway flooding
P28		Roadway flooding
P29		Roadway flooding
P30		Roadway flooding
P31		Roadway flooding
P32		Roadway flooding
P33		Roadway flooding
P34		Roadway flooding and auto entrapment
P35		Roadway flooding and debris from hillside
P36		Roadway flooding and manhole surcharging
P37	Collier Township	Flooding and erosion due to undersized culverts
P38	Coraopolis Borough	Roadway flooding
P39		Roadway flooding
P40		Roadway flooding
P41		Roadway flooding
P42		Surface flooding
P43		Surface flooding and erosion of ditch lines
P44		Surface flooding due to downstream culvert capacity

P45	Coraopolis Borough	Surface flooding due to erosion and sedimentation from stream
P46		Surface flooding due to plugged roadway culvert
P47	Crescent Township	Streambank erosion causing roadway shoulder and bank to
P48		Flooding
P49		Roadway flooding
P50		Roadway flooding
P51		Roadway flooding
P52		Roadway flooding due to sediment build-up
P53		Vegetative overgrowth obstructing channel flow
P54	Dormont Borough	Flooding
P55	Edgewood Borough	Flooding causing basement flooding along Greendale Avenue
P56	Edgeworth Borough	Accelerated erosion and sedimentation within stream
P57		Accelerated erosion and sedimentation within stream
P58		Flooding
P59		Flooding and accelerated erosion
P60		Flooding, accelerated erosion, and sedimentation
P61	Etna Borough	Flooding and sedimentation
P62		Flooding and sedimentation build-up at culvert inlet
P63		Flooding, accelerated erosion, and sedimentation
P64		Groundwater causing basement flooding
P65		Roadway flooding
P66		Roadway flooding
P67	Findlay Township	Flooding
P68		Flooding
P69		Flooding and sedimentation
P70	Forest Hills Borough	Roadway flooding
P71	Franklin Park Borough	Roadway flooding
P72	Glen Osborne Borough	Accelerated erosion at berm along retaining wall
P73		Accelerated erosion at culvert
P74		Accelerated erosion at culvert under Beaver Road
P75		Accelerated erosion at driveway culvert
P76		Accelerated erosion of fill area
P77		Flooding
P78		Flooding and accelerated erosion
P79		Flooding and accelerated erosion
P80		Groundwater
P81	Hampton Township	Flooding
P82		Flooding
P83		Flooding
P84		Flooding
P85	Jefferson Hills Borough	Flooding
P86		Flooding
P87		Landslide along roadway
P88		Landslide along roadway
P89	Jefferson Hills Borough	Landslide along roadway
P90		Water pollution and flooding
P91		Water pollution and flooding
P92	Kennedy Township	Flooding
P93		Landslide

P94	Marshall Township	Flooding
P95		Accelerated erosion along stream and landslide onto roadway
P96		Flooding
P97		Flooding and accelerated erosion
P98		Flooding and accelerated erosion
P99		Flooding and accelerated erosion
P100		Flooding and accelerated erosion
P101		Flooding and accelerated erosion
P102		Flooding and accelerated erosion
P103		Landslide
P104		Landslide
P105		Landslide
P106		Landslide along roadway
P107		Landslide at Shelbourne Road
P108		Landslide caused by erosion and stormwater
P109		Landslide caused by excess runoff and soil conditions
P110		Landslide causing damage to road and blocking stream
P111		Landslide causing Hassam Road to collapse
P112		Landslide from stormwater and soil saturation
P113		Landslide onto roadway
P114		Landslides along Flaugherty Run corridor
P115		Stream overflows flooding buildings
P116		Stream overflows flooding buildings
P117		Water pollution
P118		Water pollution
P119		Water pollution
P120		Water pollution from mine drainage
P121		Water pollution from mine drainage
P122	Moon Township	Water pollution from mine drainage
P123		Future stormwater compliance issues
P124	Municipality of Bethel Park	Future stormwater compliance issues
P125		Discharge location of storm sewer polluted with mine drainage
P126		Flooding caused by bridge collapse
P127		Roadway and property flooding
P128		Roadway flooding
P129		Roadway flooding and accelerated erosion
P130		Roadway flooding and sedimentation
P131		Roadway flooding and sedimentation
P132		Roadway flooding and sedimentation
P133		Roadway flooding caused by failing storm sewer pipe
P134	Municipality of Monroeville	Roadway flooding, accelerated erosion, and sedimentation
P135		Flooding due to collection capacity issues
P136		Flooding due to collection capacity issues
P137		Flooding due to collection capacity issues
P138		Flooding
P139		Residential flooding from discharge from Mt. Lebanon Golf
P140		Residential flooding due to conveyance system capacity
P141		Groundwater causing basement flooding
P142	Municipality of Mount Lebanon	Accelerated erosion causing urban stream degradation

P143	North Fayette Township	Flooding
P144		Flooding and sedimentation
P145		Flooding from stormwater runoff
P146		Stream sedimentation restricting flow
P147		Stream sedimentation restricting flow
P148	O'Hara Township	Flooding
P149		Flooding, accelerated erosion, sedimentation, and landslide
P150		Landslide
P151		Sedimentation from unnamed tributary to Squaw Run
P152	Scott Township	Accelerated erosion
P153		Flooding
P154		Flooding
P155		Flooding
P156		Flooding
P157		Flooding and accelerated erosion
P158		Flooding and groundwater causing damage to residential
P159		Flooding caused by debris build-up at culvert inlet
P160		Flooding due to collapsed stormwater conveyance system
P161		Flooding due to limited capacity stormwater conveyance system
P162		Flooding on industrial property
P163		Flooding on industrial property
P164		Flooding on industrial property
P165		Ground movement
P166		Groundwater spring causes ground saturation
P167		Groundwater spring causes roadway icing
P168		Landslide
P169		Landslide on private property
P170		Landslide on private property
P171		Landslide on private property
P172		Roadway flooding and stream erosion
P173		Sedimentation causing blockage of bridge
P174		Streambank flooding and accelerated erosion to abutment
P175		Water pollution caused by abandoned mine drainage
P176		Water pollution caused by AMD and roadway flooding
P177	Shaler Township	Accelerated erosion and sedimentation
P178		Accelerated erosion and sedimentation
P179		Flooding and sedimentation
P180		Flooding of homes within 100-year floodplain
P181		Flooding, accelerated erosion, sedimentation, and landslide
P182	Sharpsburg Borough	Roadway flooding caused by combined storm sewer surcharge

P183	South Fayette Township	Accelerated Erosion
P184		Accelerated erosion of collection ditch
P185		Flooding
P186		Flooding
P187		Flooding
P188		Flooding
P189		Flooding
P190		Flooding
P191		Flooding
P192		Flooding
P193		Flooding
P194		Flooding
P195		Flooding
P196		Flooding
P197		Flooding
P198		Flooding
P199	South Park Township	Flooding
P200		Flooding, sedimentation, low bridges
P201	Tarentum Borough	Flooding along Bull Creek from SR 28 to Railroad Bridge
P202	Turtle Creek Borough	Roadway flooding
P203		Roadway flooding
P204	West Deer Township	Basement flooding
P205		Roadway flooding along Route 910
P206		Roadway flooding along Saxonburg Boulevard

Table C - Summary Table for Municipality-Identified Stormwater Problem Areas without a Form A (2011)

Municipality	Description
Baldwin Borough	Roadway flooding
Bell Acres Borough	Roadway flooding
Carnegie Borough	Roadway flooding
Churchill Borough	Basement flooding
	Flooding
	Flooding
City of Pittsburgh	Roadway flooding
	Roadway flooding caused by limited stream capacity
	Roadway flooding caused by limited stream capacity
	Roadway flooding caused by limited stream capacity
Collier Township	Roadway flooding caused by limited stream capacity
Elizabeth Township	Roadway flooding
	Roadway flooding
Forward Township	Accelerated erosion
	Accelerated erosion
Hampton Township	Roadway flooding
Jefferson Hills Borough	Accelerated erosion
Marshall Township	Stream bank flooding
McCandless Township	Flooding
Moon Township	Stormwater discharge from school floods residential properties
Municipality of Monroeville	Roadway flooding
	Roadway flooding
Municipality of Penn Hills	Landslide along Coal Hollow Road
	Landslide along Old William Penn Highway
	Roadway flooding
	Roadway flooding
	Roadway flooding
	Roadway flooding
	Roadway flooding
North Fayette Township	New development failing to maintain BMPs causing flooding
O'Hara Township	Roadway flooding due to lack of drainage facilities
Pleasant Hills Borough	Roadway Flooding
Plum Borough	Accelerated erosion on unnamed tributary to Abers Creek
	Accelerated stream bank erosion along Plum Creek
	Flooding
	Flooding
	Residential flooding at Kirk Drive
	Roadway and residential flooding
	Roadway flooding
	Roadway flooding
	Roadway flooding
	Various stormwater issues due to inadequate infrastructure
	Various stormwater issues due to inadequate infrastructure
Rankin Borough	Flooding
Ross Township	Roadway flooding
Scott Township	Flooding from stormwater runoff from recent church construction
Sewickley Heights Borough	Roadway flooding
Shaler Township	Roadway flooding
South Park Township	Roadway flooding caused by limited stream capacity
	Cement blocks and debris in stream cause residential flooding
	Stormwater runoff resulting in residential flooding

Table C - Summary Table for Municipality-Identified Stormwater Problem Areas without a Form A (2011)

Municipality	Description
Springdale Township	Roadway flooding
West Mifflin Borough	Accelerated erosion
	Accelerated erosion at culvert
	Accelerated Erosion from Cherry lane to Borough limits
	Accelerated erosion from Homestead Duquesne Road to Grant Avenue
	Flooding
	Flooding
	Flooding
	Flooding
	Flooding
	Landslide
	Landslide
	Landslide between Webster Avenue and Glenny Lane Extension
	Landslide from GM plant property
	Landslide onto Miller Road
	Sedimentation
	Sedimentation
	Sedimentation from Cherry lane to Borough limits
White Oak Borough	Accelerated erosion
	Accelerated erosion
Wilkins Township	Flooding
	Flooding
	Flooding
	Flooding
	Flooding
	Flooding
	Flooding
	Flooding
	Flooding

APPENDIX C-3

Stormwater Problem Areas Identified by Municipalities

Map Point	Municipality	Problem location name	Watershed	Types of Stormwater Problems	Please provide any additional description/explanation on the types stormwater problems checked.	Cause(s) of Stormwater Problems	Please provide any additional description/explanation on the causes of stormwater problems checked.	Year the problem at this location most recently occurred.	Year the problem at this location first occurred.	How regularly does the identified problem occur at this location?	What is the duration of the problem at this location (if applicable)?	What kind of property damage has occurred because of the problem identified at this location?	For each type of property damage experienced at this location, please describe the damage experienced, including a description of the types and number of properties damaged.	Please list and describe any solutions that have been SUGGESTED at this location.	Please list and describe any solutions that have been FORMALLY PROPOSED at this location.
0 - map location not provided	Aspinwall Borough	Aspinwall -1	Allegheny river	Flooding	Stormwater from O'Hara Twp and Fox Chapel Borough enters the Aspinwall combined sewer system causing the sewer in Brilliant Avenue to surcharge.	Stormwater Volume	Stormwater from O'Hara Twp and Fox Chapel Borough enters the Aspinwall combined sewer system causing the sewer in Brilliant Avenue to surcharge. The source of the water is the upstream developments in O'Hara and Fox Chapel that do not have stormwater retention facilities.	2009	1972	Less than 1 per year	Less than 1 day	Private property damage, More than one owner, Public property damage	10 homes and 2 businesses experience flooding of basements from the surcharging sewer along Brilliant Avenue damaging appliances, furnishings and heating systems.	The stream could be piped directly to the Allegheny River and removed from the Aspinwall sewer system by utilizing an abandoned storm sewer in the UPMC St Margaret's property that flows in to the City Water plant property. Pipe would have to be installed from the UPMC parking lot to the stream and also from the downstream end of the pipe to the Allegheny River.	The stream could be piped directly to the Allegheny River and removed from the Aspinwall sewer system by utilizing an abandoned storm sewer in the UPMC St Margaret's property that flows in to the City Water plant property. Pipe would have to be installed from the UPMC parking lot to the stream and also from the downstream end of the pipe to the Allegheny River.
1	Baldwin Township	Baldwin township 1	Saw Mill Run	Flooding	Flooding on road and businesses	Stormwater Volume	Excessive storm runoff	2010	Unknown	Less than 1 per year	Less than 1 day	Private property damage	1 business with damaged inventory Several businesses with water in building	None	None
0 - map location not provided	Baldwin Township	Baldwin Twp-0	Sawmill Run	Flooding, Sedimentation	Flooding to buildings and roadway	Stormwater Volume	Large volume of runoff water	2012	unknown	More than 1 per year	Less than 1 day	Private property damage, More than one owner	business with damaged inventory	none	none
2	Ben Avon	Ben Avon	Ohio River	Flooding, Accelerated Erosion, Sedimentation, Landslide	Flooding - Extends beyond where Spruce ties into Ohio, upstream through Avalon at time. Accelerated Erosion - Degradation of stream bank and private property. Sedimentation - Erosion leads to portions having sediment build up. Landside - Four sections of retaining walls have collapsed. This has cost Ben Avon Boro over $300,000 since 1996. There have been other costs borne by homeowners and business owners. Stormwater retention ponds near Interstate 279 have sediment and their capacity is reduced due to lack of maintenance on these ponds.	Stormwater Volume, Stormwater Velocity, Water Obstruction	Stormwater Volume - During periods of high rainfall, the volume of water exceeds the capacity of Spruce Run and upstream retention ponds. Some of the measures that have been taken to reduce stormwater in the sanitary system have resulted in greater flows in creeks. Stormwater Velocity - The volume of water during high rainfall flows at higher velocity, exacerbating the erosion and damage to retaining walls and structures. Water Obstruction - During high rainfall events, sediment and loose debris build up in the creek, creating blockages and obstructing the flow of water.	2011	More than 20 years ago	Less than 1 per year	More than one day	Private property damage, More than one owner, Public property damage	Private property damage: Four homes with flooding in the basement and first floor. Five or six light industrial buildings have experienced some flooding and/or inaccessibility. Also Boro Public Works garage is inaccessible during flooding. More than one owner: Four homes.	Purchase the houses and eliminate the issue. Cleanout stormwater retention ponds upstream. Channel restoration to create a more nature flow pattern for the stream	None
3	Ben Avon Heights Borough	Ben Avon Heights 1	Girtys Run	Flooding, Accelerated Erosion	Cambride Road needed to be closed to Vehicular traffic since 2006 due to damage from Hurricane Ivan Flooding	Stormwater Volume, Stormwater Velocity, Stormwater Direction	Large amounts of water from Hurricane Ivan damaged the roadway	2006	2006	Only during Ivan	Since Ivan	Public property damage	The Borough Roadway was washed out and needed to be closed and has been since due to lack of funding	n/a	n/a
123	Bethel Park	Bethel Park 1	n/a	Other	Stormwater Compliance Issues if redeveloped	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
124	Bethel Park	Bethel Park 2	n/a	Other	Stormwater Compliance Issues if redeveloped	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
54	Borough of Dormont	Dormont - Athens Alley	Saw Mill Run	Flooding	The Borough has hired Hazen and Sawyer to determine designs for alleviating continual flooding at this location.	Stormwater Volume, Stormwater Velocity, Stormwater Direction	This problem is coming from too much water running down from multiple points and ending up at the middle of Athens Alley. The storm drainage system is incapable of handling too large a volume of water and as such the water is cascading downhill above ground.	2012	1967	Less than 1 per year	Less than 1 day	Private property damage, More than one owner	Retaining walls, backyards, exterior house walls have all been damaged over the years by flooding at this location	We are awaiting design solutions from Hazen and Sawyer which will be presented to Council for consideration. Some suggestions include rerouting lines, adding lines, increasing line dimensions, and green solutions.	Nothing has been formally proposed at this time.
78	Borough of Glen Osborne	Osborne-1	Ohio River	Flooding, Accelerated Erosion	Near 607 Davis Lane					Major precipitation events		No Property Damage, Stream bank erosion exposing sanitary sewer			

Map Point	Municipality	Problem location name	Watershed	Types of Stormwater Problems	Please provide any additional description/explanation on the types stormwater problems checked.	Cause(s) of Stormwater Problems	Please provide any additional description/explanation on the causes of stormwater problems checked.	Year the problem at this location most recently occurred.	Year the problem at this location first occurred.	How regularly does the identified problem occur at this location?	What is the duration of the problem at this location (if applicable)?	What kind of property damage has occurred because of the problem identified at this location?	For each type of property damage experienced at this location, please describe the damage experienced, including a description of the types and number of properties damaged.	Please list and describe any solutions that have been SUGGESTED at this location.	Please list and describe any solutions that have been FORMALLY PROPOSED at this location.
79	Borough of Glen Osborne	Osborne-2	Ohio River	Flooding, Accelerated Erosion	Near 1008 Beaver Road					Major precipitation events		Public Property Damage	Stream bank erosion and damage to bridge base		
76	Borough of Glen Osborne	Osborne-3	Ohio River	Accelerated Erosion	Erosion of fill area at parking lot of Crilmore Medical Center					Major precipitation events		Public Property Damage	Erosion of fill area at parking lot of Crilmore Medical Center	Restore stream channel	
77	Borough of Glen Osborne	Osborne-4	Ohio River	Flooding	Flooding at culvert under Route 65; channel formed around overflow pipe	Weeds from stream banks clog culvert grate				Major precipitation events		No Property Damage		Restore stream channel	Add rock on right stream bank
74	Borough of Glen Osborne	Osborne-5	Ohio River	Accelerated Erosion	Parks Run - Accelerated erosion at culvert under Beaver Road					Major precipitation events		No Property Damage		Bank Stabilization	Install riprap and wing walls
75	Borough of Glen Osborne	Osborne-6	Ohio River	Accelerate Erosion	Parks Run - Accelerated erosion at driveway culvert at 529 Glen Mitchell Rd.	Shallow Stream Bed				Major precipitation events		No Property Damage		Restore Stream Channel	Stabilize streambanks with riprap
73	Borough of Glen Osborne	Osborne-7	Ohio River	Accelerated Erosion	Parks Run - Accelerated erosion at culvert at 535-539 Glen Mitchell Rd.					Major precipitation events		Public Property Damage	Stream undermined large trees which fell across road and damaged power lines and guardrail	Stabilize stream bank at culvert outlet	Build wall or install riprap
80	Borough of Glen Osborne	Osborne-8	Ohio River	Groundwater	Excessive groundwater drains onto Beaver Rd., approx. 1,200 ft. east of Beaver Rd./Glen Mitchell Rd. intersection	Springs				Extended wet periods and Major precipitation events		road flooding	In winter, drainage onto Beaver Road creates icy conditions.		
72	Borough of Glen Osborne	Osborne-9	Ohio River	Accelerated Erosion, Groundwater	Accelerated erosion at berm along retaining wall across from 520 Sycamore Road	Groundwater				Major precipitation events		Retaining wall undermining	Sink hole developing; erosion of berm along retaining wall	Restore berm, add catch basin or re-direct water to side of road	
NA	Borough of Pennsbury Village				Reported: no stormwater problems within municipality										
NA	Braddock Borough				Reported: no stormwater problems within municipality										
6	Bradford Woods	Bradford Woods 1	Pine Creek	Flooding, Accelerated Erosion, Sedimentation	Stormwater runoff causes erosion and flooding of private property and sedimentation on the same private property.	Stormwater Volume, Stormwater Direction	Surface runoff from swale comes onto private property during heavy rain events.	2012	2006	More than 1 per year	Less than 1 day	Private property damage	Private in-ground pool has runoff and sediment and house has had some damage from water and runoff.	Retention Pond to detain stormwater.	None
4	Bradford Woods	Bradford Woods 2	Pine Creek	Flooding	During heavy storm events runoff from the roadway flows to the adjacent properties and flooding of the yards occurs.	Stormwater Volume, Stormwater Velocity	Water runoff during heavy storm events	2010	2004	Less than 1 per year	Less than 1 day	Private property damage	debris in yards and damage to landscaping	curbing of roadway and storm inlets	none
5	Bradford Woods	Bradford Woods 3	Pine Creek	Flooding	Flooding of private property during heavy stormwater events	Stormwater Volume	During heavy rain events water from roadway floods private property	2010	2004	Less than 1 per year	Less than 1 day	Private property damage	Stormwater damage to existing lawns and landscaping and debris on private property.	Upsize of existing stormwater culverts along the properties	none
7	Bradford Woods	Bradford Woods 4	Connoquenessing	Sedimentation, Water Pollution	Stormwater runoff from surrounding roads and properties flows from walking trail and ends up in local pond, filling with debris and sedimentation.	Stormwater Volume, Stormwater Direction	Stormwater flows from roads and private properties onto local walking path and pond.	2012	2004	More than 1 per year	Less than 1 day	Private property damage	Local walking path has been damaged continuously and sediment from roads and path ends up in pond as pollution.	stormwater capture and conveyance.	none
8	Bradford Woods	Bradford Woods 5	Connoquenessing	Sedimentation	Sedimentation from runoff deposits onto private properties.	Stormwater Volume, Stormwater Direction	Runoff leaves sediment and debris on private property and also causes minor damage to property.	2012	2004	More than 1 per year	Less than 1 day	Private property damage	landscaping and property damage	stormwater capture and conveyance	none
NA	Bridgeville Borough	No Known Problem Area			Reported: no stormwater problems within municipality					Only during Agnes					
NA	Chalfant Borough				Reported: no stormwater problems within municipality										
9	Cheswick Borough	Cheswick-1	Allegheny River	Infiltration of groundwater into Sanitary Sewer plus roots problems	Excessive stormwater gets into Sanitary sewer from groundwater and down hill into manhole covers.	Stormwater Volume	Roots seem to be main problem. Every year we vactor and cut out the roots in the system. It seems to work.	2009	2009	More than 1 per year		Private property damage	6 residences had water in basement	We vactor every year for preventive maintenance by cleaning and cutting out roots. Also if there is a call for heavy rain we check the sewers (Sanitary and Storm for no overflow).	Same as above plus possible plugs in manhole cover
0 - map location not provided	Churchill	Churchill 1	Turtle Creek	Flooding	Flooding has caused damage to private property.	Stormwater Volume, Stormwater Direction	Stormwater during major events floods the properties at the low elevations in this area.	2004	1972	Only during Ivan	Less than 1 day	Private property damage, More than one owner	Residence with water in basements.	Review of stormwater runoff and volumes during major rain events.	None.
NA	City of Duquesne				Reported: no stormwater problems within municipality										

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37	Collier Township	Collier1	Campbells Run	Flooding, Accelerated Erosion, Sedimentation	Stormwater runoff causes flooding and erosion	Stormwater Volume, Stormwater Velocity, Water Obstruction	Undersized culverts	2012	2006	More than 1 per year	Less than 1 day	Private property damage, More than one owner; Public property damage	Commercial business flooding in lower areas.	Regional stormwater management	None
38	Coraopolis	Coraopolis-1	Ohio	Flooding	Roadway Flooding: Limited pipe conveyance on State Route 51	Stormwater Volume	Roadway Flooding: Limited pipe conveyance on State Route 51	2012	20+ years	More than 1 per year	Less than 1 day	No property damage	Impedes traffic: roadway flooding	None	None
39	Coraopolis	Coraopolis-2	Ohio	Flooding	Roadway Flooding, limited stormwater conveyance in State Stormsewer	Stormwater Volume	Roadway Flooding, limited stormwater conveyance in State Stormsewer	2009	20+ years	More than 1 per year	Less than 1 day	Private property damage, More than one owner	Private property damage: Flooding backs up from roadway to private property, basement flooding	Increase in state stormsewer pipe diameter	None
40	Coraopolis	Coraopolis-3	Thorn Run	Flooding, Accelerated Erosion, Sedimentation	Roadway flooding of Thorn Run from Thorn Street to Kendall Street on Fourth Avenue during Hurricane Ivan.	Stormwater Volume	Roadway flooding of Thorn Run from Thorn Street to Kendall Street on Fourth Avenue during Hurricane Ivan. Culvert(s) with debris accelerated flooding.	2004	2004	Only during Ivan	Less than 1 day	Private property damage	Flooding of commercial structure	None	None
45	Coraopolis	Coraopolis-4	Montour Run	Flooding, Accelerated Erosion, Sedimentation	Erosion and Sedimentation from stream blocking an existing storm sewer system resulting in surface flooding	Stormwater Volume, Stormwater Velocity, Stormwater Direction	Erosion and Sedimentation from stream blocking an existing storm sewer system resulting in surface flooding	2010	20+ years	Less than 1 per year	Flooding is than 1 day, sedimentation is ongoing	Private property damage, Public property damage	Private property damage: resident with water in garage and debris on property Public Property damage: roadway erosion, etc.	Decrease peak stormwater flows from upstream community	None
46	Coraopolis	Coraopolis-5	Montour Run	Flooding, Sedimentation	Surface flooding from plugged culvert under state roadway and county property	Stormwater Volume, Water Obstruction	Surface flooding from plugged culvert under state roadway and county property	2010	20+ years	Less than 1 per year	Varies, has occurred more than 1 day	Public property damage, impedes traffic. (roadway flooding)	Public Property Damage - Surface flooding on borough property Also impedes traffic on SR 51 (surface roadway flooding)	Maintenance of State and County Culvert	None
42	Coraopolis	Coraopolis-6	Montour Run	Flooding	Surface flooding on private property adjacent to Montour Run	Stormwater Volume	Surface flooding on private property adjacent to Montour Run	2012	20+ years	More than 1 per year	More than one day	Private property damage, Public property damage	Private Property Damage: Surface flooding on property from Montour run. Public Property Damage: Floodwater backs up into sewage lift station	None	None
44	Coraopolis	Coraopolis-7	McCabe Run	Flooding, Sedimentation	Flooding: Surface flooding resulting from downstream culvert capacity and increased peak flow from upstream	Stormwater Volume	Flooding: Surface flooding resulting from downstream culvert capacity and increased peak flow from upstream	2010	20+ years	Less than 1 per year	Floods less than a day, sedimentation is ongoing	Private property damage, Public property damage	Private Property Damage: Surface flooding in resident yards Public Property Damage: Roadway Flooding	None	None
43	Coraopolis	Coraopolis-8	Ohio	Flooding, Accelerated Erosion, Sedimentation	Stormwater runoff eroding upstream ditch lines and surface flooding	Stormwater Volume, Stormwater Velocity	Stormwater runoff eroding upstream ditch lines and surface flooding	2010	20+ years	Less than 1 per year	Less than 1 day	Private property damage, More than one owner; Public property damage	Private Property Damage: Erosion of ditch lines next to private drives, surface flooding. Public Property Damage: Surface flooding and sedimentation on public roadways	None	None
41	Coraopolis	Coraopolis-9	Ohio	Flooding	Surface flooding of street	Stormwater Volume	Surface flooding of street	<5 years	20+ years	More than 1 per year	Less than 1 day	Private property damage, Public property damage	Private Property Damage: water backs up into private garage Public Property Damage - Roadway flooding	None	None
49	Crescent Township	Crescent 1	Flaugherty Run	Flooding	Flooding of Roadway during heavy rain events	Stormwater Volume, Stormwater Velocity, Stormwater Direction	water floods road and sometimes roadway must be closed	2011	2003	More than 1 per year	Less than 1 day	Private property damage, More than one owner	multiple yards had sediment and debris build-up after water receded	n/a	n/a
50	Crescent Township	Crescent 2	Flaugherty Run	Flooding	Flooding at the Spring Run Road/SR 51 area which is a low lying area that floods during rain events	Stormwater Volume, Stormwater Direction	Roadway is impassable at times during high water events	2004	1965	Less than 1 per year	Less than 1 day	Private property damage	erosion and sediment in private yards during the events	n/a	n/a
51	Crescent Township	Crescent 3	Flaugherty Run	Flooding	Flooding in low lying area between SR 51 and Riverview Road.	Stormwater Volume, Stormwater Direction	Water flooded roadway and property during high water event	2004	1965	Less than 1 per year	Less than 1 day	Private property damage, Public property damage	Township Park and private property was damaged by flooding and erosion	n/a	n/a

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52	Crescent Township	Crescent 4	Flaugherty Run	Sedimentation	Sediment buildup from rain events blocking shoulder and pushing water into roadway	Stormwater Direction	Storm water sediment build-up over the years has caused sediment to deposit along shoulder of roadway	2004	1965	More than 1 per year	continual buildup	No property damage	n/a	n/a	n/a
47	Crescent Township	Crescent 5	Flaugherty Run	Landslide	Erosion of stream embankment has caused roadway shoulder and bank to begin to move	Stormwater Volume, Stormwater Velocity, Stormwater Direction	encroachment of landslide is a concern for the safety of the traveling public	2013	2012	More than 1 per year	on-going	Public property damage	Road shoulder and stream embankment is eroding and sliding towards stream	n/a	n/a
53	Crescent Township	Crescent 6	Flaugherty Run	vegetative overgrowth	vegetation around the stream is overgrowing the steam channel and obstructing the channel flow	Water Obstruction	vegetation causes stream to overflow	2013	2010	More than 1 per year	on-going	Public property damage	overflow of water onto the roadway due to obstruction causing minor roadway damage	n/a	n/a
48	Crescent Township	Crescent 7	Ohio river	Flooding	Flooding during heavy rain events from the Ohio River to local municipal rivers and property	Stormwater Volume, Stormwater Velocity, Stormwater Direction	Ohio river flooding during high rain events with property damage	2004	1967	Only during Ivan	More than one day	Private property damage, More than one owner, Public property damage	Until waters receded flooding occurred on both public and private property	n/a	n/a
NA	Dravosburg Borough				Reported: no stormwater problems within municipality										
NA	East McKeesport Borough				Reported: no stormwater problems within municipality										
0 - map location not provided	East Pittsburgh Borough	East Pittsburgh - 1	Turtle Creek	Flooding	Flooding along Electric Avenue.	Stormwater Volume	Excessive flow overloaded an existing storm culvert	2009	2004	Only during Ivan	Less than 1 day	Loss of life / vital services, Private property damage, More than one owner, Public property damage	Loss of utility service Private property damage - 13 properties Public property damage - clogging of sewers	upstream retention facilities	none
55	Edgewood	Edgewood1	Upper Mon	Flooding	Flooding causing local basement flooding along Greendale Avenue between Boyd Street and S. Braddock A venue	Stormwater Volume, Stormwater Velocity	Excess flow not handled by catch basins	2009	2004	Only during Ivan	Less than 1 day	Private property damage, More than one owner	6 Residents with Basement flooding	cleaning and televising of lines	same as approve
60	Edgeworth Borough	Edgeworth 1	Ohio	Flooding, Accelerated Erosion, Sedimentation	see above	Stormwater Volume, Stormwater Velocity, Water Obstruction	water obstruction is undersized culvert	1999	no record	Less than 1 per year	Less than 1 day	No property damage	n/a	increase size of culvert	none formally proposed
58	Edgeworth	Edgeworth 2	Little Sewickley Creek	Flooding	Stormwater backs up from Ohio River and floods park	Stormwater Volume	Flood elevation of Ohio River	2004	1972	Only during Ivan	More than one day	Private property damage, More than one owner, Public property damage	open space flooding- public bridge damage, access road damage, pedestrian bridge destroyed	n/a	none
56	Edgeworth Borough	Edgeworth 3	Little Sewickley Creek	Accelerated Erosion, Sedimentation	Erosion along the Stream	Stormwater Volume, Stormwater Velocity, Stormwater Direction, Water Obstruction	Runoff from large drainage areas from highly erodible soils which deposit sediment in stream and block bridge structures	2012	n/a	More than 1 per year	every rain event erosion occurs	Private property damage, Public property damage	erosion exposes infrastructure, weakens trees long embankments causing trees to fall--large trees in excess of 3 foot diameter	check dams natural erosion controls	none
59	Edgeworth	Edgeworth 4	Sewickley Creek	Flooding, Accelerated Erosion	erosion	Stormwater Volume, Stormwater Velocity, Stormwater Direction	flooding during Ivan-back water from Ohio	2008	2008	Only during Ivan	Less than 1 day	Private property damage	yard flooding	n/a	none
57	Edgeworth	Edgeworth 5	Little Sewickley Creek	Accelerated Erosion, Sedimentation	Stream Bank Erosion which deposits sediment in Stream	Stormwater Volume, Stormwater Velocity	Eroded material clogs structures	2012	n/a	More than 1 per year	Less than 1 day	Private property damage	stream bank erosion	stream bank protection	completed stream bank protection in various areas-none planned currently
NA	Elizabeth Borough				Reported: no stormwater problems within municipality										
65	Etna Borough	Etna 1	Pine Creek Watershed	Flooding	Flooding of intersection	Stormwater Volume	Stormwater Volume - bottom of a large drainage area;	2004	1987	Less than 1 per year	Less than 1 day	Private property damage, More than one owner	Commercial business flooded - loss of inventory; private residence substantially damaged - actually eventually torn down	Installation of debris poles above storm water culvert upstream of this location and installation of additional storm water inlets and installation of additional conveyance capacity.	All of the above - not only formally proposed - actually all installed

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61	Etna Borough	Etna 2	Pine Creek Watershed	Flooding, Sedimentation	Storm culvert at the bottom of a large drainage area - upstream communities have storm water piped into and above culvert and storm water volume can exceed capacity of culvert causing flooding; velocity and volume of storm water carry sedimentation down the valley into the culvert causing capacity issues with the culvert.	Stormwater Volume, Stormwater Velocity	Stormwater Volume - culvert is at the bottom of steep valley and stormwater volume can exceed culvert size - culvert runs under State Route 8; Stormwater Velocity - both velocity and volume of stormwater converging into culvert which runs under homes and then state highway can and has exceeded culvert size causing blockage of culvert entrance and subsequent flooding. Velocity and volume also bring sedimentation and debris along that also have clogged culvert entrance causing localized flooding.	2004	1990	Less than 1 per year	Less than 1 day	Private property damage, Public property damage	Private residence has been flooded due to debris clogging culvert and coming up through floor of home during aftermath of Hurricane Ivan. At this same time, large debris carried into the culvert damaged the culvert pipe, walls and ceiling of culvert.	Detention/Retention Facility upstream of culvert	None
63	Etna Borough	Etna 3	Pine Creek Watershed	Flooding, Accelerated Erosion, Sedimentation	Flooding: Stormwater runoff causes flooding of this culvert; Accelerated Erosion: Location at the base of a large stormwater drainage area with very steep shale slopes; stormwater causes accelerated erosion which has blocked the culvert entrance; Sedimentation: buildup of sedimentation from erosion of steep slopes on both sides of the natural run causes culvert blockage.	Stormwater Velocity, Water Obstruction	Stormwater Velocity: large drainage area emptying into culvert at the bottom of the valley; Water Obstruction: Velocity and volume of water can and have brought trees, etc. down from steep slopes sides blocking culvert pipe and causing overtopping onto roadway.	2004	1984	Less than 1 per year	Less than 1 day	Private property damage	Private property located below at the intersection of Washington and Parker Streets (site of Etna 1) - commercial property with damaged inventory and single family residential home with first floor flooding. Home was eventually demolished due to repeated events.	Debris pole installation upstream of culvert entrance.	Debris pole installation upstream of culvert entrance - proposed and installed.
62	Etna Borough	Etna 4	Pine Creek Watershed	Flooding, Sedimentation	Sedimentation: Stormwater runoff causes sedimentation build-up at culvert from hillside drainage area upstream; Flooding: Stormwater runoff and sedimentation build-up at culvert has caused blockage of culvert entrance and subsequent overtopping of culvert structure.	Stormwater Velocity	Velocity: Stormwater runoff velocity causes sedimentation buildup at culvert and velocity can cause backup at culvert entrance.	1994	1990	Less than 1 per year	Less than 1 day	Private property damage	Private residential property damage: water in first floor which came through kitchen door	debris pole installation above culvert	formally proposed and installed - clean out of culvert after every rain event and large clean out annually
66	Etna Borough	Etna 5	Pine Creek	Flooding	Street: Stormwater causes street flooding during heavy rainfall events.	Stormwater Volume	Stormwater Volume: Volume can exceed drainage facilities causing roadway flooding.	2012	1980	More than 1 per year	Less than 1 day	No property damage	No damage to either private or public property	additional drainage facilities/inlets/storm piping	None
64	Etna Borough	Etna 6	Pine Creek	Groundwater	Water coming through basement walls	Stormwater Volume	None	2011	Unknown	More than 1 per year	Less than 1 day	Private property damage	One owner experiencing basement flooding	None	None
89	Findlay Township	Findlay 1	Montour	Flooding, sedimentation	Flooding occurs during very heavy rains	Stormwater Volume, Water Obstruction		2004	n/a	Only during Ivan	Less than 1 day	private property damage	Residential property damage to 2 properties	Removal of debris from Montour Creek	n/a
87	Findlay Township	Findlay 2	Montour	Flooding	Flooding occurs during very heavy rains	Stormwater Volume, Stormwater Velocity, Water Obstruction		2004	n/a	Only during Ivan	Less than 1 day	private property damage, more than one owner	Commercial property damage to 2 properties	Removal of debris from Montour Creek and stabilize banks	n/a
88	Findlay Township	Findlay 3	Montour	Flooding	Flooding occurs during very heavy rains	Stormwater Volume, Stormwater Velocity		2004	n/a	Less than 1 per year	Less than 1 day	private property damage, more than one owner	Residential and Commercial property damage to 10 properties	Would need to widen North Fork of the Montour Trail	n/a
70	Forest Hills	Forest Hills-1	Turtle Creek	Flooding	Kenmore Avenue near Yost Blvd. experiences flooding during large storm events. Flooding has occurred twice in the last 15 years. This is the low point where water from Route 30, Yost Blvd and local Forest Hills and Braddock Hills streets collects and pools when the rainfall overloads the piped stream (Fail Run). The majority of the water is from Route 30.	Stormwater Volume	Inadequate storm sewers on Route 30 divert excess water to Sumner Avenue, a local street where the water collects at a low point being Kenmore near Yost. Additional flow comes from Yost Blvd (a County Road) and local streets in Forest Hills and Braddock Hills.	2009	2004	Less than 1 per year	Less than 1 day	More than one owner	10 homes had water in their basements resulting in damage to heating systems and appliances. Of these, 6 had more serious damage including furniture.	Better stormwater collection and retention on Route 30	None as of yet.
71	Franklin Park Borough	Franklin Park-1	Lowries Run	Flooding	Creek overflows onto road at this location.	Stormwater Volume	Creek is to close to road.	2010	unknown	Less than 1 per year	Less than 1 day	Private property damage	Residential basement flooding.	Dredging the creek.	Penn DOT has dredged the creek in the past.
NA	Homestead Borough				Reported: no stormwater problems within municipality										
85	Jefferson Hills Borough	Jefferson Hills 1	Monongahela River	Flooding, Water pollution	Flooding along the Mon Riverfront.	Stormwater Volume, Stormwater Velocity, Stormwater direction	Flooding along the Mon Riverfront	2011	unknown	Less than 1 per year, Only during Ivan	less than 1 day	Private property damage, more than one owner	Commercial property damage		
90	Jefferson Hills Borough	Jefferson Hills 2	Monongahela River	Water pollution, Flooding, Accelerated erosion, Sedimentation	Flooding along Peters Creek.	Stormwater Volume, Stormwater Velocity, Stormwater direction	Flooding Along Peters Creek	2011	unknown	Less than 1 per year	less than 1 day	Private property damage, more than one owner	residential property damage		

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91	Jefferson Hills Borough	Jefferson Hills 3	Monongahela River	Water pollution, Flooding, Accelerated erosion, Sedimentation	Flooding along Walton Road	Stormwater Volume, Stormwater Velocity, Stormwater direction	Flooding along Walton Road	2011	unknown	Less than 1 per year	less than 1 day	Private property damage, more than one owner	residential property damage		
87	Jefferson Hills Borough	Jefferson Hills 4	Monongahela River	Landslide	Landslide along Bedell Road, east of Gill Hall Road		Landslide along Bedell Road, east of Gill Hall Road	2012	unknown			Public property damage	road		
88	Jefferson Hills Borough	Jefferson Hills 5	Monongahela River	Landslide	Landslide along East Waterman.		Landslide along East Waterman.	2012	unknown			Public property damage	road		
86	Jefferson Hills Borough	Jefferson Hills 6	Monongahela River	Flooding, Accelerated erosion, Sedimentation, Water pollution	Flooding along Route 51 Corridor along Lewis	Stormwater Volume, Stormwater Velocity, Stormwater direction	Flooding along Route 51 Corridor along Lewes Run	2011	unknown	Less than 1 per year. Only during Ivan	Less than 1 day	Private property damage, more than one owner	residential property damage		
89	Jefferson Hills Borough	Jefferson Hills 7	Monongahela River	Landslide	Landslide along West Waterman Road		Landslide along West Waterman Road	2011	unknown			Public property damage	road		
92	Kennedy	Kennedy-1	Chartiers	Flooding	Severe storm events often cause flooding and erosion of secondary gravel road. This is a isolated location zoned General Industrial use, albeit there is only a vehicle junk yard and several residential houses.	Stormwater Volume, Stormwater Velocity	Accumulated sedimentation in parts of Chartiers Creek.	2004	2004	Only during Ivan	More than one day	Private property damage, More than one owner; Public property damage	Private Property damage 3 residences with flooding confined to ancillary grounds.	Keep the Chartiers Creek clear of debris.	Keep the Chartiers clear of debris. Stabilize creek banks.
93	Kennedy	Kennedy-2	Chartiers	Landslide	0+J80 R80	Stormwater Volume, Stormwater Velocity, Stormwater Direction	The slide began on opposite side of the roadway, pushing the road to major slide area.	2012	2012	Less than 1 per year	six months to one year	Public property damage	Public property damage: Road slide.	To grade the opposite hillside of the road to minimize the velocity of stormwater; to install new catch basins; to construct a retaining wall at the major slide area secured with steel rods driven horizontally beneath the road surface.	Grade the opposite hillside of the road to minimize the velocity of stormwater; to install new catch basins; to construct a retaining wall at the major slide area secured with steel rods driven horizontally beneath the road surface.
NA	Liberty Borough				Reported: no stormwater problems within municipality										
94	Marshall Township	Marshall - 1	Pine Creek	Flooding	Flooding: Narrow stream channel causes rear yard flooding during significant rainfall events	Stormwater Volume	Volume: Volume of water is too great to be contained within stream channel during significant rainfall events.	2010	unknown	More than 1 per year		Private property damage	Private property damage, 1 resident, streambank erosion.	Streambank channelization	None.
130	Monroeville	Monroeville - 1	Turtle Creek	Flooding, Sedimentation	Unfavorable hydraulics and sedimentation causes localized roadway flooding.	Stormwater Volume, Stormwater Velocity, Stormwater Direction, Water Obstruction	Sedimentation and hydraulics cause Leak Run to overflow its banks and storm sewers to overflow at junction with Thompson Run.	2012	Unknown	Less than 1 per year	Less than 1 day	No property damage	None. Flooding creates a dangerous traffic situation.	Stream cleaning to remove accumulated sediment and restore culvert capacity coupled with stream improvements to provide more favorable hydraulics.	None.
125	Monroeville	Monroeville - 2	Turtle Creek	Water Pollution	96" RCP storm sewer pipe serving approximately 400 acres of heavily commercial land which is heavily polluted with mine drainage, detergents, and sewage discharges at this location.	Pollution	Pollution	2013	Unknown	More than 1 per year	Constant	No property damage	None.	Treatment facility.	None.
127	Monroeville	Monroeville - 3	Turtle Creek	Flooding	Possibly undersized or failing series of individually-owned culverts result in road and property flooding.	Stormwater Volume, Water Obstruction	Stormwater runoff volume and obstructions caused by culverts result in flooding.	2009	Unknown	Less than 1 per year	Less than 1 day	Private property damage, More than one owner	Basement flooding and damage to yards of roughly 10 homes.	Replacing series of antiquated culverts with a single replacement culvert.	None.
131	Monroeville	Monroeville - 4	Turtle Creek	Flooding, Sedimentation	Drainage from upgradient causes flooding and sediment on tri-boro expressway.	Stormwater Volume, Stormwater Velocity	Drainage problems	2009? Maybe since then.	Unknown	Less than 1 per year	Less than 1 day	Public property damage	Expressway must be closed by police, once flooding subsides PennDOT must clean the roadway.	Drainage improvements.	None.
126	Monroeville	Monroeville - 5	Turtle Creek	Flooding, Accelerated Erosion, Obstruction	Past flooding caused erosion that collapsed a residential private bridge which now obstructs Dirty Camp Run stream.	Stormwater Volume, Stormwater Velocity, Water Obstruction	Past flooding caused erosion that collapsed a residential private bridge which now obstructs Dirty Camp Run stream.	2013	Unknown	More than 1 per year	Continual obstruction	Private property damage	Collapsed private bridge used for driveway.	Reconstruct bridge, restore stream channel.	None.

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129	Monroeville	Monroeville - 6	Turtle Creek	Flooding, Accelerated Erosion	Insufficient storm sewer capacity causes roadway flooding which endangers motorists. Streambank erosion in many areas has damaged Mosside Boulevard repeatedly. Problem spans Route 48/ Mosside Blvd from Cambridge Square Drive to Route 130/ Broadway Boulevard.	Stormwater Volume, Stormwater Velocity, Water Obstruction	Storm sewers are undersized.	2009?	Unknown	Less than 1 per year	Less than 1 day	Loss of life / vital services, Private property damage, More than one owner, Public property damage	Firefighter lost life saving victim trapped in car. Many cars have been damaged after being caught in floodwaters. Damage at Compunetix and other businesses. Damage to roadway.	Regional stormwater detention facility, upgrading storm sewer system.	None.
134	Monroeville	Monroeville - 7	Turtle Creek	Flooding, Accelerated Erosion, Sedimentation, Landslide	Flooding - Uncontrolled runoff from Haymaker Road causes downstream storm sewer system to be overwhelmed and flood Route 130. Erosion - Uncontrolled runoff from Haymaker Road erodes streambeds and deposits sediment into downstream storm sewer system and onto roadway. Sedimentation - Uncontrolled runoff from Haymaker Road erodes streambeds and deposits sediment into downstream storm sewer system and onto roadway. Landslide - Uncontrolled runoff from Haymaker Road saturates slope area and has caused or exacerbated at least 3 landslides.	Stormwater Volume, Stormwater Velocity	Flooding - Uncontrolled runoff from Haymaker Road causes downstream storm sewer system to be overwhelmed and flood Route 130. Erosion - Uncontrolled runoff from Haymaker Road erodes streambeds and deposits sediment into downstream storm sewer system and onto roadway. Sedimentation - Uncontrolled runoff from Haymaker Road erodes streambeds and deposits sediment into downstream storm sewer system and onto roadway. Landslide - Uncontrolled runoff from Haymaker Road saturates slope area and has caused or exacerbated at least 3 landslides.	2012	Unknown	Less than 1 per year	Less than 1 day	Private property damage, More than one owner, Public property damage	Private property - 3 homes have had damage to yard/ lawn areas. Public property - Each event requires sediment removal by Municipality and PennDOT including occasional storm sewer cleaning. Landslides have damaged two roads.	Piping of upstream runoff downslope to regional detention facility.	None.
128	Monroeville	Monroeville - 8	Turtle Creek	Flooding	Elevated runoff upstream results in flooding along Abers Creek Road roughly between Northern Pike and the PA Turnpike after heavy rains.	Stormwater Volume	Elevated runoff upstream results in flooding along Abers Creek Road roughly between Northern Pike and the PA Turnpike after heavy rains.	2012	Unknown	Less than 1 per year	Less than 1 day	Private property damage, More than one owner, Public property damage	Private property - Flooding of property and damage to contents of roughly 8 homes. Public property - Flooding has damaged the road and storm sewers multiple times as well as the sanitary sewer system and a park.	None	None.
133	Monroeville	Monroeville - 9	Turtle Creek	Flooding	Failing private storm sewer pipe causes roadway flooding on Verlinden Drive and Old Frankstown Road.	Water Obstruction	Failing private storm sewer pipe causes roadway flooding on Verlinden Drive and Old Frankstown Road.	2012	Unknown	More than 1 per year	Less than 1 day	Private property damage	Damage to lawn, driveway, parking lot of businesses and damage to contents of one building. Danger to motorists.	Replace failing pipe	None.
132	Monroeville	Monroeville - 10	Turtle Creek	Flooding, Sedimentation	Sedimentation has caused shallow lake and stream to "silt in" and diminish capacity of storm sewers and culverts resulting in roadway flooding on Logans Ferry Road and Old Frankstown Road.	Stormwater Volume	Sedimentation has caused shallow lake and stream to "silt in" and diminish capacity of storm sewers and culverts resulting in roadway flooding on Logans Ferry Road and Old Frankstown Road.	2009	Unknown	Less than 1 per year	Less than 1 day	Public property damage	Roadway has been damaged by floodwaters. Flooding causes a danger to motorists.	Engineered dredging to restore capacity of stream, storm sewers	None.
135	Mt Lebanon	1		Flooding		Stormwater volume		7/1/2013	Prior 2004	Less than 1 per year	Less than 1 day	Private Property Damage, More than one owner	2 Homes damaged		A new storm sewer was installed in 2013. It is designed to the 25-year storm
136	Mt Lebanon	2		Flooding		Stormwater volume		7/1/2013	Prior 2004	Less than 1 per year	Less than 1 day	Private Property Damage, More than one owner	4 Homes damaged	Currently proposing a storm sewer project	
137	Mt Lebanon	3		Flooding		Stormwater volume		7/1/2013	Prior 2004	Less than 1 per year	Less than 1 day	Private Property Damage, More than one owner	2 Homes damaged		
138	Mt Lebanon	4		Flooding		Stormwater volume		7/1/2013	Prior 2004	Less than 1 per year	Less than 1 day	Property Damage	1 property damaged		
139	Mt Lebanon	5		Flooding		Stormwater Volume, Stormwater Direction		7/1/2013	Prior 2004	Less than 1 per year	Less than 1 day				
140	Mt Lebanon	6		Flooding		Stormwater volume		7/1/2013	Prior 2004	Less than 1 per year	Less than 1 day	Private property damage	1 Home damaged		Project to be bid in September 2013.
141	Mt Lebanon	7		Groundwater		Stormwater volume		7/1/2013	Prior 2004	Less than 1 per year	Less than 1 day				
142	Mt Lebanon	8		Accelerated Erosion		Stormwater Volume, Stormwater Velocity, Stormwater Direction		7/1/2013	Prior 2004	Less than 1 per year	Less than 1 day				

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0 - map location not provided	Mt Oliver	Walter Avenue	Monongahela	Groundwater	a groundwater spring leaks out onto Walter Street and causes hazard in cold weather	Stormwater Direction	Spring from hillside and no available catch basins to carry flow away	2013	many years ago	More than 1 per year	More than one day	No property damage, Roadway hazard	no property damage	Installation of catch basin and storm piping to convey to nearby stream	none
NA	North Braddock Borough				Reported: no stormwater problems within municipality										
143	North Fayette Township	North Fayette 1	Montour	Flooding	None	Stormwater Volume, Water Obstruction	None	2012	2004	More than 1 per year	Less than 1 day	Public property damage	Stream Bank Erosion and Road Shoulder erosion	remove obstructions, acquire property and construct pond.	None
145	North Fayette Township	North Fayette 2	Robinson Run	Flooding	Flooding from Storm Water run off	Stormwater Volume, Stormwater Velocity	Stormwater runoff from Route 22/30, overall stormwater flow from Hankey Farms	2012	2012	More than 1 per year	Less than 1 day	No property damage	None	Construct Stormwater Pond and enlarge road crossing on Oakdale Road	Construct Stormwater Pond and enlarge road crossing on Oakdale Road
146	North Fayette Township	North Fayette 3	Robinson Run	Sedimentation	Stream Sedimentation Restricting Flow	Water Obstruction	Build up of Sedimentation in Stream	2012	2004	More than 1 per year	Ongoing	No property damage	None	Remove Sedimentation-	Contact PennDOT to remove since it is adjacent to State roads.
147	North Fayette Township	North Fayette 4	Robinson Run	Sedimentation	Build up of Sediment in Stream, restricting flow	Water Obstruction	Build Up of Sediment in Stream from various storms	2012	2004	Less than 1 per year	Less than 1 day	No property damage	remove sediment	contact PennDOT to remove since it is adjacent to State Road	contact PennDOT to remove since it is adjacent to State Road
144	North Fayette Township	North Fayette 5	Montour	Flooding, Sedimentation	Flooding during heavy rains	Stormwater Volume, Water Obstruction	Flooding during heavy rains due to sedimentation and volume	2012	2004	Less than 1 per year	Less than 1 day	No property damage	None	remove sediment	Work with Findlay Township to remove sediment as permitted
NA	North Versailles				Reported: no stormwater problems within municipality										
149	O'Hara Township	O'Hara 1	Seitz Run	Flooding, Accelerated Erosion, Sedimentation, Landslide	Low PADOT bridge causes backups and stream overflow	Stormwater Volume, Stormwater Velocity, Water Obstruction	Low Bridge	2007	unknown	Less than 1 per year	Less than 1 day	Private property damage, More than one owner	Private property damage to 15 properties	regular cleaning by PADOT	none
152	O'Hara Township	O'Hara 2	Squaw Run	Sedimentation	Sedimentation from unnamed tributary to Squaw Run			On Going	Unknown	More than 1 year	n/a	none	none	Regular cleaning by Allegheny County	none
150	O'Hara Township	O'Hara 3	Squaw Run	Landslide	none	Stormwater Volume, Stormwater Velocity		On Going	Unknown						
151	O'Hara Township	O'Hara 3	Squaw Run	Landslide	none	Stormwater Volume, Stormwater Velocity		On Going	Unknown						
148	O'Hara Township	O'Hara 4	Powers Run	Flooding	none	Stormwater Volume, Water Obstruction	Private culvert collapsing causing reduced flow area	2007	Unknown	More than 1 year		Private property damage, More than one owner	private property damage to 2 properties	Remove culvert	
14	Pittsburgh	pittsburgh-1	Allegheny River	Flooding	Flooding, auto entrapment	Stormwater Volume	flooding	Past 1-2 years	unknown	Less than 1 per year		unknown	N/A	N/A	N/A
13	Pittsburgh	Pittsburgh-2	Allegheny River	Flooding	Flooding	Stormwater Volume	Flooding	Past 1-2 years	unknown	Less than 1 per year		unknown	auto entrapment	unknown	unknown
10	Pittsburgh	Pittsburgh-3	Allegheny River	Flooding	Auto Entrapment	Stormwater Volume	Flooding	Past 1-2 Years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
11	Pittsburgh	Pittsburgh-4	Allegheny River	Flooding	Basement Flooding - Homeowner says it's flooding and getting worse at a rapid rate	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		Private property damage	unknown	unknown	unknown
15	Pittsburgh	Pittsburgh-5	Monongahela	Flooding	Flooding, Auto entrapment - Caller stuck in car with waters rising	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
18	Pittsburgh	Pittsburgh-6	Allegheny River	Flooding	Reports of road flooding	Stormwater Volume	Paesible Manhole surcharging	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
35	Pittsburgh	Pittsburgh-7	Allegheny River	Flooding, Debris washing down from hillside onto road	Flooding on roadway and debris washing down from hillside onto lane of travel	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
19	Pittsburgh	Pittsburgh-8	Monongahela River	Flooding	Pitt. university police report flooding at intersection and cars getting stuck	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
20	Pittsburgh	Pittsburgh-9	Monongahela	Flooding	Report of 5 foot deep flooding on Saline St	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
21	Pittsburgh	Pittsburgh-10	Allegheny River	Flooding	Report of road flooding, vehicles floating on water	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
22	Pittsburgh	Pittsburgh-11	Allegheny River	Flooding	Flooding in intersection, water up to cars doorway & trapped in vehicle	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
36	Pittsburgh	Pittsburgh-12	Monongahela River	Flooding	Flooding, Manhole Surcharging	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
23	Pittsburgh	Pittsburgh-13	Allegheny River	Flooding	Flooding, vehicles stuck	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
24	Pittsburgh	Pittsburgh-14	Allegheny River	Flooding	Flooding for 3 blocks, about 2 ft. deep	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
25	Pittsburgh	Pittsburgh-15	Allegheny River	Flooding	Flooding in intersection, cars stuck	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
26	Pittsburgh	Pittsburgh-16	Allegheny River	Flooding	Flooding up to cars windows	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
27	Pittsburgh	Pittsburgh-17	Allegheny River	Flooding	Flooding at intersection - cars stuck	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
28	Pittsburgh	Pittsburgh-18	Allegheny River	Flooding	Flooding at intersection - vehicles stuck	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
29	Pittsburgh	Pittsburgh-19	Allegheny River	Flooding	Flooding in intersection - cars stuck	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown

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30	Pittsburgh	Pittsburgh-20	Monongahela River	Flooding	Street flooded, cars stuck	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
12	Pittsburgh	Pittsburgh-21	Monongahela River	Flooding	Flooding on road from the Creek	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
31	Pittsburgh	Pittsburgh-22	Monongahela River	Flooding	Flooding in intersection, car stuck	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
16	Pittsburgh	Pittsburgh-23	Monongahela River	Flooding	Home Flooding, Water coming in through 1st floor windows	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		Private property damage	unknown	unknown	unknown
32	Pittsburgh	Pittsburgh-24	Monongahela River	Flooding	Intersection Flooded	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
34	Pittsburgh	Pittsburgh-25	Allegheny River	Flooding	Intersection Flooded, car trapped	Stormwater Volume	unknown	Past 1-2 years	unknown	Less than 1 per year		unknown	unknown	unknown	unknown
17	Pittsburgh	Pittsburgh-26	Monongahela River	Landslide	Stormwater causes landslide onto roadway	Stormwater Volume	unknown	2012	unknown	Less than 1 per year		Public property damage	closed roadway	unknown	Concrete repair to hillside in 2011. A different part of the hill was involved in landslide in 2012
33	Pittsburgh	Pittsburgh-27	Allegheny River	Flooding	Stormwater floods Washington Boulevard during large rain events	Stormwater Volume, Stormwater Velocity	PWSA has an ongoing study to determine the causes of the flooding in the Washington Boulevard area.	2011	unknown	Less than 1 per year		Loss of life / vital services, Public property damage	no residence in area	Traffic gate during flooding events. Open culvert to the River. Raise roadway. Retention ponds	Ongoing study to determine feasible solutions
NA	Port Vue Borough				Reported: no stormwater problems within municipality										
154	Scott Twp	Scott-1	Georges Run	Flooding	Stream Flooding - Conveyance Capacity Limited	Stormwater Volume	NA	2012	1980s	Less than 1 per year	Less than 1 day	Private property damage	Private Property damage: private drains and public utilities	Private Property owner increase conveyance capacity	none known
176	Scott Twp	Scott-2	Georges Run	Water Pollution	Abandoned Mine Drainage enters stream	AMD freezes on County owned road	AMD freezes on County owned road	2013	1950s	More than 1 per year	continuous	road freezes on county owned road	AMD freezes on County owned road	None have been discussed	None have been proposed
177	Scott Twp	Scott-3	Chartiers Creek	AMD, Flooding, Sedimentation, Groundwater	AMD enters state owned storm sewer. Flooding caused if opening at RT 50 state owned/maintained CB is obstructed	Stormwater Volume, Stormwater Velocity, Water Obstruction		2013	1950s	More than 1 per year	year round	Private property damage, More than one owner, Public property damage	Private property damage to the 3 commercial buildings. Public property damage when AMD enters into the state roadway storm sewer	BMP for known or existing AMD areas.	
162	Scott Twp	Scott-4	Chartiers Creek	Flooding	Limited capacity in PennDOT stormwater conveyance system	Stormwater Volume	Limited capacity in PennDOT stormwater conveyance system	2012	1950s	Less than 1 per year	Less than 1 day	No property damage	None	None have been suggested	None have been proposed
158	Scott Twp	Scott-5	Painters Run	Flooding, Accelerated Erosion	Limited capacity in County Stormwater culvert	Stormwater Volume	Limited capacity in County Stormwater Culvert	2011	1997	Less than 1 per year	Less than 1 day	Private property damage	Private Property Damage: Damage to existing commercial structure	Conveyance capacity increase to County Stormwater Culvert	None
155	Scott Twp	Scott-6	Chartiers Creek	Flooding	Areas submerged during flood events (Ivan)	Stormwater Volume	Areas submerged during flood events (Ivan)	2004	2004	Only during Ivan	More than one day	Private property damage, More than one owner	Private property damage: residential structures damaged, ~5 houses with water in basements	None	None
156	Scott Twp	Scott-7	Scrubgrass	Flooding	Culvert pipe blown out	Stormwater Volume, Stormwater Velocity	Private Culvert pipe blown out by excess stormwater runoff	2012	2011	Less than 1 per year	Less than 1 day	Private property damage	Private property damage: surface erosion on private property (residential)	Pipe replacement	private property owner replaced pipe
175	Scott Twp	Scott-8	Scrubgrass	Flooding, Accelerated Erosion	Streambank flooding, abutment washout behind private driveway stream crossings along PennDOT roadway	Stormwater Volume, Stormwater Velocity	Streambank flooding, abutment washout behind private driveway stream crossings along PennDOT roadway	2012	20+ years	Less than 1 per year	Less than 1 day	Private property damage	Private property damage: washout behind private driveway bridge abutments	none investigated	none
157	Scott Twp	Scott-9	Chartiers	Flooding	Surface Flooding	Stormwater Volume	Surface Flooding	2004	2004	Only during Ivan	More than one day	Private property damage	Private property damage: Multiple residences, basement and yard damage	None	None
159	Scott Twp	Scott-10	Painters Run	Flooding, Groundwater	Stormwater: Low lying residential structure with basement flooding	Stormwater Volume, Stormwater Direction	Stormwater: Low lying residential structure with basement flooding	2012	2010	Less than 1 per year	More than one day	Private property damage	Basement wall collapse	Homeowner reconstructed basement walls and added french drain/pump system	Homeowner reconstructed basement walls and added french drain/pump system
161	Scott Twp	Scott-11	Chartiers Creek	Flooding, Accelerated Erosion	Surface Flooding: Stormwater runoff from collapsed/destroyed PennDOT stormwater conveyance system	Stormwater Volume	Surface Flooding: Stormwater runoff from collapsed/destroyed PennDOT stormwater conveyance system	2012	2010	More than 1 per year	More than one day	Private property damage	Private Property Damage: Yard Flooding/Erosion	Install/Re-establish stormwater piping	Install/Re-establish stormwater piping - Grant applications submitted for funding consideration
160	Scott Twp	Scott-12	Scrubgrass	Landslide	Landslide: Private Property chronic landslide (fill)	Fill	Landslide: Private Property chronic landslide (fill)	2006	15+ years	Less than 1 per year	unknown	Private property damage	Private property damage resulting from fill failure	None	None
171	Scott Twp	Scott-13	Chartiers Creek	Landslide	Landslide - Backyard of private residences	Landslide, cause unknown	Cause Unknown, private landslide	2005	2005	Less than 1 per year	unknown, private property	Private property damage	Private property damage, landslide behind private residences, may be result of stormwater	None	None

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172	Scott Twp	Scott-14	Hope Hollow	Landslide	Landslide: Private landslide, cause unknown, could be partial runoff	Fill Area	Landslide on private residential property	2013	2008	More than 1 per year	ongoing	Private property damage	Private property damage: structural damage from landslide/soil movement and yard area slipping.	Cause unknown	None
153	Scott Twp	Scott-15	Hope Hollow	Accelerated Erosion	Accelerated Erosion: Stormwater runoff from private storm sewer system in disrepair	Stormwater Velocity, Stormwater Direction	Stormwater erosion on private property from upstream private storm sewer system in disrepair	2013	2007	More than 1 per year	Ongoing erosion	Private property damage, More than one owner	Private property damage: backyard erosion to several residences	upstream private storm sewer system be rehabilitated	None
170	Scott Twp	Scott-16	Whiskey run	Groundwater	Groundwater spring causing yard saturation/nuisance/mosquitos, etc	Groundwater spring causing yard saturation/nuisance/ mosquitos, etc	Groundwater spring causing yard saturation/nuisance/mosquitos, etc.	2013	20+ years	More than 1 per year	ongoing	Private property damage, More than one owner	Private property damage: soil saturation, nuisance for residences	pipe underdrain to street	none
167	Scott Twp	Scott-17	Whiskey run	Groundwater	Groundwater Spring: spring from private property causes public roadway icing and occupies capacity in existing public storm sewer	Stormwater Volume, Stormwater Direction	Groundwater Spring: spring from private property causes public roadway icing and occupies capacity in existing public storm sewer	2013	20+ years	More than 1 per year	ongoing	Private property damage, Public property damage	Private property damage: saturated yards and basement wall damage Public Property damage: runoff onto public roadways, freezing/icing during cold weather	new private piping into existing public storm sewer system	none
168	Scott Twp	Scott-18	Whiskey Run	Landslide	Landslide: stormwater runoff (possibly downspouts) and improper fill placement on private property	Landslide: stormwater runoff (possibly downspouts) and improper fill placement on private property	Landslide: stormwater runoff (possibly downspouts) and improper fill placement on private property	2011	20+ years	Less than 1 per year	varies	Private property damage, More than one owner	Private property damage: loss of yard area	slope stabilization and surface water management	none
173	Scott Twp	Scott-19	Whiskey Run	Flooding, Accelerated Erosion	Stream erosion, surface flooding and localized roadway flooding	Stormwater Volume, Stormwater Velocity	Ongoing stream erosion, surface flooding in narrow stream channel	2012	20+ years	Less than 1 per year	Less than 1 day	Private property damage, More than one owner, Public property damage	heavy storm results in stream bank erosion, surface flooding on roadway Hurricane Ivan – Flooding damage to multiple residences	Armoring of streambanks (ongoing through grant projects)	Armoring of streambanks (ongoing through grant projects)
153	Scott Twp	Scott-20	Chartiers Creek	Flooding	Flooding on industrial property during Hurricane Ivan	Stormwater Volume	Flooding on industrial property during Hurricane Ivan	2004	2004	Only during Ivan	More than one day	Private property damage	Private property damage on industrial property/structure(s)	None	None
154	Scott Twp	Scott-21	Chartiers Creek	Flooding	Flooding of Industrial property during hurricane Ivan	Stormwater Volume	Flooding of Industrial property during hurricane Ivan	2004	2004	Only during Ivan	More than one day	Private property damage, More than one owner	Private Property Damage to Industrial property and structural damage	None	None
165	Scott twp	Scott-22	Chartiers Creek	Flooding	Flooding of Industrial property during hurricane Ivan	Stormwater Volume	Flooding of Industrial property during hurricane Ivan	2004	2004	Only during Ivan	More than one day	Private property damage, More than one owner	Flooding of Industrial property during hurricane Ivan, damaged property and structure	None	None
174	Scott Twp	Scott 23	Chartiers Creek	Sedimentation	Sedimentation causes blockage beneath the lower chord of bridge	Stormwater Volume, Stormwater Velocity	Stream channel erosion	2012	2007	More than 1 per year	More than one day	Public property damage	Road closure and debris on roadway	Stabilize stream bank. Reduce flow velocity upstream.	N/A
160	Scott Twp	Scott 24	Chartiers Creek	Flooding	Debris is collected at entrance to culvert Limits capacity.	Stormwater Volume, Stormwater Velocity, Water Obstruction	Inlet blockage.	2012	1985	More than 1 per year	Less than 1 day	Debris Cleanup	Debris cleanup.	None.	None
166	Scott Twp	Scott 25	Chartiers Creek	Ground Movement	Ground movement with undetermined cause.	Unknown	Cause unknown	2012	2009	More than 1 per year	Ongoing	Private property damage, More than one owner	Ground and foundation (single family homes) movement	PADEP (OSMR) reviewed site and did not relate mine subsidence.	None
181	Shaler Township	Shaler 1	Pine Creek	Flooding, Homes in 100-year floodplain		Stormwater Volume, Homes in 100-year floodplain		2004	unknown	Less than 1 per year	2-3 days during Ivan	Private property damage, More than one owner	Residential property damage to 30 properties, damage to public park	Purchased and demolished some homes in area	none
182	Shaler Township	Shaler 2	Girly's Run	Flooding, Accelerated Erosion, Sedimentation, Landslide, Homes in 100-year floodplain		Stormwater Volume, Stormwater Velocity, Water Obstruction, Homes in 100-year floodplain, landslide red bed clays		2009	unknown	Less than 1 per year	2-3 days during Ivan	Private property damage, More than one owner	Residential property damage to 15 properties	Purchased and demolished some homes in area, built retaining wall against GR	none
178	Shaler Township	Shaler 3	Pine Creek	Accelerated Erosion, Sedimentation		Stormwater Volume, Stormwater Velocity, Stormwater direction	Upstream limit of streambank erosion of LPC West	2004-Ongoing	unknown	More than 1 year	Bank erosion ongoing			Streambank stabilization, both hard and soft	none
179	Shaler Township	Shaler 4	Pine Creek	Accelerated Erosion, Sedimentation		Stormwater Volume, Stormwater Velocity, Stormwater direction	Downstream limit of streambank erosion of LPC West	2004-Ongoing	unknown	More than 1 year	Bank erosion ongoing			Streambank stabilization, both hard and soft	none

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180	Shaler Township	Shaler 5	Pine Creek	Flooding, Sedimentation		Stormwater Volume, Stormwater Velocity		2004	1986	More than 1 year		Loss of life / vital services, Private property damage, More than one owner, Public property damage	Residential property damage to 25 properties. Sanitary sewer damage	Township purchased some homes, built flood wall, but flooding still occurs	none
183	Sharpsburg Borough	Sharpsburg - 1	Allegheny River	Flooding	A stream coming from O'Hara Twp. Shaler Twp. and carrying drainage from PennDOT's Route 28 enters the Sharpsburg Combined sewer system at Ravine Street. During heavy rain events, this stream flow increases causing sewer surcharging along Ravine Street	Stormwater Volume	A stream coming from O'Hara Twp. Shaler Twp. and carrying drainage from PennDOT's Route 28 enters the Sharpsburg Combined sewer system at Ravine Street. During heavy rain events, this stream flow increases causing sewer surcharging along Ravine Street. The source of the excess flow is development upstream of Sharpsburg in Shaler and O'Hara as well as Route 28 that do not have storm water retention.	2009	1972	Less than 1 per year	Less than 1 day	Private property damage, More than one owner, Public property damage	Sewer surcharging in the basements of 20 homes and 2 businesses. Appliances, heating systems and furnishings were damaged.	Either upstream stormwater retention facilities or the re-routing of the stream to remove it from the Sharpsburg combined sewer system would resolve the problem.	The re-routing of the stream to remove it from the Sharpsburg combined sewer system has been proposed
186	South Fayette	South Fayette-1	Millers Run	Flooding	Area floods in rains over 3"	Stormwater Volume	Culvert under road too small.	2004	1990 prior	Less than 1 per year	Less than 1 day	Private property damage, More than one owner	Erosion of yards.	Replace with larger culvert or bridge.	None
187	South Fayette	South Fayette-2	Millers Run	Flooding	Area floods in rains over 3"	Stormwater Volume	Existing catch basin and pipe too small. Blockage by floating debris often blocks catch basin grate	2004	1990 prior	Less than 1 per year	Less than 1 day	No property damage	None	Replace catch basin and pipe with larger. Protect grate from debris.	None
185	South Fayette	South Fayette-3	Millers Run	Accelerated Erosion	Erosion of collection ditch during heavy rains	Stormwater Volume, Stormwater Velocity	Stormwater travels too fast and erodes ditch.	2012	2007	More than 1 per year		Private property damage	Erosion of collector ditch that leads to development detention pond.	Repair ditch and take measures to slow flows	None.
0 - map location not provided	South Fayette	South Fayette-4	Millers Run	Flooding	Area floods in rains over 6".	Stormwater Volume	Millers Run overbanks and floods adjacent yards.	2004	1990 prior	Less than 1 per year	Less than 1 day	No property damage	None	Bridge replaced by PennDOT in 2009. Will observe during next hurricane type storm event.	None
188	South Fayette	South Fayette-5	Millers Run	Flooding	Area floods in rains over 6"	Stormwater Volume	Millers run overbanks to adjacent yards.	2004	1990 prior	Only during Ivan	Less than 1 day	Private property damage, More than one owner	Erosion of yards and house water damage.	Undetermined.	None.
189	South Fayette	South Fayette-6	Millers Run	Flooding	Area floods in rains over 6".	Stormwater Volume	Millers Run overbanks to adjacent yards.	2004	1990 prior	Only during Ivan	Less than 1 day	Private property damage, More than one owner	Erosion of yards and house water damage.	Undetermined.	None.
190	South Fayette	South Fayette-7	Millers Run	Flooding	Area floods in rains over 6"	Stormwater Volume	Millers Run overbanks and floods adjacent yards.	2004	1990 prior	Only during Ivan	Less than 1 day	Private property damage, More than one owner	Erosion of yards and house water damage.	Undetermined.	None.
191	South Fayette	South Fayette-8	Millers Run	Flooding	Area floods in rains over 3".	Stormwater Volume	Creek overflows due to silt buildup and bridge too small.	2012	1990 prior	Less than 1 per year	Less than 1 day	Private property damage, More than one owner	House water damage.	Regular dredging of silt and replace bridge over Millers Run	None.
192	South Fayette	South Fayette-9	Coal Pit Run	Flooding	Area floods in rains over 2"	Stormwater Volume	Stormwater flows over road.	2012	1990 prior	Less than 1 per year	Less than 1 day	Public property damage	Erosion of road berm.	Problem should be eliminated by Southern Beltway project.	None
193	South Fayette	South Fayette-10	Coal Pit Run	Flooding	Area floods in rains over 4".	Stormwater Volume	Stormwater flows over road.	2010	1990 prior	Less than 1 per year	Less than 1 day	Public property damage	Erosion of road berm.	Replace bridge over Coal Pit Run.	Bridge replacement unsuccessfully submitted for state grant in 2011.
195	South Fayette	South Fayette-11	Coal Pit Run	Flooding	Area floods in rains over 4".	Stormwater Volume	Water flows over road due to backup at bridge.	2010	1990 prior	Less than 1 per year	Less than 1 day	Public property damage	Erosion of road berm.	Replacement of bridge.	Bridge replacement unsuccessfully submitted for state grant in 2011.
196	South Fayette	South Fayette-12	Chartiers Creek	Flooding	Area floods in rains over 4"	Stormwater Volume	Stormwater fills ditch and runs over road.	2010	1990 prior	Less than 1 per year	Less than 1 day	Public property damage	Erosion of road berm.	Replace existing catch basin and outlet pipe with larger.	None.
194	South Fayette	South Fayette-13	Coal Pit Run	Flooding	Area floods in rains over 4"	Stormwater Volume	Upstream yards flood and flows over Washington Pike	2010	1990 prior	Less than 1 per year	Less than 1 day	Private property damage, More than one owner, Public property damage	Private: erosion of yards. Public: erosion of road berm	Enlarge bridge span to increase stormwater flow capacity.	PennDOT project to replace bridge is scheduled to be done in 2013.

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197	South Fayette	South Fayette-14	Chartiers Creek	Flooding	Area floods in rains over 6".	Stormwater Volume	Floods yards adjacent to Greenwood Dr.	2004	1990 prior	Less than 1 per year	Less than 1 day	Private property damage	Erosion of yards.	Storm collection system was installed by Township. Will observe during next hurricane type storm.	None.
198	South Fayette	South Fayette-15	Chartiers Creek	Flooding	Area floods in rains over 2"	Stormwater Volume	Backs up at bridge.	2012	1990 prior	Less than 1 per year	Less than 1 day	Public property damage	Erosion of road berm	Creek needs dredged.	None
199	South Fayette	South Fayette-16	Chartiers Creek	Flooding	Area floods in rains over 2"	Stormwater Volume	Backs up at bridge.	2012	1990 prior	Less than 1 per year	Less than 1 day	Public property damage	Erosion of road berm	PennDOT is designing a project to replace bridge over Chartiers Creek.	None
184	South Fayette	South Fayette-17	Millers Run	Accelerated Erosion	Area floods in rains over 2"	Stormwater Velocity	Ditch overtops road.	2012	1990 prior	Less than 1 per year	Less than 1 day	Public property damage	Erosion of road berm	Maintain road stability with rip-rap.	None
201	South Park Township	South Park 1	Peters Creek	Flooding, Sedimentation, Low Bridges		Stormwater Volume, Stormwater Velocity, Water Obstruction		2012			Less than 1 day	Private Property Damage, More than one owner	1 business (Owl's Club - Cochran Mills Rd.)		
200	South Park Township	South Park 2	Peters Creek	Flooding		Stormwater Volume	Stormwater Runoff Causes back-up onto Pleasant St., Church St. and Sewage Lines	2004		More than 1 per year (Every time there is a heavy rain)	Less than 1 day	Private property damage, More than one owner, Public property damage	1 business was damaged (American Legion); Several residences with water in basement	Clean out the stream and remove trees in stream.	
NA	Swissvale Borough				Reported: no stormwater problems within municipality										
202	Tarentum Borough	1	Bull Creek	Flooding, Accelerated Erosion, Sedimentation, Landslide	Flooding from Bull Creek escaping streambank	Stormwater Volume, Water Obstruction	n/a	2009	n/a	Only during rain	n/a	Public Property Damage	Damage to Borough Garage	Dredge and stabilize Bull Creek	
81	Township of Hampton	Hampton 1	Pine Creek	Flooding	Flooding - The area floods on a regular basis	Stormwater Volume, Water Obstruction	Current County bridge restrict flow. Channelization effects velocity.	2007	early 1900's	Less than 1 per year	More than one day	Private property damage, More than one owner, Public property damage	commercial: building and site formally located on this site was damaged by flooding along with a channel wall	Replace bridge with culvert of sufficient capacity and install a detention facility	Property was acquired by the Township as part of the Lower Allison Park project.
82	Township of Hampton	Hampton 2	Pine Creek	Flooding	Area has experienced flooding on a regular basis	Stormwater Volume, Stormwater Velocity	Volume of water at confluence.	2004	early 1900's	Less than 1 per year	More than one day	Private property damage, More than one owner, Public property damage	Several private single family dwellings were highly damaged in basements and on first floors. Township VFD building also damaged	Acquire private properties and install detention facility	Area part of Phase 2 of the Lower Allison Park storm water attenuation project
83	Township of Hampton	Hampton 3	Pine Creek	Flooding	Area flooding regularly	Stormwater Volume	Stream capacity exceeds volume in this area.	2004	early 1900's	Less than 1 per year	More than one day	Loss of life / vital services, Public property damage	Public Facility: Buildings and site highly damaged during flood events. Facility off line for several days.	Local fish/wildlife group to partner with Fish Commission to install fish habitats along stream shores that should also assist in reducing bank erosion.	Any future replacement design for the facility will include consideration of the flooding issues.
84	Township of Hampton	Hampton 4	Pine Creek	Flooding	Area historically flooded	Stormwater Volume, Stormwater Velocity	Steam capacity inadequacy.	2004	early 1900's	Less than 1 per year	More than one day	Commercial property	Commercial: Daycare facility located in this area required evacuation and sustained extensive basement and first floor damage	Acquire additional private properties and install on-stream storm water facility	None
115	Township of Moon	Moon 1	Flaugherty Run	Flooding	Storm water causes the stream to leave its bank causing flooding	Stormwater Volume, Stormwater Velocity	I believe development along this corridor has caused increased volume and velocity to cause flooding and erosion along Montour Run.	unknown	unknown	Less than 1 per year	Less than 1 day	Private property damage, More than one owner, Public property damage	Private properties and business with damaged inventory	unknown	unknown
115	Township of Moon	Moon 2	Flaugherty Run	Flooding	Stream leaves its banks causing flooding at various properties at the corner of Brodhead and Flaugherty Run Roads and along several properties upstream and down stream from this point	Stormwater Volume, Stormwater Velocity	unknown	not on record	not on record	More than 1 per year		Private property damage, More than one owner	parking lot flooded, basements flooded	no suggestion	none known

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116	Township of Moon	Moon 3	Ohio River	Flooding	Narrows Run stream over flows its bank. Flooding occurs at the Honda Dealership along University Blvd	Stormwater Volume, Stormwater Velocity, Water Obstruction	Water obstruction may be from the culvert under the highway is too small for the amount of water	not recorded	not recorded	Less than 1 per year	Less than 1 day	Private property damage, More than one owner	Private property	None	none
114	Township of Moon	Moon 4	Flaugherty Run	Landslide	All along the Flaugherty Run corridor from Jackson Road to Stoops Ferry Road, there have been instances of landslides due to the redbed soils	soils, ground saturation	types of soils found in this area along with ground water saturation may contribute to the problems along this valley	not tracked	not tracked	More than 1 per year	on going	Private property damage, More than one owner, Public property damage	Various types of damage consistent with landslides: loss of roads, encreachment into streams, loss of parking lot,	none known	Geological testing prior to development as required in the Township SALDO
106	Township of Moon	Moon 5	Moon 5	Landslide	Landslide along Boggs School Road cause the road way to drop off. Major repair and reconstruction had to occur	Stormwater Direction	Ground saturation and soil types likely contributed to the problem.	unknown	unknown	More than 1 per year	closed road until repaired	Private property damage, More than one owner, Public property damage	Road way dropped and had to be closed. Road gave way into private property.	unknown	Installed drainage during reconstruction.
111	Township of Moon	Moon 6	Montour Run	Landslide	Landslide caused Hassam Road to collapse and fall towards the stream	Stormwater Direction, soils, ground saturation	Landslide caused Hassam Road to collapse and fall towards the stream. Roadway was closed and had to be reconstructed.	unknown	unknown	Less than 1 per year	closed road until repaired	Private property damage, Public property damage	Slide from state road caused road way material to drop onto private property	None known	PennDOT may have installed better drainage along this area
110	Township of Moon	Moon 7	Flaugherty Run	Landslide	Landslide caused hillside to give way. It caused damage to township road and blocked stream along becks Run Road	Stormwater Direction, Water Obstruction, soils, ground saturation	Ground saturation likely cause slide of hillside into Becks Run Road and stream damage near the intersection of Flaugherty Run Road. It was complicated by stream flow direction and crossing under road.	unknown	unknown	Less than 1 per year	closed road until repaired	Private property damage, Public property damage	Township property and 1 private property owner	unknown	Permits were obtained to relocate stream, proper drainage installed during road way reconstruction
107	Township of Moon	Moon 8	Flaugherty Run	Landslide	Landslide at Shelbourne Road above Flaugherty Run Road caused problems during construction of the single family development. Geological testing was done and procedures were in place but methods did not prevent the slide from occuring	Stormwater Direction, soils, ground saturation	Landslide at Shelbourne Road above Flaugherty Run Road caused problems during construction of the single family development. Geological testing was done and procedures were in place but methods did not prevent the slide from occurring.	unknown	unknown	Less than 1 per year	More than one day	Private property damage	Private property damage, delays in project.	None known	Additional engineering and geotech repairs were done by the developer.
103	Township of Moon	Moon 9	Montour Run	Landslide	Landslide caused problems with Downing Drive off of Hassam Road. The hillside on the high side came down onto the road way and slid towards the stream on lower side.	Stormwater Velocity, Stormwater Direction, soils, ground saturation	Landslide caused problems with Downing Drive off of Hassam Road. The hillside on the high side came down onto the road way and slid towards the stream on lower side.	over 30 years ago	over 30 years ago	Less than 1 per year	closed road until repaired	Private property damage, Public property damage	Private property damaged. Township roadway damaged. After the repairs were done, much of the property was donated to the Park to help protect the adjacent stream and prevent additional problems with slides due to land development.	None Known	Land left undeveloped due to soil conditions.
105	Township of Moon	Moon 10	Flaugherty Run	Landslide	Storm water runoff causing landslide at the Hanger Restaurant causing hillside to bulge onto parking lot and nearby restaurant building. Ongoing problem	Stormwater Velocity, Stormwater Direction, soils, ground saturation	Storm water runoff causing landslide at the Hanger Restaurant causing hillside to bulge onto parking lot and nearby restaurant building. Ongoing problem	unknown	unknown	More than 1 per year	ongoing	Private property damage	Business property damage	None known	None known
113	Township of Moon	Moon 11	Ohio River	Landslide	Landslide -Storm water runoff and soil conditions cause hillside to give way and slide into Shafer Road at this location up from the intersection with Stoops Ferry Road.	Stormwater Velocity, Stormwater Direction, soils, ground saturation	Storm water runoff caused landslide at the Shafer Road. Road was closed until repairs could be made.	not recorded	not recorded	Less than 1 per year	closed road until repaired	Private property damage, Public property damage	Township Road damaged	Not known	Reconstructed road include addressing storm water problem
104	Township of Moon	Moon 12	Flaugherty Run	Landslide	Landslide took out storm water retention system. Area kept sliding towards and encroached into Flaugherty Run stream.	Stormwater Volume, Stormwater Velocity, Stormwater Direction, soils, ground saturation	Storm water and soil conditions caused Landslide at the Autumn Woods Plan of lots off of Becks Run Road and above Flaugherty Run Road	2011	2007	Less than 1 per year	years	Private property damage	Private property damage. Excessive costs were borne by the developer for repairs.	None known	various geological and engineering designs.
112	Township of Moon	Moon 13	Flaugherty Run	Landslide	Landslide form storm water and soil saturation along Brodhead Road below the intersection of Purdy Road. The pavement and ground gave way towards Boggs School Road.	Stormwater Velocity, Stormwater Direction	Storm water direction and soil conditions contributed to landslide along Brodhead Road.	not recorded	not recorded	More than 1 per year	limited road until repaired	Private property damage, Public property damage	Slide repaired along state right of way and private property and roadway restored	Not known	Not known
108	Township of Moon	Moon 14	Ohio River	Accelerated Erosion, Landslide	Erosion and storm water contributed to landslide near Staunton Drive off of Stoops Ferry Road. Soil gave way down onto Railroad Right of Way	Stormwater Direction, soils, ground saturation	Erosion and storm water direction plus soil conditions contributed to slide	not recorded	not recorded	More than 1 per year	More than one day	Private property damage, Public property damage	Two residential lots plus active railroad. Material encroached into right of way but did not impede train passage.	not known	Slide was repaired, soil removed from right of way and top regraded

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109	Township of Moon	Moon 16, Moon 17	Flaugherty Run	Landslide, Groundwater	Landslide on lower side of Boggs School Road near intersection with Spring Run Road. Roadway is showing early signs of a slip. Excess water runoff and soil conditions contribute to the problem along this area	Stormwater Volume, Stormwater Velocity, Stormwater Direction	All of the above contribute to slide conditions along Boggs School Road.	continuing problem	not recorded	More than 1 per year	More than one day	Private property damage, More than one owner, Public property damage	Private property and township road	unknown	unknown
0 - map location not provided	Township of Moon	Moon 16, Moon 17	Flaugherty Run	Landslide, Groundwater	Landslide on lower side of Boggs School Road near intersection with Spring Run Road. Roadway is showing early signs of a slip. Excess water runoff and soil conditions contribute to the problem along this area	Stormwater Volume, Stormwater Velocity, Stormwater Direction	All of the above contribute to slide conditions along Boggs School Road.	continuing problem	not recorded	More than 1 per year	More than one day	Private property damage, More than one owner, Public property damage	Private property and township road	unknown	unknown
95	Township of Moon	Moon 18	Montour Run	Accelerated Erosion, Landslide	Accelerated erosion along stream and landslide onto Hirshinger Road between Hookstown Grade Road and Montour Run Road	Stormwater Volume, Stormwater Velocity, Stormwater Direction	Storm water volume, velocity and direction contribute to the erosion and landslide conditions	not tracked	not tracked	More than 1 per year	More than one day	Private property damage, Public property damage	Township road - Hirshinger Road has experience damage due to landslide and erosion	unknown	unknown
97	Township of Moon	Moon 19	Flaugherty Run	Flooding, Accelerated Erosion	Accelerated erosion and flooding occur along Flaugherty Run stream up stream from Jerry's Junkyard	Stormwater Volume, Stormwater Velocity, Stormwater Direction	Velocity and volume are major contributors to the flooding and erosion problem in this area between Brodhead Road and Stoops Ferry Road along the Flaugherty Run Road	not recorded	not recorded	More than 1 per year	Less than 1 day	Private property damage, More than one owner, Public property damage	Flood damage to homes and businesses have occurred along this corridor of Flaugherty Run	None known	None Known
98	Township of Moon	Moon 20	Flaugherty Run	Flooding, Accelerated Erosion	Accelerated erosion has occurred at runoff points into this property. Flooding occurs at the base of the property closer to Flaugherty Run Road	Stormwater Volume, Stormwater Velocity, Stormwater Direction	Accelerated erosion has occurred at runoff points into this property known as Olson Park along Flaugherty Run Road between Becks Run Road and Brodhead Road. Flooding occurs at the base of the property closer to Flaugherty Run Road.	unknown	unknown	More than 1 per year	More than one day	Public property damage	Accelerated erosion has occurred at runoff points into this public park property. Flooding occurs at the base of the property closer to Flaugherty Run Road	Erosion controls and widening of the stream bed	Some erosion controls
99	Township of Moon	Moon 21	Flaugherty Run	Flooding, Accelerated Erosion	Flooding and accelerated erosion has occurred at several locations along the Flaugherty Run Road corridor including property at 334 Flaugherty Run and Brodhead Trailer Park at 273 Flaugherty Run Road	Stormwater Volume, Stormwater Velocity, Stormwater Direction	Flooding and accelerated erosion has occurred at several locations along the Flaugherty Run Road corridor including property at 334 Flaugherty Run and Brodhead Trailer Park at 273 Flaugherty Run Road	not recorded	not recorded	More than 1 per year	Less than 1 day	Private property damage, More than one owner	Flooding and accelerated erosion has occurred at several locations along the Flaugherty Run Road corridor including private residential property at 334 Flaugherty Run and Brodhead Trailer Park at 273 Flaugherty Run Road	none known	none known
100	Township of Moon	Moon 22	Flaugherty Run	Flooding, Accelerated Erosion	Flooding and accelerated erosion has occurred at several locations along the Flaugherty Run Road corridor including property at 334 Flaugherty Run and Brodhead Trailer Park at 273 Flaugherty Run Road	Stormwater Volume, Stormwater Velocity, Stormwater Direction	Flooding and accelerated erosion has occurred at several locations along the Flaugherty Run Road corridor including property at 334 Flaugherty Run and Brodhead Trailer Park at 273 Flaugherty Run Road	not recorded	not recorded	More than 1 per year	Less than 1 day	Private property damage, More than one owner	Flooding and accelerated erosion has occurred at several locations along the Flaugherty Run Road corridor including private residential property at 334 Flaugherty Run and Brodhead Trailer Park at 273 Flaugherty Run Road	none known	none known
101	Township of Moon	Moon 23	Montour Run	Flooding, Accelerated Erosion	Accelerated erosion and flooding has occurred along the Montour Coketown Road Area off of Rout 51 near the beginning of the Montour Trail.	Stormwater Volume, Stormwater Velocity, Stormwater Direction	Accelerated erosion and flooding has occurred along the Montour Coketown Road Area off of Rout 51 near the beginning of the Montour Trail.	not recorded	not recorded	More than 1 per year	Less than 1 day	More than one owner, Public property damage	Accelerated erosion and flooding has occurred on properties along the Montour Coketown Road Area off of Rout 51 near the beginning of the Montour Trail. The Trail Association has worked to minimize erosion of the trail area	None known	None Known
117	Township of Moon	Moon 24	Flaugherty Run	Water Pollution	Results from MS4 testing indicate bacteria at this Flaug8 outfall	Infiltration	Contamination by infiltration	2011	2010	Less than 1 per year		No property damage	Not determined	Inform the Municipal Authority	Municipal Authority will investigate
118	Township of Moon	Moon 25	Montour Run	Water Pollution	Outfall testing from MS4 found bacteria at the MoC10A outfall along Thorn Run Road across form Crown Plaza	Infiltration	Infiltration	2011	2010	Less than 1 per year	not determined	not determined.	Not determined	Notified the Municipal Authority	Municipal Authority has a plan to replace old sewer system

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119	Township of Moon	Moon 26	Ohio River	Water Pollution	Outfall testing due to MS4 requirement determined bacteria at Narro2 outfall near the intersection of Stoops Ferry Road and Shafer Road.	infiltration	Outfall testing due to MS4 requirement determined bacteria at Narro2 outfall near the intersection of Stoops Ferry Road and Shafer Road. Likely the problem is from sanitary sewer line infiltration.	2011	2010	Less than 1 per year	not determined	not determined	Not determined	Notified the Municipal Authority	Municipal Authority has developed a plan to replace older sanitary sewer lines.
120	Township of Moon	Moon 27	Ohio River	Water Pollution	Water pollution form Mine Drainage	abandoned mines	Water pollution from mine drainage	2012	unknown	More than 1 per year	More than one day	Private property damage, Public property damage	Mine drainage infiltrates basements of homes and drains out on to street and into storm drains causing icing problems on the road in winter months and pollution into storm drains	There has been solutions to eliminate the mine drainage from the homes and road way to directly pipe it to the catch basins.	No solution has been initiated for mine drainage pollution
121	Township of Moon	Moon 28	Montour Run	Water Pollution	Mine drainage runs out of the ground and drains out into yards and on to street and into storm drains causing icing problems on the road in winter months and pollution into storm drains. Some instances it drains directly into the stream at Timberyoke between Nyelimber Parkway and Hayeswold Drive	mine drainage	Mine drainage runs out of the ground and drains out into yards along Timberyoke and Great Oaks Drives and on to street and into storm drains causing icing problems on the road in winter months and pollution into storm drains. Some instances it drains directly into the stream.	2012	not recorded	More than 1 per year	More than one day	Private property damage, More than one owner, Public property damage	Water pollution problem along Timberyoke and Great Oaks Drives	None known	None
122	Township of Moon	Moon 29	Montour Run	Water Pollution	Water pollution from Mine Drainage near Bendix Drive	mine drainage	Water pollution from Mine Drainage near Bendix Drive	2012	not recorded	More than 1 per year	More than one day	not determined	Water pollution from Mine Drainage near Bendix Drive directly into stream	none	none
102	Township of Moon	moon 30	Montour Run	Flooding, Accelerated Erosion	Accelerated erosion and Flooding has occurred into basements of homes along Timberyoke Road.	Stormwater Volume, Stormwater Velocity, Stormwater Direction	Accelerated erosion and Flooding has occurred into basements of homes along Timberyoke Road near street address 221	not recorded	not recorded	More than 1 per year	Less than 1 day	Private property damage, More than one owner	Erosion has redirected the water flow towards the homes along the beginning of the stream along Timberyoke Drive	None known	None known
NA	Trafford Borough				No areas of stormwater problems in the part of Trafford in Allegheny County					Only during Agnes					
203	Turtle Creek Borough	Turtle Creek - 1	Turtle Creek	Flooding	Thompson Run floods during heavy rain events affecting Church Street, Larimer Avenue, Railroad Street and Thompson Street in Turtle Creek Borough.	Stormwater Volume	During extreme rain events, Thompson Run overflows its banks flooding residential and commercial areas along the stream	2009	1972	Less than 1 per year	More than one day	Loss of life / vital services, Private property damage, More than one owner, Public property damage	Public property damage included pavement wash-out and sewer damage. Private property damage included flooded basements and first floors, damage to heating units, appliances and furnishings as well as structural damage to residential and commercial buildings. 125 private property buildings affected/damaged.	Storm water retention facilities in the upper areas of the watershed in Monroeville, Penn Hills and Wilkins Twp are needed	none
204	Turtle Creek Borough	Turtle Creek - 2	Turtle Creek	Flooding	Flooding along Lynn Avenue and Monroeville Avenue during extreme rain events.	Stormwater Volume	Flooding damages residences, public facilities and commercial buildings along Lynn Avenue and Monroeville Avenue during rain events due to an undersized culvert.	2009	1972	Less than 1 per year	More than one day	Loss of life / vital services, Private property damage, More than one owner, Public property damage	35 residential homes with flooded basements resulting in damage to heating units, appliances and furnishings. Structural damage to one commercial building that had to be demolished. Flooding of commercial buildings resulting in damage to heating units, appliances and furnishings. Flooding of a high school football field resulting in damage to playing surface and support facilities. Flooding of municipal building resulting in damage to heating units, appliances and furnishings.	Replacing an underground culvert with a larger size culvert.	Replacing an underground culvert with a larger size culvert.
NA	Wall Borough				Reported: no stormwater problems within municipality										
206	West Deer Township	West Deer - 1	Deer Creek	Flooding	Route 910 occasionally flooded.	Stormwater Volume	Side tributary and main stream converge	2010	unknown	Less than 1 per year	Less than 1 day	road flooding	Route 910 occasionally flooded	None	None

Map Point	Municipality	Problem location name	Watershed	Types of Stormwater Problems	Please provide any additional description/explanation on the types stormwater problems checked.	Cause(s) of Stormwater Problems	Please provide any additional description/explanation on the causes of stormwater problems checked.	Year the problem at this location most recently occurred.	Year the problem at this location first occurred.	How regularly does the identified problem occur at this location?	What is the duration of the problem at this location (if applicable)?	What kind of property damage has occurred because of the problem identified at this location?	For each type of property damage experienced at this location, please describe the damage experienced, including a description of the types and number of properties damaged.	Please list and describe any solutions that have been SUGGESTED at this location.	Please list and describe any solutions that have been FORMALLY PROPOSED at this location.
207	West Deer Township	West Deer - 2	Deer Creek	Flooding	Saxonburg Boulevard occasionally flooded	Stormwater Volume	Volume	2010	unknown	Less than 1 per year	Less than 1 day	Road flooding	Saxonburg Boulevard occasionally flooded	none	none
205	West Deer Township	West Deer - 3	Little Deer Creek	Flooding	Basement flooding	Stormwater Volume	none	2011	unknown	Less than 1 per year	Less than 1 day	Private property damage, More than one owner	6 residences with water in basements	none	none
NA	West View Borough				Reported: no stormwater problems within municipality										
NA	Whitaker Borough				Reported: no stormwater problems within municipality										
NA	Wilkinsburg Borough				Reported: no stormwater problems within municipality										
NA	Wilmerding Borough				Reported: no stormwater problems within municipality										
0 - location not provided	ACCD	ACCD1		Flooding	Flooding on the property	Stormwater volume		2013		More than 1 per year		Private Property Damage	Residential Property Damage, 1 property		
0 - location not provided	ACCD	ACCD2		Flooding, Accelerated Erosion	Stormwater from neighboring elementary school parking areas and driveways discharge into residential back yards resulting in flooding	Stormwater Volume, Stormwater Velocity		2013		More than 1 per year		Private Property Damage More than 1 owner	Residential Property Damage, 2-3 properties		
0 - location not provided	ACCD	ACCD3		Flooding, Sedimentation	Cement blocks, boulders and debris in creek create obstructions resulting in flooding at least once a year.	Water Obstruction		2013		More than 1 per year		Private Property Damage	Residential Property Damage, 1 property		
0 - location not provided	ACCD	ACCD4		Flooding, Accelerated Erosion, Sedimentation	New housing developments failing to maintain stormwater BMPs resulting in flooding , accelerated erosion and sedimentation	Stormwater volume		2013		More than 1 per year		Private Property Damage More than 1 owner	Residential Property Damage, many properties		
0 - location not provided	ACCD	ACCD5		Other (Drainage)	Walking trail for housing development has resulted in drainage issues that flow onto complainant's property			2013				Private Property Damage	Residential Property Damage, 1 property		
0 - location not provided	ACCD	ACCD6		Flooding	Recent church construction resulting in flooding from runoff from church parking lot being discharged onto neighbor's property	Stormwater Volume, Stormwater Velocity		2013		More than 1 per year		Private Property Damage	Residential Property Damage, 1 property		
0 - location not provided	ACCD	ACCD7		Flooding	Stormwater runoff has resulted in flooding of home and property	Stormwater Volume, Stormwater Velocity		2013				Private Property Damage	Residential Property Damage, 1 property		

APPENDIX C-4

Obstructions Identified from FEMA FIS Stream Profiles

Appendix C-4 - Table of Obstructions from FEMA FIS Stream Profiles

Obstruction No.	No. on Stream	Stream Name	Obstruction Description/Location
O-1	ABE-01	Abers Creek	Cavitt Road
O-2	ABE-02	Abers Creek	Abers Creek Road
O-3	ABE-03	Abers Creek	Abers Creek Road
O-4	ABE-04	Abers Creek	Private Drive
O-5	ABE-05	Abers Creek	William Penn Highway
O-6	ABE-06	Abers Creek	Golden Mile Highway
O-7	ABE-07	Abers Creek	old Abers Creek Road
O-8	ABE-08	Abers Creek	Golden Mile Highway
O-9	ABE-09	Abers Creek	Municipal Rd
O-10	ABE-10	Abers Creek	Old Frankstown Rd
O-11	ABE-11	Abers Creek	New Texas Road
O-12	ABE-10	Abers Creek	Golden Mile Highway SR 286
O-13	ABE-13	Abers Creek	Malibar Drive
O-14	ALL-02	Allegheny River	Lock and Dam 3
O-15	ALL-03	Allegheny River	Lock and Dam 4
O-16	ALL-HI-01	Allegheny River - Herrs Island Back Channel	Railroad
O-17	BER-02	Bear Run	Private Road
O-18	BER-01	Bear Run	MT. Nebo Road
O-19	BEK-01	Becks Run	foot bridge
O-20	BEK-02	Becks Run	foot bridge
O-21	BEK-03	Becks Run	Becks Head Road
O-22	BEK-04	Becks Run	BAJO Street
O-23	BEK-05	Becks Run	Becks Head Road
O-24	BSC-01	Big Sewickley Creek	Beaver Road
O-25	BSC-02	Big Sewickley Creek	Access Road
O-26	BSC-03	Big Sewickley Creek	Merriman Road
O-27	BSC-04	Big Sewickley Creek	Big Sewickley Creek Road
O-28	BSC-05	Big Sewickley Creek	Access Road
O-29	BSC-06	Big Sewickley Creek	Access Road
O-30	BSC-07	Big Sewickley Creek	Access Road
O-31	BSC-08	Big Sewickley Creek	Big Sewickley Creek Road
O-32	BOS-01	Boston Hollow Run	Smithfield Street
O-33	BOS-02	Boston Hollow Run	Private Road
O-34	BOS-03	Boston Hollow Run	Private Road
O-35	BOS-04	Boston Hollow Run	Private Road
O-36	BOS-05	Boston Hollow Run	SR 48 Boston Hollow Road
O-37	BOS-06	Boston Hollow Run	SR 48 Boston Hollow Road
O-38	BOY-01	Boyds Hollow Run	Private Drive
O-39	BOY-02	Boyds Hollow Run	Private Drive
O-40	BOY-03	Boyds Hollow Run	Private Drive
O-41	BRE-01	Breakneck Creek	Three Degree Road
O-42	BRU-01	Brush Creek 2	Thorn Hill Road
O-43	BRU-02	Brush Creek 2	Interstate Route 79
O-44	BRU-03	Brush Creek 2	U.S. Route 19 - Perry Highway
O-45	BRU-04	Brush Creek 2	Northgate Drive
O-46	BRU-05	Brush Creek 2	Sewage Treatment Plant Entrance
O-47	BUL-01	Bull Creek	Access Road

Appendix C-4 - Table of Obstructions from FEMA FIS Stream Profiles

Obstruction No.	No. on Stream	Stream Name	Obstruction Description/Location
O-48	BUL-02	Bull Creek	Access Road
O-49	BUL-03	Bull Creek	Bull Creek Allegheny Bridge No.2
O-50	BUL-04	Bull Creek	Bull Creek Allegheny Bridge No.3
O-51	BUL-05	Bull Creek	Bull Creek Road
O-52	BUL-06	Bull Creek	Access Road
O-53	BUL-07	Bull Creek	Lardintown Road
O-54	BUL-08	Bull Creek	State route 908 - Millerstown and Culmerville Road
O-55	BUL-09	Bull Creek	Thompson Road
O-56	BUL-10	Bull Creek	Thompson Road
O-57	BUL-11	Bull Creek	Thompson Road
O-58	CAM-01	Campbells Run	Glass Street
O-59	CAM-02	Campbells Run	Railroad
O-60	CAM-03	Campbells Run	Railroad
O-61	CAM-04	Campbells Run	Railroad Street
O-62	CAM-05	Campbells Run	Campbells Run Road
O-63	CAM-06	Campbells Run	Brookside Road
O-64	CAM-07	Campbells Run	Private Drive
O-65	CAM-08	Campbells Run	Private Drive
O-66	CAM-09	Campbells Run	Campbells Run Road
O-67	CAM-10	Campbells Run	Campbells Run Road
O-68	CAM-11	Campbells Run	Penn Lincoln Parkway
O-69	CAM-12	Campbells Run	Private Drive
O-70	CAM-13	Campbells Run	Private Drive
O-71	CAM-14	Campbells Run	Private Drive
O-72	CAM-15	Campbells Run	Private Drive
O-73	CAM-16	Campbells Run	Private Drive
O-74	CAM-17	Campbells Run	Private Drive
O-75	CAM-18	Campbells Run	Private Drive
O-76	CAM-16	Campbells Run	Private Drive
O-77	CFT-01	Chalfant Run	Larimer Avenue
O-78	CFT-02	Chalfant Run	Baker Avenue
O-79	CFT-03	Chalfant Run	Private Drive
O-80	CFT-04	Chalfant Run	Rodi Road
O-81	CHR-01	Chartiers Creek	Rail Road
O-82	CHR-02	Chartiers Creek	West Carson Street
O-83	CHR-03	Chartiers Creek	Tuener Road
O-84	CHR-04	Chartiers Creek	Rail Road - Confluence of Whiskey
O-85	CHR-05	Chartiers Creek	Chestnut Street
O-86	CHR-06	Chartiers Creek	Jane Street
O-87	CHR-07	Chartiers Creek	Third Street
O-88	CHR-08	Chartiers Creek	Hammond Street
O-89	CHR-09	Chartiers Creek	Rail Road
O-90	CHR-10	Chartiers Creek	Rail Road
O-91	CHR-11	Chartiers Creek	Green Tree Road
O-92	CHR-12	Chartiers Creek	Railroad

Appendix C-4 - Table of Obstructions from FEMA FIS Stream Profiles

Obstruction No.	No. on Stream	Stream Name	Obstruction Description/Location
O-93	CHR-13	Chartiers Creek	Panters Run Road
O-94	CHR-14	Chartiers Creek	Railroad
O-95	CHR-15	Chartiers Creek	Diversion Channel Cut Off Culvert
O-96	CHR-16	Chartiers Creek	State Route 50
O-97	CHR-17	Chartiers Creek	Railroad
O-98	CHR-18	Chartiers Creek	Mayview Road
O-99	CHR-19	Chartiers Creek	Railroad
O-100	CHR-20	Chartiers Creek	Boyce Road
O-101	CHR-19	Chartiers Creek	Railroad
O-102	CHR-20	Chartiers Creek	Boyce Road
O-103	CCD-01	Chartiers Creek Diversion Channel	Concrete Drop Structure
O-104	CCD-02	Chartiers Creek Diversion Channel	Steen Road
O-105	DCR-01	Dirty Camp Run	Broadway Avenue
O-106	DCR-02	Dirty Camp Run	Merchants Alley
O-107	DCR-03	Dirty Camp Run	Diamond Alley
O-108	DCR-04	Dirty Camp Run	3rd Street
O-109	DCR-05	Dirty Camp Run	Electric Alley
O-110	DCR-06	Dirty Camp Run	Eleanor Street
O-111	DCR-07	Dirty Camp Run	Footbridge
O-112	DCR-08	Dirty Camp Run	Footbridge
O-113	DCR-09	Dirty Camp Run	Taylor Avenue
O-114	DCR-08	Dirty Camp Run	Wall Avenue
O-115	DCR-11	Dirty Camp Run	Private Drive
O-116	RBR-01	Robinson Run	Railroad
O-117	RBR-02	Robinson Run	South Ewing Road
O-118	RBR-03	Robinson Run	Railroad
O-119	RBR-05	Robinson Run	Walkers Mill Road
O-120	RBR-04	Robinson Run	Railroad
O-121	RBR-06	Robinson Run	Railroad
O-122	RBR-07	Robinson Run	Old Noblestown Road
O-123	RBR-08	Robinson Run	Railroad
O-124	RBR-09	Robinson Run	Union Avenue
O-125	RBR-10	Robinson Run	Railroad
O-126	RBR-11	Robinson Run	Railroad
O-127	RBR-12	Robinson Run	Access Road
O-128	RBR-13	Robinson Run	Main Street
O-129	RBR-14	Robinson Run	Station Street
O-130	RBR-15	Robinson Run	Main Street
O-131	SLR-01	Sawmill Run	Waterfall
O-132	SLR-02	Sawmill Run	Ivy Street
O-133	SLR-01	Sawmill Run	Moss Street
O-134	SLR-04	Sawmill Run	Private Drive
O-135	SLR-05	Sawmill Run	Private Drive
O-136	SLR-06	Sawmill Run	Private Drive
O-137	SLR-07	Sawmill Run	Culvert Exit
O-138	SLR-08	Sawmill Run	Route 130

Appendix C-4 - Table of Obstructions from FEMA FIS Stream Profiles

Obstruction No.	No. on Stream	Stream Name	Obstruction Description/Location
O-139	LKR-01	Leak Run	Railroad
O-140	LKR-02	Leak Run	Old William Penn Highway
O-141	LKR-03	Leak Run	Evergreen Drive
O-142	LKR-04	Leak Run	Private Drive
O-143	NRR-01	North Branch Robinson Run	Private Road
O-144	NRR-02	North Branch Robinson Run	Private Road
O-145	NRR-03	North Branch Robinson Run	Private Road
O-146	NRR-04	North Branch Robinson Run	North Branch Road
O-147	NRR-06	North Branch Robinson Run	Bateman Road
O-148	NRR-07	North Branch Robinson Run	Private Road
O-149	NRR-05	North Branch Robinson Run	Private Road
O-150	TOM-01	Thompson Run	Tri-Borough Expressway
O-151	TOM-02	Thompson Run	Church Street
O-152	TOM-03	Thompson Run	Factory Entrance
O-153	TOM-04	Thompson Run	Jones Street
O-154	TOM-05	Thompson Run	Abandoned Railroad Bridge
O-155	TOM-06	Thompson Run	Buena Vista Road
O-156	TOM-07	Thompson Run	Railroad
O-157	TOM-08	Thompson Run	Mccully Road
O-158	TOM-09	Thompson Run	Leak Run
O-159	TOM-10	Thompson Run	Frey Road
O-160	TOM-11	Thompson Run	Thompson Run Road
O-161	TOM-12	Thompson Run	Railroad
O-162	TRC-01	Turtle Creek	Wall Borough Bridge
O-163	TRC-02	Turtle Creek	Railroad
O-164	TRC-03	Turtle Creek	Dam
O-165	TRC-04	Turtle Creek	Railroad
O-166	CKR-01	Crooked Run	State Route 148 - Fifth Ave
O-167	CKR-02	Crooked Run	Auberle Ave
O-168	CKR-03	Crooked Run	State Route 148 - Fifth Ave
O-169	CKR-04	Crooked Run	Private Drive
O-170	CKR-05	Crooked Run	Arcaninia St
O-171	CKR-06	Crooked Run	Residence
O-172	CKR-07	Crooked Run	Private Drive
O-173	CKR-08	Crooked Run	Private Drive
O-174	CKR-09	Crooked Run	Private Drive
O-175	CKR-10	Crooked Run	Private Drive
O-176	CKR-11	Crooked Run	Private Drive
O-177	CKR-12	Crooked Run	Private Drive
O-178	CKR-13	Crooked Run	Private Drive
O-179	CKR-14	Crooked Run	Private Drive
O-180	CRR-01	Crouse Run	Royal View Drive
O-181	CRR-02	Crouse Run	South Pioneer Road
O-182	CRR-03	Crouse Run	Private Drive
O-183	CRR-04	Crouse Run	Private Drive
O-184	CRR-05	Crouse Run	South Pioneer Road

Appendix C-4 - Table of Obstructions from FEMA FIS Stream Profiles

Obstruction No.	No. on Stream	Stream Name	Obstruction Description/Location
O-185	CRR-06	Crouse Run	Private Drive
O-186	CRR-07	Crouse Run	Private Drive
O-187	CRT-01	Crouse Run Tributary	Hickory Drive
O-188	DRC-01	Deer Creek	State Route 910
O-189	DRC-02	Deer Creek	Caitlin Drive
O-190	DRC-03	Deer Creek	State Route 910
O-191	DRC-04	Deer Creek	State Route 910
O-192	DGR-01	Douglass Run	Scott Hill Road
O-193	DGR-02	Douglass Run	Berdar Drive
O-194	DGR-03	Douglass Run	Douglass Run Road
O-195	DGR-04	Douglass Run	Pine View Drive
O-196	DGR-05	Douglass Run	Private Drive
O-197	DGR-06	Douglass Run	Private Drive
O-198	DGR-07	Douglass Run	Private Drive
O-199	DGR-08	Douglass Run	Long Hollow Road
O-200	DGR-09	Douglass Run	Private Drive
O-201	DGR-10	Douglass Run	Private Drive
O-202	DGR-11	Douglass Run	Private Drive
O-203	DGR-12	Douglass Run	Long Hollow Road
O-204	DGR-13	Douglass Run	State Route 136
O-205	DGR-14	Douglass Run	Private Drive
O-206	ETR-01	East Thompson Run	Northern Pike
O-207	ETR-02	East Thompson Run	U.S. Route 22
O-208	ETR-03	East Thompson Run	Private Drive
O-209	ETR-04	East Thompson Run	Private Drive
O-210	ETR-05	East Thompson Run	Old William Penn Highway
O-211	ETR-06	East Thompson Run	Old William Penn Highway
O-212	ETR-07	East Thompson Run	Footbridge
O-213	ETR-08	East Thompson Run	Footbridge
O-214	ETR-09	East Thompson Run	U.S. Route 22
O-215	FTR-01	Fallen Timber Run	State Route 51 Hayden Boulevard
O-216	FTR-02	Fallen Timber Run	State Route 51 Hayden Boulevard
O-217	FTR-03	Fallen Timber Run	Private Drive
O-218	FTR-04	Fallen Timber Run	Private Drive
O-219	GEO-01	Georges Run	State Route Washing Avenue
O-220	GEO-02	Georges Run	Charles Drive
O-221	GEO-03	Georges Run	Hope Hollow Road
O-222	GIL-01	Gillespie Run	Private Drive
O-223	GIL-02	Gillespie Run	Private Drive
O-224	GIL-03	Gillespie Run	Private Drive
O-225	GIL-04	Gillespie Run	Private Drive
O-226	GIL-05	Gillespie Run	Private Drive
O-227	GIL-06	Gillespie Run	Pine View Drive
O-228	GIL-07	Gillespie Run	Private Drive
O-229	GIL-08	Gillespie Run	Private Drive
O-230	GIL-09	Gillespie Run	Private Drive

Appendix C-4 - Table of Obstructions from FEMA FIS Stream Profiles

Obstruction No.	No. on Stream	Stream Name	Obstruction Description/Location
O-231	GIL-10	Gillespie Run	Private Drive
O-232	GIL-11	Gillespie Run	Private Drive
O-233	GIL-12	Gillespie Run	Private Drive
O-234	GIL-13	Gillespie Run	Private Drive
O-235	GIL-14	Gillespie Run	Private Drive
O-236	GIL-15	Gillespie Run	Private Drive
O-237	GIL-16	Gillespie Run	Private Drive
O-238	GTR-01	Girtys Run	Grant Avenue
O-239	GTR-02	Girtys Run	Sheridan Street
O-240	GTR-03	Girtys Run	Footbridge
O-241	GTR-04	Girtys Run	Sheridan Street
O-242	GTR-05	Girtys Run	Footbridge
O-243	GTR-06	Girtys Run	Sedgwick Street
O-244	GTR-07	Girtys Run	Lincoln Avenue
O-245	GTR-08	Girtys Run	Klopfer Street
O-246	GTR-09	Girtys Run	North Avenue
O-247	GTR-10	Girtys Run	North Avenue
O-248	GTR-11	Girtys Run	Footbridge
O-249	GTR-12	Girtys Run	Evergreen Avenue
O-250	GTR-13	Girtys Run	North Avenue
O-251	GTR-14	Girtys Run	Evergreen Avenue
O-252	GTR-15	Girtys Run	Marvin Street
O-253	GTR-16	Girtys Run	Evergreen Avenue
O-254	GTR-17	Girtys Run	Babcock Boulevard
O-255	GTR-18	Girtys Run	Babcock Boulevard
O-256	GTR-19	Girtys Run	Babcock Boulevard
O-257	GTR-20	Girtys Run	Dravo Street Extension
O-258	GTR-21	Girtys Run	Private Drive
O-259	GTR-22	Girtys Run	Babcock Boulevard
O-260	GTR-23	Girtys Run	Bridge
O-261	GTR-14	Girtys Run	Gvergreen Road Bridge
O-262	GTR-25	Girtys Run	Babcock Boulevard
O-263	GTR-26	Girtys Run	Babcock Boulevard
O-264	GTR-27	Girtys Run	Babcock Boulevard
O-265	GTR-28	Girtys Run	Building
O-266	GTR-29	Girtys Run	Confluence Rochester Run
O-267	GTR-30	Girtys Run	Private Bridge
O-268	GTR-31	Girtys Run	Private Bridge
O-269	GTR-32	Girtys Run	Private Bridge
O-270	GTR-33	Girtys Run	Building
O-271	GTR-34	Girtys Run	Building
O-272	GTR-35	Girtys Run	Building
O-273	GTR-36	Girtys Run	Private Bridge
O-274	GTR-37	Girtys Run	Footbridge
O-275	GTR-38	Girtys Run	Bernice Street
O-276	GTR-39	Girtys Run	Footbridge

Appendix C-4 - Table of Obstructions from FEMA FIS Stream Profiles

Obstruction No.	No. on Stream	Stream Name	Obstruction Description/Location
O-277	GTR-40	Girtys Run	Footbridge
O-278	GTR-41	Girtys Run	Building
O-279	GTR-42	Girtys Run	Building
O-280	GTR-43	Girtys Run	Culvert
O-281	GTR-44	Girtys Run	Three Degree Road
O-282	GHR-01	Gourdhead Run	Duncan Avenue
O-283	GHR-02	Gourdhead Run	Private Drive
O-284	GHR-03	Gourdhead Run	Old State Route 8
O-285	GHR-04	Gourdhead Run	Clearview Road
O-286	GHR-05	Gourdhead Run	Lee Drive
O-287	GHR-06	Gourdhead Run	Harts Run Road
O-288	GSR-01	Graesers Run	Harts Run Road
O-289	GSR-02	Graesers Run	Brookside Boulevard
O-290	HHR-01	Happy Hollow Run	Lovedale Road
O-291	HHR-02	Happy Hollow Run	Private Road
O-292	HHR-03	Happy Hollow Run	Sportsmans Club Road
O-293	HHR-04	Happy Hollow Run	Private Road
O-294	HTR-01	Harts Run	Private Drive
O-295	HTR-02	Harts Run	Private Road
O-296	HTR-03	Harts Run	Clearview Road
O-297	HTR-04	Harts Run	Harts Run Road
O-298	HMR-01	Hoffman Run	Private Drive
O-299	HMR-02	Hoffman Run	Private Drive
O-300	HMR-03	Hoffman Run	Private Drive
O-301	HMR-04	Hoffman Run	Private Drive
O-302	HMR-05	Hoffman Run	Culvert
O-303	HMR-06	Hoffman Run	Private Drive
O-304	HMR-07	Hoffman Run	Walter Avenue
O-305	HMR-08	Hoffman Run	Otto Street
O-306	HMM-01	Humms Run	Pine Valley Drive
O-307	HMM-02	Humms Run	State Route 286
O-308	HMM-03	Humms Run	Cape Cod Drive
O-309	HMM-04	Humms Run	South Duane Drive
O-310	HMM-05	Humms Run	State Road 286
O-311	HMM-06	Humms Run	Culvert
O-312	JKR-01	Jacks Run	Private Drive
O-313	LWR-01	Lewis Run	Old Clairton Road
O-314	LWR-02	Lewis Run	Lewis Run Road
O-315	LWR-03	Lewis Run	State Route 51
O-316	LWR-04	Lewis Run	lewis Run Road
O-317	LWR-05	Lewis Run	State Route 51
O-318	LWR-06	Lewis Run	Private Drive
O-319	LWR-07	Lewis Run	Private Drive
O-320	LWR-08	Lewis Run	Private Drive
O-321	LWR-09	Lewis Run	State Route 51
O-322	LWR-10	Lewis Run	Private Drive

Appendix C-4 - Table of Obstructions from FEMA FIS Stream Profiles

Obstruction No.	No. on Stream	Stream Name	Obstruction Description/Location
O-323	LWR-11	Lewis Run	Person Drive
O-324	LWR-12	Lewis Run	State Route 51
O-325	LWR-13	Lewis Run	Parking Area
O-326	LWR-14	Lewis Run	Parking Area
O-327	LWR-15	Lewis Run	State Route 51
O-328	LWR-16	Lewis Run	Parking Area
O-329	LWR-17	Lewis Run	Coal Valley Road
O-330	LWR-18	Lewis Run	Private Drive
O-331	LKR-01	Lick Run	Railroad
O-332	LKR-02	Lick Run	Wallace Road
O-333	LKR-03	Lick Run	Private Drive
O-334	LKR-04	Lick Run	Mcelheny Road
O-335	LKR-05	Lick Run	Private Drive
O-336	LKR-06	Lick Run	Railroad
O-337	LKR-07	Lick Run	Railroad
O-338	LKR-08	Lick Run	Wilson Road
O-339	LKR-09	Lick Run	Cochran Mill Road
O-340	LKR-10	Lick Run	Hough Drive
O-341	LKR-11	Lick Run	Curry Hollow Road
O-342	LKR-12	Lick Run	Railroad
O-343	LKR-13	Lick Run	Horning Road
O-344	LKR-14	Lick Run	Mcannulty Road
O-345	LBC-01	Little Bull Creek	Pleasantville Road
O-346	LDC-01	Little Deer Creek	Railroad
O-347	LDC-02	Little Deer Creek	Rich Hill Road
O-348	LDC-03	Little Deer Creek	Access Road
O-349	LDC-04	Little Deer Creek	Railroad
O-350	LPE-07	Little Deer Creek	Mckrell Road
O-351	LDC-08	Little Deer Creek	Railroad
O-352	LDC-09	Little Deer Creek	Private Road
O-353	LPE-01	Little Pine Creek East	Kay Street
O-354	LPE-02	Little Pine Creek East	Private Drive
O-355	LPE-03	Little Pine Creek East	Saxonburg Boulevard
O-356	LPE-04	Little Pine Creek East	Private Drive
O-357	LPE-05	Little Pine Creek East	Saxonburg Boulevard
O-358	LPE-06	Little Pine Creek East	Private Drive
O-359	LPE-07	Little Pine Creek East	Private Drive
O-360	LPE-08	Little Pine Creek East	Private Drive
O-361	LPE-09	Little Pine Creek East	Private Drive
O-362	LPE-10	Little Pine Creek East	Brown's Hill Road
O-363	LPE-11	Little Pine Creek East	Private Drive
O-364	LPE-12	Little Pine Creek East	Private Drive
O-365	LPE-13	Little Pine Creek East	Saxonburg Boulevard
O-366	LPE-14	Little Pine Creek East	Klein Road
O-367	LPE-15	Little Pine Creek East	Dressel Land
O-368	LPW-01	Little Pine Creek West	Dewey Street

Appendix C-4 - Table of Obstructions from FEMA FIS Stream Profiles

Obstruction No.	No. on Stream	Stream Name	Obstruction Description/Location
O-369	LPW-02	Little Pine Creek West	Greely Avenue
O-370	LPW-03	Little Pine Creek West	Little Pine Creek Road
O-371	LPW-04	Little Pine Creek West	Little Pine Creek Road
O-372	LPW-05	Little Pine Creek West	Little Pine Creek Road
O-373	LPW-06	Little Pine Creek West	Private Drive
O-374	LPW-07	Little Pine Creek West	Little Pine Creek Road
O-375	LPW-08	Little Pine Creek West	Wetzel Road
O-376	LPW-09	Little Pine Creek West	Mcelheny Road
O-377	LPW-10	Little Pine Creek West	Vilsack Road
O-378	LPW-11	Little Pine Creek West	Substation Drive
O-379	LPW-12	Little Pine Creek West	Sutter Road
O-380	LPW-13	Little Pine Creek West	Thompson Run Road
O-381	LPW-14	Little Pine Creek West	Mcintyre Road
O-382	LPW-15	Little Pine Creek West	Private Drive
O-383	LPW-16	Little Pine Creek West	Brittany Place
O-384	LPW-17	Little Pine Creek West	Hazlett Road
O-385	LPW-18	Little Pine Creek West	Remington Drive
O-386	LPW-19	Little Pine Creek West	Winchester Drive
O-387	LPW-20	Little Pine Creek West	Private Drive
O-388	LPW-21	Little Pine Creek West	Babcock Boulevard
O-389	LPC-01	Little Plum Creek	Confluence With Plum Creek
O-390	LPC-02	Little Plum Creek	New Texas Road
O-391	LBR-01	Lobbs Run	State Street
O-392	LBR-02	Lobbs Run	Walton Road
O-393	LBR-03	Lobbs Run	Private Drive
O-394	LBR-04	Lobbs Run	Walton Road
O-395	LBR-05	Lobbs Run	Walton Road
O-396	LBR-06	Lobbs Run	Private Drive
O-397	LBR-07	Lobbs Run	Walton Road
O-398	LGR-01	Long Run	Shopping Center Drive
O-399	LGR-02	Long Run	Lincoln Road
O-400	LGR-03	Long Run	Lincoln Road
O-401	LGR-04	Long Run	Oakview
O-402	LGR-05	Long Run	Private Drive
O-403	LGR-06	Long Run	Mystic Hills Road
O-404	LGR-07	Long Run	Private Drive
O-405	LGR-08	Long Run	Private Drive
O-406	LGR-09	Long Run	Private Drive
O-407	LGR-10	Long Run	Rankin Road
O-408	LGR-11	Long Run	Private Drive
O-409	LGR-12	Long Run	Private Drive
O-410	LGR-13	Long Run	Private Drive
O-411	LGR-14	Long Run	Private Drive
O-412	LGR-15	Long Run	Coulterville Road
O-413	LWR-01	Lowries Run	Private Bridge
O-414	LWR-02	Lowries Run	Private Bridge

Appendix C-4 - Table of Obstructions from FEMA FIS Stream Profiles

Obstruction No.	No. on Stream	Stream Name	Obstruction Description/Location
O-415	LWR-03	Lowries Run	Gibson Street
O-416	LWR-04	Lowries Run	Private Road
O-417	LWR-05	Lowries Run	Private Drive
O-418	LWR-06	Lowries Run	Glen Road
O-419	LWR-07	Lowries Run	Josephs Lane
O-420	LWR-08	Lowries Run	Interstate 279
O-421	LWR-09	Lowries Run	Wood Plank Bridge
O-422	LWR-10	Lowries Run	Lowries Run Road
O-423	LWR-11	Lowries Run	Reiss Run Road
O-424	LWR-12	Lowries Run	Private Road
O-425	LWR-13	Lowries Run	Private Road
O-426	LWR-14	Lowries Run	Private Road
O-427	LWR-15	Lowries Run	Rochester Road
O-428	LWR-16	Lowries Run	Private Drive
O-429	LWR-17	Lowries Run	Sloop Road
O-430	LWR-18	Lowries Run	Private Drive
O-431	MCR-01	McCaslin Run	Hillcrest Farm Road
O-432	MCR-02	McCaslin Run	Private Drive
O-433	MCR-03	McCaslin Run	Private Culvert
O-434	MCC-01	McClarens Run	White Swan Amusement Park
O-435	MCC-02	McClarens Run	Hilton Inn Drive
O-436	MLR-01	McLaughlin Run	Commercial Street and Railroad
O-437	MLR-02	McLaughlin Run	Bridgeville Road
O-438	MLR-03	McLaughlin Run	Baldwin Road
O-439	MLR-04	McLaughlin Run	McLaughlin Run Road
O-440	MLR-05	McLaughlin Run	Private Bridge
O-441	MLR-06	McLaughlin Run	McLaughlin Run Road
O-442	MLR-07	McLaughlin Run	McLaughlin Run Road
O-443	MLR-08	McLaughlin Run	Private Drive
O-444	MLR-09	McLaughlin Run	Lesnett Road
O-445	MLR-10	McLaughlin Run	Morrow Road
O-446	MLR-11	McLaughlin Run	Access Road
O-447	MLR-12	McLaughlin Run	Foot Bridge
O-448	MLR-13	McLaughlin Run	Foot Bridge
O-449	MLR-14	McLaughlin Run	Foot Bridge
O-450	MLR-15	McLaughlin Run	Ramp to US Route 19
O-451	MLR-16	McLaughlin Run	Ramp to US Route 19
O-452	MLR-17	McLaughlin Run	Foot Bridge
O-453	MLR-18	McLaughlin Run	Bethel Church Road
O-454	MLR-01	Millers Run	Millers Run Road
O-455	MLR-02	Millers Run	Railroad Abandoned
O-456	MLR-03	Millers Run	Millers Run Road
O-457	MLR-04	Millers Run	Morgan Hollow Road
O-458	MLR-05	Millers Run	State Route 978
O-459	MLR-06	Millers Run	State Route 50
O-460	MLR-07	Millers Run	Parks Road

Appendix C-4 - Table of Obstructions from FEMA FIS Stream Profiles

Obstruction No.	No. on Stream	Stream Name	Obstruction Description/Location
O-461	MLR-08	Millers Run	State Route 50
O-462	MON-01	Monongahela River	Lock and Dam No 2
O-463	MON-02	Monongahela River	Lock and Dam No 3
O-464	MTR-11	Montour Run	Railroad
O-465	MTR-12	Montour Run	Railroad
O-466	MTR-13	Montour Run	Enlow Road
O-467	MTR-14	Montour Run	California Holloe Road
O-468	MTR-15	Montour Run	Railroad
O-469	MTR-16	Montour Run	School House Row
O-470	MTR-17	Montour Run	Railroad
O-471	MTR-18	Montour Run	Abandoned Bridge
O-472	MTR-06	Montour Run	Scott Road
O-473	MTR-07	Montour Run	Private Drive
O-474	MTR-08	Montour Run	Cliff Mine Road
O-475	MTR-09	Montour Run	Cliff Mine Road
O-476	MTR-10	Montour Run	Railroad
O-477	MTR-01	Montour Run	Railroad
O-478	MTR-02	Montour Run	Hassam Road
O-479	MTR-03	Montour Run	Hickman Road
O-480	MTR-04	Montour Run	Railroad
O-481	MTR-05	Montour Run	Park Manor Boulevard
O-482	MNR-01	Moon Run	Instate Route 79 Culvert
O-483	MNR-02	Moon Run	State Routes 51 and 50
O-484	NFR-01	North Fork Montour Run	Robinson Road
O-485	NFR-02	North Fork Montour Run	Culvert
O-486	NFR-03	North Fork Montour Run	Culvert
O-487	NFR-04	North Fork Montour Run	Access Road
O-488	NFR-05	North Fork Montour Run	Culvert
O-489	NFR-06	North Fork Montour Run	Access Road
O-490	ORB-01	Ohio River Back Channel	Emsworth Back Channel Dam
O-491	PTR-01	Painters Run	Bower Hill Road
O-492	PTR-02	Painters Run	Painters Run Road
O-493	PRC-01	Peters Creek	State Route 51
O-494	PRC-02	Peters Creek	Private Drive
O-495	PRC-03	Peters Creek	Gill Hall Road
O-496	PRC-04	Peters Creek	Snowden Road
O-497	PRC-05	Peters Creek	Railroad
O-498	PHR-01	Pidgeon Hollow Run	Yates Street
O-499	PHR-02	Pidgeon Hollow Run	Smithfield Street
O-500	PHR-03	Pidgeon Hollow Run	Private Drive
O-501	PHR-01	Pidgeon Hollow Run	Private Drive
O-502	PNC-01	Pine Creek	Railroad
O-503	PNC-02	Pine Creek	Pine Street
O-504	PNC-03	Pine Creek	Crescent Street
O-505	PNC-04	Pine Creek	Grant Avenue
O-506	PNC-05	Pine Creek	East Pennview Street

Appendix C-4 - Table of Obstructions from FEMA FIS Stream Profiles

Obstruction No.	No. on Stream	Stream Name	Obstruction Description/Location
O-507	PNC-06	Pine Creek	Spencer Lane
O-508	PNC-07	Pine Creek	State Route 8
O-509	PNC-08	Pine Creek	Butler Plank Road
O-510	PNC-09	Pine Creek	Private Drive
O-511	PNC-10	Pine Creek	Railroad
O-512	PNC-11	Pine Creek	State Route 8
O-513	PNC-12	Pine Creek	Burchfield Road
O-514	PNC-13	Pine Creek	Elfinwild Road
O-515	PNC-14	Pine Creek	Private Drive
O-516	PNC-15	Pine Creek	-Mounr Royal Boulevard
O-517	PNC-16	Pine Creek	Railroad
O-518	PNC-17	Pine Creek	Railroad
O-519	PNC-18	Pine Creek	Confluence of Crouse Run
O-520	PNC-19	Pine Creek	Railroad
O-521	PNC-20	Pine Creek	Abandoned Railroad
O-522	PNC-21	Pine Creek	Private Drive
O-523	PNC-22	Pine Creek	Kummer Road
O-524	PNC-23	Pine Creek	Grubbs Road
O-525	PNC-24	Pine Creek	Powers Drive
O-526	PNC-25	Pine Creek	Footbridge
O-527	PNC-26	Pine Creek	Blazier Drive
O-528	PNC-27	Pine Creek	U.S. route 19
O-529	PNC-28	Pine Creek	Pine Creek Road
O-530	PNC-29	Pine Creek	Oak Ridge Drive
O-531	PNC-30	Pine Creek	Private Drive
O-532	PNC-31	Pine Creek	Meinert Road
O-533	PNC-32	Pine Creek	Private Drive
O-534	PYF-01	Piney Fork	State Route 88
O-535	PYF-02	Piney Fork	Culvert
O-536	PYF-03	Piney Fork	Footbridge
O-537	PYF-04	Piney Fork	Irishtown Road
O-538	PST-01	Pitt Street Tributary	Boston Hollow Road
O-539	PMC-01	Plum Creek	Plum Street
O-540	PMC-02	Plum Creek	Hulton Road
O-541	PMC-03	Plum Creek	Abandoned Railroad
O-542	PMC-04	Plum Creek	Steurnagel Lane
O-543	PMC-05	Plum Creek	Boda Road
O-544	PMC-06	Plum Creek	Milltown Road
O-545	PMC-07	Plum Creek	Mary Street
O-546	PMC-08	Plum Creek	Railroad
O-547	PMC-09	Plum Creek	Universal Road
O-548	PMC-10	Plum Creek	Interstate Route 79
O-549	PMC-11	Plum Creek	Millers Lane
O-550	PMC-12	Plum Creek	Anderson Avenue
O-551	PMC-13	Plum Creek	State Route 380
O-552	PKC-01	Pucketa Creek	Columbia Road

Appendix C-4 - Table of Obstructions from FEMA FIS Stream Profiles

Obstruction No.	No. on Stream	Stream Name	Obstruction Description/Location
O-553	PKC-02	Pucketa Creek	Crystal Drive
O-554	PKC-03	Pucketa Creek	Greensburg Road
O-555	PKC-04	Pucketa Creek	Alta Drive
O-556	PKC-05	Pucketa Creek	Old Leechburg Road
O-557	PKC-06	Pucketa Creek	Private Drive
O-558	SDC-01	Sandy Creek	Private Drive
O-559	SDC-02	Sandy Creek	Bon-Air Products Inc Building
O-560	SDC-03	Sandy Creek	Private Drive
O-561	SDC-04	Sandy Creek	State Route 130
O-562	SDC-05	Sandy Creek	Verona Road
O-563	SMR-11	Saw Mill Run	Armory Bridge
O-564	SMR-12	Saw Mill Run	Interval Street
O-565	SMR-13	Saw Mill Run	Edgebrook Avenue
O-566	SMR-14	Saw Mill Run	State Route 51
O-567	SMR-15	Saw Mill Run	Midwood Avenue
O-568	SMR-16	Saw Mill Run	Footbridge
O-569	SMR-17	Saw Mill Run	Access Road
O-570	SMR-18	Saw Mill Run	Footbridge
O-571	SMR-19	Saw Mill Run	Confluence of Weyman Run
O-572	SMR-20	Saw Mill Run	State Route 88
O-573	SMR-21	Saw Mill Run	McNeil Road
O-574	SMR-22	Saw Mill Run	Foot Bridge
O-575	SMR-01	Saw Mill Run	Traffic Circle and Railroad
O-576	SMR-02	Saw Mill Run	Pittsburgh Trucking lines Building
O-577	SMR-03	Saw Mill Run	Independence Street
O-578	SMR-04	Saw Mill Run	Shaler Street
O-579	SMR-05	Saw Mill Run	Ramps to Penn Lincoln Parkway
O-580	SMR-06	Saw Mill Run	Penn Lincoln Parkway
O-581	SMR-07	Saw Mill Run	Crane Avenue
O-582	SMR-08	Saw Mill Run	Private Drive
O-583	SMR-09	Saw Mill Run	Port Authority Transit Bridge
O-584	SMR-10	Saw Mill Run	U.S. Route 19 truck Route
O-585	SGR-01	Scrubgrass Run	Railroad
O-586	SGR-02	Scrubgrass Run	Green Tree Road
O-587	SGR-03	Scrubgrass Run	Railroad
O-588	SGR-04	Scrubgrass Run	Old Scrubgrass Road
O-589	SGR-05	Scrubgrass Run	Private Drive
O-590	SGR-06	Scrubgrass Run	Private Drive
O-591	SGR-07	Scrubgrass Run	Old Scrubgrass Road
O-592	SGR-08	Scrubgrass Run	Old Scrubgrass Road
O-593	SGR-09	Scrubgrass Run	Private Drive
O-594	SGR-10	Scrubgrass Run	Private Drive
O-595	SFM-01	South Fork Montour Run	Santiago Road
O-596	SPR-01	Spring Garden Run	Spring Garden Avenue
O-597	SPR-02	Spring Garden Run	Spring Garden Avenue
O-598	SPR-03	Spring Garden Run	Private Drive

Appendix C-4 - Table of Obstructions from FEMA FIS Stream Profiles

Obstruction No.	No. on Stream	Stream Name	Obstruction Description/Location
O-599	SPR-04	Spring Garden Run	Private Drive
O-600	SPR-05	Spring Garden Run	Ramage Road
O-601	SQR-01	Squaw Run	Fox Chaple Road
O-602	SQR-02	Squaw Run	Field Club Road
O-603	SQR-03	Squaw Run	Squaw Run Road East
O-604	SQR-04	Squaw Run	Squaw Run Road East
O-605	SQR-05	Squaw Run	Foot Bridge
O-606	SQR-06	Squaw Run	Old Mill Road
O-607	SQR-07	Squaw Run	Private Drive
O-608	SQR-08	Squaw Run	Private Drive
O-609	SQR-09	Squaw Run	Private Drive
O-610	SQR-10	Squaw Run	Private Drive
O-611	SQR-11	Squaw Run	Private Drive
O-612	SQR-12	Squaw Run	Dam
O-613	SQR-13	Squaw Run	Willow Run Road
O-614	SRT-01	Squaw Run Tributary No. 1	Abandoned Bridge
O-615	SSR-01	Streets Run	Streets Run Road
O-616	SSR-02	Streets Run	Confluence of tributary no.e to
O-617	SSR-03	Streets Run	Railroad
O-618	SSR-04	Streets Run	Streets Run Road
O-619	SSR-05	Streets Run	Railroad
O-620	SSR-06	Streets Run	Doyle Road
O-621	TPF-01	Tributary 1 To Piney Fork	Library Road
O-622	TPF-02	Tributary 1 To Piney Fork	Allegheny County Port Authority Right
O-623	TPF-03	Tributary 1 To Piney Fork	Foot Bridge
O-624	TPF-04	Tributary 1 To Piney Fork	Beagle Drive
O-625	TPF-05	Tributary 1 To Piney Fork	Allegheny County Port Authority Right
O-626	TPF-06	Tributary 1 To Piney Fork	West Kings School Road
O-627	TBC-01	Tributary To Bull Creek	Bull Creek Road
O-628	MSB-01	Unnamed Stream Along Moss Side Blvd.	Broadway Boulevard State Route 130
O-629	MSB-02	Unnamed Stream Along Moss Side Blvd.	Private Drive
O-630	WBC-01	West Branch Deer Creek	Private Drive
O-631	WBC-02	West Branch Deer Creek	Confluence With Deer creek
O-632	WKR-01	Whiskey Run	Private Drive
O-633	WKR-02	Whiskey Run	Private Drive
O-634	WKR-03	Whiskey Run	State Route 121
O-635	WKR-04	Whiskey Run	Bell Road
O-636	WKR-05	Whiskey Run	Trumbull Drive
O-637	WKR-06	Whiskey Run	US Routes 22 and 30
O-638	WKR-07	Whiskey Run	Private Drive
O-639	WCT-01	Wildcat Run	Buena Vista Road
O-640	WCT-02	Wildcat Run	Buena Vista Road
O-641	WCT-03	Wildcat Run	Private Drive
O-642	WCT-04	Wildcat Run	Private Drive
O-643	WCT-05	Wildcat Run	Private Drive
O-644	WCT-06	Wildcat Run	Private Drive

Appendix C-4 - Table of Obstructions from FEMA FIS Stream Profiles

Obstruction No.	No. on Stream	Stream Name	Obstruction Description/Location
O-645	WCT-07	Wildcat Run	Private Drive
O-646	WCT-08	Wildcat Run	Private Drive
O-647	WCT-09	Wildcat Run	Foot Bridge
O-648	WCT-10	Wildcat Run	Private Drive
O-649	WCT-11	Wildcat Run	Private Drive
O-650	WCT-12	Wildcat Run	Private Drive
O-651	WYR-01	Wylie Run	Lovedale Road
O-652	WYR-02	Wylie Run	Private Drive
O-653	WYR-03	Wylie Run	Private Drive
O-654	WYR-04	Wylie Run	Lovedale Road
O-655	WYR-05	Wylie Run	Jacktown Road
O-656	LDC-05	Little Deer Creek	Railroad
O-657	LPE-06	Little Deer Creek	Main Street

APPENDIX D

PUBLIC INVOLVEMENT

APPENDIX D-1

Watershed Plan Advisory Committee (WPAC) #1
November 19, 2012 Meeting

COUNTY OF ALLEGHENY
RICH FITZGERALD
COUNTY EXECUTIVE

Watershed Plan Advisory Committee (WPAC)
Meeting No. 1

Welcome & Introductions

1. Act 167 Overview

2. Role of the Watershed Plan Advisory Committee (WPAC)

3. Background for the Allegheny County Act 167 Coordination with other Plans

4. Scope of Work
    a. Phase I – Initial Assessment
    b. Phase II – Stormwater Management Plan Study and Plan

5. Review of Municipal Survey Results

6. Open Discussion on Stormwater Problems

7. Schedule/Timeline

Questions

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Allegheny County Stormwater Management Plan
Watershed Plan Advisory Committee Meeting Minutes
Committee Meeting #1
November 19, 2012

Attendees
A list of attendees is provided as an attachment to these minutes.

Welcome and Introduction
Rich Fitzgerald, Allegheny County Executive, welcomed everybody in attendance. He emphasized that there is a need for homeowners, developers, and municipalities to work together to develop a plan for stormwater management. He introduced the agenda and noted that Phase I – Initial Assessment and Phase II – Stormwater Management Plan Study and Plan will be completed over the course of 3 years.

Act 167 Overview
Chad Davis, Michael Baker Jr. Inc. (Baker), introduced the team members present who are working on the project and presented an overview of Act 167. Paul DeBarry, Newell Tereska and Mackay (NTM) Engineering, Inc., explained the importance of stormwater management and noted that the purpose of the Allegheny County Act 167 Plan is to prevent flooding, prevent stream degradation, and manage stormwater from new and re-development through a stormwater ordinance. Old plans only looked at water quantity but new plans also have to look at water quality through infiltration and pollutant capture. The goals of the plan will be to maintain natural hydrologic regimes, identify and prevent flooding/storm water problems, promote groundwater recharge, minimize stream bank erosion, manage water quality, promote nonstructural stormwater management, identify who is responsible for maintenance of BMPs, and educating the public on stormwater management. Municipal participation during the planning process is key. Phase I of this project is to set up a Watershed Plan Advisory Committee (WPAC), develop GIS mapping, identify problem areas, establish the scope of work, responsibilities, and cost estimate for Phase II, and prepare a report summarizing the activities performed and results of Phase I. Phase II of the project will be the plan preparation and will include GIS database compilation, water quantity/quantity modeling (if needed), development of standards and criteria, and develop a model stormwater ordinance. Once the plan is finalized, adopted by the County, and approved by the Pennsylvania Department of Environmental Protection (PADEP), the municipalities will adopt the ordinance within six months.

Watershed Plan Advisory Committee (WPAC)
Chad Davis described the details regarding the WPAC including the participating organizations and role. He explained that the most important element in the process is the input from the local municipalities.

Questions/Comments
- Chad Davis was asked to speak to the definition of “Best Management Practices”. Chad Davis explained that this is an engineering reference that describes options to be considered in a variety of circumstances. There is a Pennsylvania Stormwater Best Management Practices Manual (BMP Manual) from 2006 that describes these practices.
- This plan will be able to be worked on and built on as needs arise. There was a discussion about the North Hills Council of Governments (NHCOG) and their focus on building a pond in the North Hills. There is a 2008 model ordinance and platform that can be used for all parties to work together.

Existing Act 167 Stormwater Management Plans

Chad Davis spoke about the existing plans including the North Hills, Flaugherty Run, Montour Run, Monongahela River, and Turtle Creek Plans. These plans most likely address water quantity not water quality. It is helpful to use these existing plans to determine what is working and what is not working to improve stormwater management.

Scope of Work

Paul DeBarry outlined the details regarding the Phase I Scope of Work including analyzing watershed characteristics, obtaining existing data, conducting a survey on problem areas (input from WPAC very important for this task), mapping problem areas (these will be color coded so that the cause of the problems will be illustrated in relation to the problem locations), developing the Phase II scope of work and cost estimate, and obtaining WPAC input. Phase I will be ongoing from now through May 2013. He explained that it is important to identify problem areas so that they can be further investigated to better develop solutions. He showed slides depicting stormwater management practices that can be employed depending on the needs of the situation. He explained that the Phase II Scope of Work is expected to be divided into five tasks including Data Collection and Analysis, Technical Analysis, Problem Areas and Obstructions, Public/Municipal Participation through WPAC, and the preparation of the Phase II Report. For Task 1, forms will be developed to collect the data on problem areas and then engineering calculations will be done to develop solutions based on the BMP Manual. Task 2 will include detailed hydrologic modeling if/where needed to evaluate water quality, peak flow, stream stability and groundwater recharge and to develop a management strategy. A map of obstructions and problem areas will be prepared under Task 3 and conceptual solutions will be provided in the plan based on the BMP Manual. Technical standards and criteria, and cost estimates for the problem area solutions will be prepared under Task 3. Chad Davis concluded with a discussion of the public participation that will be conducted through the WPAC under Task 4. Task 5 will be the preparation of the draft report, municipal review, and finalization of the report.

Questions/Comments

- There was a question raised about areas where pollutants from parking areas are draining to wetlands; more specifically, who is responsible for maintaining the wetlands. Chad Davis explained that the property owner is responsible and can use it as an educational opportunity as this example was located at a school.

Municipal Survey Results

Chad Davis explained that the website currently includes the responses for 26 of 130 municipalities. He demonstrated the path to take to respond to the survey. He then showed some results as they stand at this time. He emphasized that if a community is in more than one watershed, they must respond to the survey separately for each watershed. When filling out the survey/map on-line, Chad noted that it is critical that the location point is identified with the same exact nomenclature as the description of the items cannot be linked up in GIS. Chad also noted that if a municipality already has their information in GIS, they can just send that to Chad instead of using the online map. The importance of the WPAC responses was stressed and all municipalities were encouraged to participate.

Open Discussion

- Sam Gibson, KLH Engineers, asked if there is a way to delineate stream limits on the web survey. Chad Davis replied that “upstream” and “downstream” limits should be used as input for linear issues. In addition, GIS data could be sent.

- Bob Powers, Town of McCandless, commented about the Shaler/Hampton/Etna concern regarding recent improvements and potential for flood control at North Park Lake.
- Toby Cordek, Town of McCandless, stated that the spillway design for control of North Park Lake was shelved and that it was determined that it should be kept as a recreational lake. He also noted that the project was primarily designed as a US Army Corps of Engineers project.
- Chad Davis commented that there may be other lakes in the County to look at for recreational use and quantity control. Paul DeBarry added that information regarding the existing lakes in Allegheny County can be modeled and that hydrographs can be developed to best manage these resources.
- Mary Ellen Ramage, Etna Borough, stated that she had approached the County regarding the North Park Lake improvements and was told that it cannot be used as quantity control. Chad Davis noted that the existing spillway would need significant improvements, but noted that design and construction was completed for protecting the embankment for flows that overtop the dam.
- There was a comment to encourage the use of cisterns to collect and reuse water.
- John Rusnak, Bellevue Borough's engineer from HRG, commented that this plan will not solve all stormwater problems immediately. Chad Davis added that it will take time to make the plan successful. Paul DeBarry stated that new development and redevelopment projects both need to address stormwater. He explained that the ordinance will require six months for PADEP approval, will include identification of problem areas, and will be up to municipalities to correct what they can in these problem areas. It is unlikely that an immediate resolution to this problem will be implemented at this time.
- Mary Ellen Ramage, Etna Borough, asked if this will be a requirement for every municipality and who will enforce this. Paul DeBarry answered that DEP funded the Act 167 Plans years ago. While the program is presently unfunded at the DEP level, the state still requires that the plan be consistent with the Act. In the past, the state could hold liquid fuel funds from the local municipalities if they are not in compliance.
- Toby Cordek, Town of McCandless, commented that stormwater management techniques have changed and McCandless has made changes to their ordinances to reflect these over time.
- Bob Hurley, Allegheny County Economic Development, commented that the Allegheny County 167 Plan takes precedence if a municipality does not have a stormwater ordinance. Paul DeBarry added that PADEP will be reviewing and approving the Act 167 Plans before they would be adopted.
- A question was asked regarding those municipalities that border other counties given that Beaver and Butler Counties are working on their own Act 167 Plans. Chad Davis added that the current project focus is only on Allegheny County given the plan is being funded by Allegheny County but the plan will account for water that flows into Allegheny County from other counties.

The meeting was adjourned.

Region 2: Watershed Plan Advisory Committee (WPAC)

November 19, 2012

Representing	Name	Title	Phone	Email
Fox Chapel Borough	Mr. Gary Koehler	Manager		
Franklin Park Borough	Ms. Ambrose Rocca	Manager		
Frazer Township	Ms. Lori Ziencik	Secretary		
Glen Osborne Borough	Ms. Diane Vierling	Secretary		
Glenfield Borough	Mr. Robert Brown	Manager		
Hampton Township	Mr. W. Christopher Lochner	Manager		
Harmar Township	Ms. Annette Dietz	Secretary/Treasurer		
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Kilbuck Township	Mr. Harry Dilmore	Manager		
Leet Township	Ms. Anna Oswald	Secretary		
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Marshall Township	Mr. Robert Robinson	District Engineer	724-935-3090	r.robinson@twp.marshall.pa.us
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Millvale Borough	Ms. Patty Hachick	Interim Secretary		
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O'Hara Township	Mr. Samuel Gibson	E.I.T/ Project Designer	412-494-0510	sgibson@klhengineers.com
Ohio Township	Mr. John Sullivan, Jr.	Manager		
PA Dep't of Community & Econ. Dev't	Mr. Denny Puko	Planning Program Manager	412-770-1660	
PA Fish & Boat Commission	Mr. Thomas Shetterly	Commissioner	814-445-8974	
PennDOT, District 11-0	Mr. Dan Cessna	District Executive	412-429-5000	
Pennsylvania DEP Southwest Section	Ms. Susan Malone	Regional Director	412-442-4000	
Pennsylvania Environmental Council	Ms. Janie French	Director of Water Programs	412-481-9400	
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Ross Township	Mr. Thomas Lavorini	Manager		
Sewickley Borough	Mr. Kevin Flannery	Manager	412-741-4015	kflannery@sewickleyborough.org
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Twin Rivers Council of Governments	Mr. John Palyo	Executive Director		
US Army Corp of Engineers	Mr. Ryan Fisher	Outreach Coordinator	412-395-7588	ryan.fisher@usace.army.mil
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West View Borough	Mr. Bruce Fromlak	Manager		
Westermoreland County Cons. District	Mr. Greg Phillips	District Manager		
Western PA Conservancy	Mr. Mark Killar	Interim Associate Vice President	412-288-2777	
TOWN OF McCANDLESS	ROGER KREY	COUNCIL	412-366-6341	r.krey@verizon.net
DEP Clean Hz0	Jim Kuncelman	MS4 Coordinator	412 442-4305	JKuncelman@pa.gov
PETE RAHAGE	ETNA	COUNCIL	412-782-1458	ROSIESMOM@VERIZON.NET
John Stephen	Three Rivers Watershed	Exec. Dir.	412-606-7149	john@threeriverswaterkeeper.org

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Aleppo Township	Ms. Gwen Patterson	Manager		
Allegheny County Conservation District	Ms. Donna Simmons	District Manager	412-241-7645	
Allegheny County Council	Mr. James Burn	Councilman		
Allegheny County Council	Mr. Matt Drozd	Councilman		
Allegheny County Council	Ms. Jan Rea	Councilwoman		
Allegheny County Council	Mr. Michael Finnerty	Councilman		
Allegheny County Council	Mr. Nicholas Futules	Councilman		
Allegheny County Dept. of Public Works	Mr. Joeseph Olczak	Director	412-350-4005	
Allegheny County Emergency Services	Mr. Alvin Henderson	Chief	412-473-2621	
Allegheny County Health Department	Mr. Ronald Voorhees	Interim Director	412-578-8008	
Allegheny County Law Department	Mr. Andrew Szefi	County Solicitor	412-350-1120	
Allegheny Valley North Council of Gov.	Mr. Tom Benecki	Executive Director		
Aspinwall Borough	Mr. Ed Warchol	Manager		
Avalon Borough	Mr. Harry Dilmore	Manager		
Beaver County Conservation District	Mr. James Shaner	Executive Director		
Bell Acres Borough	Mr. Chris Abell	Councilman	412-716-4082	cabell717@verizon.net
Bell Acres Borough	Ms. Diane Abell	Planning Commission Member	412-716-4082	dianeabell5146@gmail.com
Bellevue Borough	Mr. Douglas Sample	Manager		
Ben Avon Borough	Ms. Carmella Hallstein	Secretary		
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Cheswick Borough	Mr. Andrew Bock	Secretary		
City of Pittsburgh Dept. of Planning	Ms. Noor Ismail	Director	412-255-2200	
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Edgeworth Borough	Mr. Martin McDaniel	Manager		
Emsworth Borough	Ms. Cathy Jones	Secretary		
Etna Borough	Ms. Mary Ellen Ramage	Secretary/Manager	412-781-0569	meramage@etnaborough.org
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Westermoreland County Cons. District	Mr. Greg Phillips	District Manager		
Western PA Conservancy	Mr. Mark Killar	Interim Associate Vice President	412-288-2777	
Indiana Twp	Dan Tagley	Supv	412-486-0105	
Town of McCandless	William J McKim	Council Member	412-736 2672	wJMcKim@consolidated.net
Town of McCandless	Cindy Potter	McCandless		board@townofmccandless.com

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✓ O'HARA TOWNSHIP	CHARLES STEINERT	TOWNSHIP ENGINEER	412-784-1784 x217	cstein-t@ohara.pa.us
US ARMY CORPS OF ENGR	MARK ZAITSOFF	HYDRAULIC ENGR	412-395-7351	MARK.P.ZAITSOFF@USACE.ARMY.MIL
Bellevue Borough	John Rusnak	Borough Engineer	724-779-4777	jrusnak@hrg-inc.com
PVC Art Gazdik	Art Gazdik	Consultant	412-297-6401	artgazdik@gmail.com
Twp of Hampton	Martin Orban	Land Use Administrator	412-486-0400	Martin.orban@hampton.pa.us
TOWN OF MCCANDLESS	GERARD AUFMAN	COUNCIL	412-364-1814	AUFMAN9629@COMCAST.NET
MILLVALE BOROUGH	JOHN FEDUN	VP COUNCIL	412-606-0532	JOHNWKFEDUN@[illegible]
Town of McCandless	BOB POWERS	PRESIDENT of COUNCIL	412-364-1093	

APPENDIX D-1

Watershed Plan Advisory Committee (WPAC) #1
November 20, 2012 Meeting

COUNTY OF ALLEGHENY
RICH FITZGERALD
COUNTY EXECUTIVE

Watershed Plan Advisory Committee (WPAC)
Meeting No. 1

Welcome & Introductions

1. Act 167 Overview

2. Role of the Watershed Plan Advisory Committee (WPAC)

3. Background for the Allegheny County Act 167 Coordination with other Plans

4. Scope of Work
    a. Phase I – Initial Assessment
    b. Phase II – Stormwater Management Plan Study and Plan

5. Review of Municipal Survey Results

6. Open Discussion on Stormwater Problems

7. Schedule/Timeline

Questions

DENNIS M. DAVIN, DIRECTOR
ALLEGHENY COUNTY ECONOMIC DEVELOPMENT
ONE CHATHAM CENTER • SUITE 900 • 112 WASHINGTON PLACE • PITTSBURGH, PA 15219
PHONE (412) 350-1000 • WWW.ALLEGHENYCOUNTY.US/ECONOMIC/

Allegheny County Stormwater Management Plan
Watershed Plan Advisory Committee Meeting Minutes
Committee Meeting #2
November 20, 2012

Attendees

A list of attendees is provided as an attachment to these minutes.

Welcome and Introduction

Rich Fitzgerald, Allegheny County Executive, welcomed everybody in attendance. He emphasized that there is a need for homeowners, developers, and municipalities to work together to develop a plan for stormwater management throughout Allegheny County. He introduced the agenda and noted that Phase I – Initial Assessment and Phase II – Stormwater Management Plan Study and Plan will be completed over the course of 3 years.

Act 167 Overview

Chad Davis, Michael Baker Jr. Inc. (Baker), introduced the team members present who are working on the project and presented an overview of Act 167. Paul DeBarry, Newell Tereska and Mackay (NTK) Engineering, Inc., explained the importance of stormwater management and noted that the purpose of the Allegheny County Act 167 Plan is to prevent flooding, prevent stream degradation, and manage stormwater from new and re-development through a stormwater ordinance. Old plans only looked at water quantity but new plans also have to look at water quality through infiltration and pollutant capture. The goals of the plan will be to maintain natural hydrologic regimes, identify and prevent flooding/storm water problems, promote groundwater recharge, minimize stream bank erosion, manage water quality, promote nonstructural stormwater management, identify who is responsible for maintenance of BMPs, and educating the public on stormwater management. Municipal participation during the planning process is key. Phase I of this project is to set up a Watershed Plan Advisory Committee (WPAC), develop GIS mapping, identify problem areas, establish the scope of work, responsibilities, and cost estimate for Phase II, and prepare a report summarizing the activities performed and results of Phase I. Phase II of the project will be the plan preparation and will include GIS database compilation, water quantity/quantity modeling (if needed), development of standards and criteria, and develop a model stormwater ordinance. Once the plan is finalized, adopted by the County, and approved by the Pennsylvania Department of Environmental Protection (PADEP), the municipalities will adopt the ordinance within six months.

Questions/Comments

- Brenda Smith, Executive Director Nine Mile Run Watershed Association, asked if "non-structural" approaches included things like the use of permeable pavement to prevent stormwater runoff in the first place. Paul DeBarry answered that permeable pavement will be included as a BMP in the Act 167 Plan, along with numerous BMPs that are identified in the Pennsylvania Stormwater Best Management Practices Manual (BMP Manual). The best BMPs for the specific problems that are identified will be recommended in the Act 167 Plan.
- Brenda Smith, asked if Paul DeBarry knew if the counties that have completed their plans have ordinances that change things like the required amount of parking spaces for commercial developments. For instance, the number of parking spaces required is based on peak shopping times but even during the Christmas shopping season, there are mall parking lots that aren't even half full. Paul answered that this is a good point and that they will identify "faults" in typical existing municipal ordinances and make recommendations that municipalities should review certain ordinances to eliminate these faults.

Watershed Plan Advisory Committee (WPAC)

Chad Davis described the details regarding the WPAC including the participating organizations and role. He explained that the most important element in the process is the input from the local municipalities.

Questions/Comments

- Jeff Silka, Monroeville Municipal Manager, commented that he would like to see the private sector (e.g., building trades) be represented in the WPAC. Currently the private sector is not represented in the WPAC.

Existing Act 167 Stormwater Management Plans

Chad Davis spoke about the existing plans including the North Hills, Flaugherty Run, Montour Run, Monongahela River, and Turtle Creek Plans. These older plans most likely address water quantity not water quality. It is helpful to use these existing plans to determine what is working and what is not working to improve stormwater management.

Scope of Work

Paul DeBarry outlined the details regarding the Phase I Scope of Work including analyzing watershed characteristics, obtaining existing data, conducting a survey on problem areas (input from WPAC very important for this task), mapping problem areas (these will be color coded so that the cause of the problems will be illustrated in relation to the problem locations), developing the Phase II scope of work and cost estimate, and obtaining WPAC input. Phase I will be ongoing from now through May 2013. He explained that it is important to identify problem areas so that they can be further investigated to better develop solutions. He showed slides depicting stormwater management practices that can be employed depending on the needs of the situation. He explained that the Phase II Scope of Work is expected to be divided into five tasks including Data Collection and Analysis, Technical Analysis, Problem Areas and Obstructions, Public/Municipal Participation through WPAC, and the preparation of the Phase II Report. For Task 1, forms will be developed to collect the data on problem areas and then engineering calculations will be done to develop solutions based on the BMP Manual. Task 2 will include detailed hydrologic modeling if/where needed to evaluate water quality, peak flow, stream stability and groundwater recharge and to develop a management strategy. A map of obstructions and problem areas will be prepared under Task 3 and conceptual solutions will be provided in the plan based on the BMP Manual. Technical standards and criteria, and cost estimates for the problem area solutions will be prepared under Task 3. Chad Davis concluded with a discussion of the public participation that will be conducted through the WPAC under Task 4. Task 5 will be the preparation of the draft report, municipal review, and finalization of the report.

Questions/Comments

- Jack Petro, Manager White Oak Borough, commented that this is an “unfunded mandate”. Paul DeBarry answered that this isn’t a mandate. Jack Petro noted that there is good stuff in here that is necessary, but since it may become an unfunded mandate, they would probably have to raise taxes to cover the costs.
- Brenda Smith, Nine Mile Run Watershed Association, asked if the plan will quantify costs that municipalities have already spent to correct problems in the municipalities that have been caused by bad stormwater management to serve as a comparison to the costs of implementing the plan/ordinance. Paul DeBarry said that they could look into doing this.

- Chad Hoover, Chalfant Borough representative, noted that the Turtle Creek Watershed Association has done a lot of studies in the past and that perhaps these studies would be a good source of information for the Act 167 Plan.
- Jack Petro, Manager White Oak Borough, commented that he has been involved in projects regarding blighted areas with three Councils of Governments (COGs) and the structure of the organizations seemed to be an excellent way to go about collecting information. He asked if it would be better to go to each municipality or go to the COGs again. Chad Davis said that they invited the COGs to the WPAC meetings and that there hopefully are conversations between the COGs and municipalities. Chad Davis is open to either source of information as long as it is provided for incorporation into the plan.
- Jack Petro, Manager White Oak Borough, asked if the presentation slides are available. Chad Davis said that the slides are available on the website.

Municipal Survey Results

Chad Davis explained that the website currently includes the responses for 26 of 130 municipalities. He demonstrated the path to take to respond to the survey. He then showed some results as they stand at this time. He emphasized that if a community is in more than one watershed, they must respond to the survey separately for each watershed. When filling out the survey/map on-line, Chad noted that it is critical that the location point is identified with the same exact nomenclature as the description of the items cannot be linked up in GIS. Chad also noted that if a municipality already has their information in GIS, they can just send that to Chad instead of using the online map. The importance of the WPAC responses was stressed and all municipalities were encouraged to participate.

Open Discussion

- Chad Davis opened up the discussion period by asking if the municipal survey results that he presented generally line up with what people are seeing in their municipalities. Chad Hoover, Chalfant Borough representative, said that it depends on where the municipality is located and its size. Chalfant sits on top of a hill so they don't have stormwater issues but other communities that are at the bottom of a watershed do have problems.
- Jack Petro, Manager White Oak Borough, said that he is concerned about how things will be managed in systems where an upstream separated sewer system merges with a downstream combined sewer system. Chad Davis acknowledged that it is a complex situation.
- Chad Hoover, Chalfant Borough, noted that the Nine Mile Run Watershed Association has a lot of information that could be useful for the Act 167 Plan. Brenda Smith, Nine Mile Run Watershed Association, said that since Chad Davis has joined the board of Nine Mile Run, he will have access to all of their information.
- John Palyo, Executive Director Twin Rivers COG, asked a question regarding one of the recommendations on a slide: the term "lower the ground level" was used on a slide depicting improvements to an existing detention basin. He asked if that was equivalent to dredging the stream. Paul DeBarry said that this was not equivalent to dredging but was referring to lowering the bottom of the existing detention basin and not referring to the stream. Bob Venturni, Pennsylvania Fish and Boat Commission, added that they do not recommend dredging in a stream because it destroys the habitat of the stream. Brenda Smith, Nine Mile Run Watershed Association, added that dredging streams is not a long term solution. Chad Davis said that dredging wouldn't be recommended unless it was to remove debris or sediment that was causing a specific problem. Paul DeBarry added that if there is sediment in a stream, there is a reason such as lower slope in the stream and an upstream source like an increase in upstream stream bank erosion from high velocity runoff

from an upstream impervious area. So if the sediment is removed without addressing the cause, dredging is a short term fix because the sediment will return.

- Alvin Henderson, Chief Allegheny County Emergency Services, said that the key to being successful in stormwater management is to reduce the amount of water going into the streams by using green solutions. Paul DeBarry agreed that the closer to the source that stormwater is managed, the more effective it is.
- Jim Pillsbury, Hydraulic Engineer Westmoreland County Conservation District, offered that they have a lot of experience with installing green infrastructure BMPs in Southwestern Pennsylvania. They have found that the soil infiltration issues in this area can be overcome through good design and that the BMPs do not cost as much as you would think. Green infrastructure can be done in Southwestern PA.
- Chad Davis offered that this Act 167 Plan is funded by Allegheny County for Allegheny County problems and solutions. However, other people outside the county can take part in this process to learn/benefit in developing their own stormwater management plans. Chad also noted that there are some watersheds that cross county boundaries and while evaluation of problems/solutions will not be done for areas outside the county, the tributary areas from outside the county will be modeled as needed for evaluation of stormwater in Allegheny County.
- Chad Davis emphasized that the Act 167 Plan won't be a "fix" once it is published as it just identifies problems and solutions; the impact will come from implementation of the ordinance by the municipalities.
- Kay Pierce, Allegheny County Economic Development, offered that if any municipality needs help with the survey, her staff is available to assist.
- John Palyo, Executive Director Twin Rivers COG, asked if there is a way to check on which municipalities have completed the survey. Chad Davis said that all the information is being put into the database and is secure but the information would be available to the COG so that they can work with the municipalities to collect the information and complete the survey if requested. All contacts regarding the information should be made through Chad.

The meeting was adjourned.

Region 3: Watershed Plan Advisory Committee (WPAC)

November 20, 2012

Representing	Name	Title	Phone	Email
ALCOSAN	Ms. Arletta Williams	Executive Director	412-766-4810	
Allegheny County Cons. District	Ms. Donna Simmons	District Manager	412-241-7645	
Allegheny County Council	Mr. John Palmiere	Councilman		
Allegheny County Council	Mr. Nicholas Futules	Councilman		
Allegheny County Council	Dr. Charles Martoni	Councilman		
Allegheny County Council	Mr. Robert Macey	Councilman		
Allegheny County Council	Mr. William Robinson	Councilman	412-350-6490	
Allegheny County Council	Ms. Barbara Danko	Councilwoman	412-350-6490	
Allegheny County Council	Mr. James Ellenbogen	Councilman	412-350-6490	
Allegheny County Council	Ms. Amanda Hawkins	Councilwoman	412-350-6490	
Allegheny County Council	Mr. John DeFazio	Councilman	412-350-6490	
Allegheny County Council	Ms. Heather Heidelbaugh	Councilwoman	412-350-6490	
Allegheny County Dept. of Public Works	Mr. Philip LaMay	Acting Director	412-350-4005	
Allegheny County Emergency Services	Mr. Alvin Henderson	Chief		
Allegheny County Health Department	Mr.Ronald Voorhees	Interim Director	412-578-8008	
Allegheny County Law Department	Mr. Andrew Szefi	County Solicitor	412-350-1120	
Allegheny Valley North Council of Gov.	Mr. Tom Benecki	Executive Director		
Beaver County Conservation District	Mr. James Shaner	Executive Director	724-378-1701	
Braddock Borough	Ms. Maria McCool	Secretary/Manager		
Braddock Hills Borough	Mr. Charles Arthrell	Vice-President of Council	412-600-3979	chuckbhboro@live.com
Butler County Conservation District	Mr. Ronald Fodor	District Manager	724-285-5515	
Chalfant Borough	Ms. Kirsten Schwoegl	Secretary		
Churchill Borough	Mr. Craig Robinson	Manager		
City of McKeesport	Mr. Matthew Gergely	Manager		
City of Pittsburgh Dept. of Planning	Ms. Noor Ismail	Director	412-255-2200	
East McKeesport Borough	Ms. Connie Rosenbayger	Secretary		
East Pittsburgh Borough	Ms. Eileen Navish	Manager		
Edgewood Borough	Mr. Warren Cecconi	Manager		
Elizabeth Borough	Ms. Pam Sharp	Secretary		
Elizabeth Township	Mr. Edmond Reddy	Secretary		
Forest Hills Borough	Mr. Steven Morus	Manager	412-351-7330	manager@foresthillspa.com
Forward Township	Ms. Pam Balogh	Secretary		
Glassport Borough	Ms. Nancy Piazza-Whaby	Secretary		

Region 3: Watershed Plan Advisory Committee (WPAC)

November 20, 2012

Representing	Name	Title	Phone	Email
Liberty Borough	Ms. Debra Helderlein	Secretary		
Lincoln Borough	Ms. Sharon Jageman	Manager		
Municipality of Monroeville	Mr. Greg Erosenko	Mayor	412-818-1584	eroseg@monroeville.pa.us
✓ Municipality of Monroeville	Mr. Jeffrey Silka	Municipal Manager	412-856-3304	silkaj@monroeville.pa.us
Municipality of Penn Hills	Mr. Mohammed Rayan	Manager		
✓ Nine Mile Run Watershed Assoc.	Ms. Brenda Smith	Executive Director	412-371-8779 x 113	brenda@ninemilerun.org
North Braddock Borough	Mr. Douglas Margurlet	Secretary/Manager		
North Versailles Township	Ms. Patricia Logo	Manager		
Oakmont Borough	Mr. Bruce Jamison	Manager		
Office of the County Manager	Mr. William McKain	County Manager	412-350-5300	
PA Dep't of Community & Economic Dev't	Mr. Denny Puko	Planning Program Manager	412-770-1660	
PA Fish & Boat Commission	Mr. Thomas Shetterly	Commissioner	814-445-8974	
PennDOT, District 11-0	Mr. Dan Cessna	District Executive	412-429-5000	
Pennsylvania DEP Southwest Section	Ms. Susan Malone	Regional Director	412-442-4000	
Pennsylvania Environmental Council	Ms. Janie French	Director of Water Programs	412-481-9400	
Pitcairn Borough	Ms. Malisa Migliori	Manager		
Pittsburgh Water & Sewer Authority	Mr. Tom Palmosina	Director of Water Operations	412-255-8800	
Plum Borough	Mr. Michael Thomas	Manager		
Port Vue Borough	Ms. Joan Winters	Manager		
Rankin Borough	Ms. Patricia DiNinno	Secretary		
South Versailles Township	Ms. Carla Barron	Secretary		
Steel Valley Council of Governments	Ms. An Lewis	Executive Director		
Swissvale Borough	Ms. Amanda Ford	Manager		
Tarentum Borough	Mr. William Rossey	Burough Manager	724-224-1818	manager@tarentumboro.,com
The Penn State Center	Dr. Deno De Ciantis	Director	412-263-1000	
Three Rivers Wet Weather Demo. Prog.	Mr. John Schombert	Executive Director	412-578-7962	jschombert@3rww.org
Trafford Borough	Ms. Lisa Mallik	Manager		
Turtle Creek Borough	Ms. Dolores Porter	Manager		
Turtle Creek Valley Council of Gov.	Ms. Amanda Settlemaier ✓	Executive Director	412-858-5115	asett@tcvcog.com
Turtle Creek Watershed Assoc.	Ms. Diane Salvaggio	President		
Twin Rivers Council of Gov.	Mr. John Palyo ✓	Executive Director	412-4667377	jpalyotrcog@choicecnemail.com
US Army Corp of Engineers	Col. William Graham	District Engineer	412-395-7500	
Verona Borough	Ms. Bonita Conway	Manager		

Region 3: Watershed Plan Advisory Committee (WPAC)

November 20, 2012

Representing	Name	Title	Phone	Email
Versailles Borough	Ms. Linda Salzmann	Secretary		
Wall Borough	Ms. Julie Donolo	Secretary		
Washington County Cons. District	Mr. Gary Stokum	District Manager		
Washington County Cons. District	Mr. Gary Stokum	District Manager	724-705-7098	
Westermoreland County Cons. District	Mr. James Pillsbury	Hydraulic Engineer	724 837 5271	jim@wcdpa.com ✓
Westermoreland County Cons. District	Mr. Greg Phillips	District Manager	724-837-5271	
Western PA Conservancy	Mr. Mark Killar	Interim Associate Vice President	412-288-2777	
White Oak Borough	Mr. Donald Hultberg	Engineering Representative	412-754-0801	dhultberg@eadsgroup.com
White Oak Borough	Mr. John Petro Jr.	Manager	412-672-9727	jackpetro@woboro.com
Wilkins Township	Ms. Rebecca Bradley	Manager	412-303-0431	rbradley@wilkinstownship.com
Wilkins Township	Mr. Joseph Costa	Commissioner		rbradley@wilkinstownship.com
Wilkinsburg Borough	Ms. Marla Marcinko	Manager		
Wilmerding Borough	Mr. Joseph Hartzell	Secretary		
Edgewood Borough	Julie P. Bastianini	Assistant Manager	412 242 4824	assistantmanager@edgewoodboro.com
~~Chad Hoover~~				
Chalfant Borough	Chad Hoover	Council men	412-477-5618	CBCCjh@gmail.com
PA Fish And Boat Commission	Bob Fentorini	3 Rivers Biologist	814-445-3454	rfentorini@pa.gov
US Army Corps	Mark Wozniak	Env. Scientist	412 818 2507	mark.a.wozniak@usace.army.mil
Quaker Valley COG	John T. Jatsko	Exec. Dir	412-766-9456	qvcog@verizon.net

Region 3: Watershed Plan Advisory Committee (WPAC)

November 20, 2012

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Versailles Borough	Ms. Linda Salzmann	Secretary		
Wall Borough	Ms. Julie Donolo	Secretary		
Washington County Cons. District	Mr. Gary Stokum	District Manager		
Washington County Cons. District	Mr. Gary Stokum	District Manager	724-705-7098	
Westermoreland County Cons. District	Mr. James Pillsbury ✓	Hydraulic Engineer		jim@wcdpa.com
Westermoreland County Cons. District	Mr. Greg Phillips	District Manager	724-837-5271	
Western PA Conservancy	Mr. Mark Killar	Interim Associate Vice President	412-288-2777	
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Wilkins Township	Mr. Joseph Costa ✓	Commissioner		rbradley@wilkinstownship.com
Wilkinsburg Borough	Ms. Marla Marcinko	Manager		
Wilmerding Borough	Mr. Joseph Hartzell	Secretary		
Penn Hills	Scott Shepard	Asst. Superintendent	412-798-3151	SShepard@PennHills.org
East Pittsburgh	Rob DeZorzi	Engineer Repr.	412-824-5672	RobDC@glennengr.com

Region 3: Watershed Plan Advisory Committee (WPAC)

November 20, 2012

Representing	Name	Title	Phone	Email
Versailles Borough	Ms. Linda Salzmann	Secretary		
Wall Borough	Ms. Julie Donolo	Secretary		
Washington County Cons. District	Mr. Gary Stokum	District Manager		
Washington County Cons. District	Mr. Gary Stokum	District Manager	724-705-7098	
Westermoreland County Cons. District	Mr. James Pillsbury	Hydraulic Engineer		jim@wcdpa.com
Westermoreland County Cons. District	Mr. Greg Phillips	District Manager	724-837-5271	
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White Oak Borough	Mr. John Petro Jr.	Manager	412-672-9727	jackpetro@woboro.com
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Wilkins Township	Mr. Joseph Costa	Commissioner	412-271-5514	rbradley@wilkinstownship.com
Wilkinsburg Borough	Ms. Marla Marcinko	Manager		
Wilmerding Borough	Mr. Joseph Hartzell	Secretary		
Nichols & Slagle Engineering	Robert Herring	~~Engineer~~ Sr. Designer	412 736 2283	rherring@nichols-slagel.com

APPENDIX D-1

Watershed Plan Advisory Committee (WPAC) #1
November 28, 2012 Meeting

COUNTY OF ALLEGHENY
RICH FITZGERALD
COUNTY EXECUTIVE

Watershed Plan Advisory Committee (WPAC)
Meeting No. 1

Welcome & Introductions

1. Act 167 Overview

2. Role of the Watershed Plan Advisory Committee (WPAC)

3. Background for the Allegheny County Act 167 Coordination with other Plans

4. Scope of Work
    a. Phase I – Initial Assessment
    b. Phase II – Stormwater Management Plan Study and Plan

5. Review of Municipal Survey Results

6. Open Discussion on Stormwater Problems

7. Schedule/Timeline

Questions

DENNIS M. DAVIN, DIRECTOR
ALLEGHENY COUNTY ECONOMIC DEVELOPMENT
ONE CHATHAM CENTER • SUITE 900 • 112 WASHINGTON PLACE • PITTSBURGH, PA 15219
PHONE (412) 350-1000 • WWW.ALLEGHENYCOUNTY.US/ECONOMIC/

Allegheny County Stormwater Management Plan
Watershed Plan Advisory Committee Meeting Minutes
Committee Meeting #3
November 28, 2012

Attendees
A list of attendees is provided as an attachment to these minutes.

Welcome and Introduction
Rich Fitzgerald, Allegheny County Executive, welcomed everybody in attendance. He emphasized that there is a need for homeowners, developers, and municipalities to work together to develop a plan for stormwater management throughout Allegheny County. He introduced the agenda and noted that Phase I – Initial Assessment and Phase II – Stormwater Management Plan Study and Plan will be completed over the course of 3 years.

Act 167 Overview
Chad Davis, Michael Baker Jr. Inc. (Baker), introduced the team members present who are working on the project and presented an overview of Act 167. He explained the importance of stormwater management and noted that the purpose of the Allegheny County Act 167 Plan is to prevent flooding, prevent stream degradation, and manage stormwater from new and re-development through a stormwater ordinance. Old plans only looked at water quantity but new plans also have to look at water quality through infiltration and pollutant capture. The goals of the plan will be to maintain natural hydrologic regimes, identify and prevent flooding/storm water problems, promote groundwater recharge, minimize stream bank erosion, manage water quality, promote nonstructural stormwater management, identify who is responsible for maintenance of BMPs, and educating the public on stormwater management. Municipal participation during the planning process is key. Phase I of this project is to set up a Watershed Plan Advisory Committee (WPAC), develop GIS mapping, identify problem areas, establish the scope of work, responsibilities, and cost estimate for Phase II, and prepare a report summarizing the activities performed and results of Phase I. Phase II of the project will be the plan preparation and will include GIS database compilation, water quantity/quantity modeling (if needed), development of standards and criteria, and develop a model stormwater ordinance. Once the plan is finalized, adopted by the County, and approved by the Pennsylvania Department of Environmental Protection (PADEP), the municipalities will adopt the ordinance within six months.

Questions/Comments
- Dan Deiseroth, Mt. Lebanon's engineer from Gateway Engineers, asked if the ordinance will be developed based on the PADEP model ordinance. Chad Davis answered that it will. Mr. Deiseroth then asked if there will be a threshold for individual lots. Mr. Davis answered that it is not known at this time if a threshold will be used.

Watershed Plan Advisory Committee (WPAC)
Daniel Kauffman, (Baker), described the details regarding the WPAC including the participating organizations and role. He explained that the most important element in the process is the input from the local municipalities.

Existing Act 167 Stormwater Management Plans
Chad Davis spoke about the existing plans including the North Hills, Flaugherty Run, Montour Run, Monongahela River, and Turtle Creek Plans. These plans most likely address water quantity not water quality. It is helpful to use these existing plans to determine what is working and what is not working to improve stormwater management.

Scope of Work

Chad Davis outlined the details regarding the Phase I Scope of Work including analyzing watershed characteristics, obtaining existing data, conducting a survey on problem areas (input from WPAC very important for this task), mapping problem areas (these will be color coded so that the cause of the problems will be illustrated in relation to the problem locations), developing the Phase II scope of work and cost estimate, and obtaining WPAC input. Phase I will be ongoing from now through May 2013. He explained that it is important to identify problem areas so that they can be further investigated to better develop solutions. He showed slides depicting stormwater management practices that can be employed depending on the needs of the situation. He explained that the Phase II Scope of Work is expected to be divided into five tasks including Data Collection and Analysis, Technical Analysis, Problem Areas and Obstructions, Public/Municipal Participation through WPAC, and the preparation of the Phase II Report. For Task 1, forms will be developed to collect the data on problem areas and then engineering calculations will be done to develop solutions based on the BMP Manual. Task 2 will include detailed hydrologic modeling if/where needed to evaluate water quality, peak flow, stream stability and groundwater recharge and to develop a management strategy. A map of obstructions and problem areas will be prepared under Task 3 and conceptual solutions will be provided in the plan based on the BMP Manual. Technical standards and criteria, and cost estimates for the problem area solutions will be prepared under Task 3. Dan Kauffman concluded with a discussion of the public participation that will be conducted through the WPAC under Task 4. Task 5 will be the preparation of the draft report, municipal review, and finalization of the report.

Questions/Comments

- Jim Hannan, Bethel Park, asked about the schedule for the project. Chad Davis answered that more details will be provided later in the presentation but the expectation is that a draft of the Phase I Report will be completed in early March 2013 and the final Phase I Report will be completed in May 2013.
- Dan Deiseroth, Mt. Lebanon's engineer from Gateway Engineers, said that since there are problem areas that are large and small, what level the municipalities should report. Chad Davis suggested that this can be left at the discretion of the municipality. Some small areas can be nagging problems for a municipality, so he encouraged municipalities to report as they deamed reasonable.
- Steve Faller, Mt. Lebanon, asked that if these problem areas are identified, will there be state or county funds to assist the municipality. Chad Davis answered that this plan does not address funding but based on feedback from other meetings, the development of a plan that collectively illustrates the regional problems regarding stormwater is more effective in applying for funding from various sources including hazard mitigation. He also suggested that the US Army Corps of Engineers may be a source of funding based on prior conversations with them.
- Kay Pierce, Allegheny County Economic Development, emphasized that to receive funding, a good plan that clearly documents the problems is a great aid. Chad Davis added that publishing the plan does not mean there will be funding to correct the issues, but rather allow for potential aid and an organized approach to approaching the stormwater management issues.
- Dan Deiseroth, Mt. Lebanon's engineer from Gateway Engineers, commented that there is a link between the sanitary sewer problems and stormwater problems. Will the link between stormwater and sanitary sewer issues be addressed in this report? Chad Davis answered that the report will discuss the connection between stormwater and combined sewer overflows, but given this report is much smaller in scope and funding than the planning studies were conducted by ALCOSAN and other authorities within the region, this

plan would not supersede those previous efforts, but rather look to leverage work previously completed within the region.

- Mr. Deiseroth added that we should not lose sight of the correlation between these problems especially in the more urban South Hills communities. There is potential for inflow and infiltration issues in the communities with combined sewers.

Municipal Survey Results

Chad Davis explained that the website currently includes the responses for 26 of 130 municipalities. He demonstrated the path to take to respond to the survey. He then showed some results as they stand at this time. He emphasized that if a community is in more than one watershed, they must respond to the survey separately for each watershed. When filling out the survey/map on-line, Chad noted that it is critical that the location point is identified with the same exact nomenclature as the description of the items cannot be linked up in GIS. Chad also noted that if a municipality already has their information in GIS, they can just send that to Chad instead of using the online map. The importance of the WPAC responses was stressed and all municipalities were encouraged to participate.

Questions/Comments

- It was asked how the website survey responses will be validated. Dan Kaufmann answered that the web master verifies them before they are placed on the website. Chad Davis added that the survey was only sent to members of the Watershed Plan Advisory Committee members so they do not expect any fraud. He also said that only the mapping portions of the survey results are visible on the website not the answers to specific questions.
- Gerry Duke, Bethel Park, asked if facilities should be identified on the survey map or only problem areas. Chad Davis answered that, at this time, only problem areas should be indentified on the map.
- Ned Mitrovich, Scott Township's engineer with Lennon Smith Souleret Engineering, asked if areas with acid mine drainage should be identified on the map. Chad Davis answered that they should be included, if known.
- Deb Campbell, US Army Corps of Engineers, asked if the results of the survey are expected to show fewer extreme results in the responses when more municipalities respond. Dan Kaufmann answered that they expect the results to remain about the same with more responses.
- Kay Pierce, Allegheny County Economic Development, offered that if any municipality needs help with the survey, her staff is available to assist.

Open Discussion

- Joe Kauer, Heidelberg Borough, commented that the new FEMA 100-year floodplain maps show an expanded area in his community compared to the previous mapping. Will this trend be incorporated in the plan? Chad Davis answered that it may be but it is important for each community to include that information in their survey response. Mr. Kauer then asked how flow from neighboring counties will be addressed. Mr. Davis answered that this plan cannot reach beyond the County boarder, but runoff into Allegheny County can be modeled to account for the entire watershed.
- Dave Borneman, ALCOSAN, reiterated that there is a linkage between sanitary sewer overflows and combined sewer overflows and stormwater. This must be kept in consideration as the Act 167 Plan goes forward. Chad Davis concurred.
- Beth Dutton, 3 Rivers Wet Weather, asked what will be the content of the Phase I report. Chad Davis answered that it will be an assessment of the survey results, the areas that

should be considered for modeling, and it will identify problem areas throughout Allegheny County.

The meeting was adjourned.

Region 1: Watershed Plan Advisory Committee (WPAC)

November 28, 2012

Initial	Representing	Name	Title	Phone	Email
	ALCOSAN	Ms. Arletta Williams	Executive Director		
	Allegheny County Council	Mr. Vince Gastgeb	Councilman		
	Allegheny County Council	Mr. James Burn	Councilman		
	Allegheny County Council	Mr. Matt Drozd	Councilman		
	Allegheny County Council	Ms. Jan Rea	Councilwoman		
	Allegheny County Council	Mr. Michael Finnerty	Councilman		
	Allegheny County Council	Mr. John Palmiere	Councilman		
	Allegheny County Council	Mr. Nicholas Futules	Councilman		
	Allegheny County Council	Dr. Charles Martoni	Councilman		
	Allegheny County Council	Mr. Robert Macey	Councilman		
	Allegheny County Council	Mr. William Robinson	Councilman		
	Allegheny County Council	Ms. Barbara Danko	Councilwoman		
	Allegheny County Council	Mr. James Ellenbogen	Councilman		
	Allegheny County Council	Ms. Amanda Hawkins	Councilwoman		
	Allegheny County Council	Mr. John DeFazio	Councilman		
	Allegheny County Council	Ms. Heather Heidelbaugh	Councilwoman		
	Allegheny County Conservation District	Ms. Donna Simmons	District Manager	412-241-7645	mmickey1@covad.net
	Allegheny County Dept. of Public Works	Mr. Philip LaMay	Acting Director		
✓	**Allegheny County Emergency Services**	~~Mr. Alvin Henderson~~ Steve Williams	~~Chief~~		
	Allegheny County Health Department	Dr. Ronald Voorhees	Interim Director	412-578-8008	rvoorhees@achd.net
	Allegheny County Law Department	Mr. Andrew Szefi	County Solicitor		
	Baldwin Borough	Mr. John Barrett	Manager		
	Baldwin Township	Ms. Mary McGinley	Secretary		
	Beaver County Conservation District	Mr. James Shaner	Executive Director	724-378-1701	jim.shaner@bccdpa.us
	Bethel Park	Mr. William Spagnol	Manager		
	Brentwood Borough	Mr. George Zboyovsky	Manager	412-884-1500	gzboyovsky@brentwoodboro.com
	Bridgeville Borough	Ms. Lori Collins	Manager		
	Carnegie Borough	Mr. Steve Beuter	Administraton	412-276-1414	sbeuter.carnegieboro@comcast.net
	Carnegie Borough	Mr. Jeffrey Harbin	Manager	412-276-1414	
	Carnegie Borough	Mr. Terry Roma	Code/ Zoning Officer	412-276-1414	troma.carnegieboro@comcast.net
	Castle Shannon Borough	Mr. Thomas Hartswick	Manager		
	Chartiers Creek Watershed Association	Ms. Susan Morgan	President		susanlm@comcast.net
	Char-West Council of Governments	Mr. George Scarborough	Executive Director	412-279-3333	admin@cwcog.com

Region 1: Watershed Plan Advisory Committee (WPAC)

November 28, 2012

Initial	Representing	Name	Title	Phone	Email
	City of Duquesne	Mr. Frank Piccolini	Manager		
	City of Pittsburgh	Ms. Darlene Harris	City Council President		
	City of Pittsburgh	Mr. Luke Ravenstahl	Mayor		
	City of Pittsburgh Dept. of Planning	Mr. Dan Sentz	Environmental Planner	412-255-2233	dan.sentz@pittsburghpa.gov
	Clairton City	Mr. Howard Bednar	Manager		
	Collier Township	Mr. Sal Sirabella	Manager	412 279-2525	ssirabella@colliertwp.net
	Coraopolis Borough	Mr. Raymond McCutcheon	Manager		
	Coraopolis Water & Sewer Authority	Mr. John Schombert	Board Chairperson		
	Crafton Borough	Mr. Robert Callen	Manager		
	Crescent Township	Ms. Patience Eckhardt	Secretary		
✓	Dormont Borough	Mr. Jeff Naftal	Manager	412-561-8900	jnaftal@boro.dormont.pa.us
	Dravosburg Borough	Ms. Brenda Honick	Secretary/Treasurer		
	Findlay Township	Mr. Gary Klingman	Manager	724-695-0500	gklingman@findlaytwp.org
	Green Tree Borough	Mr. W. David Montz	Manager		
✓	Heidelberg Borough	Mr. Joseph Kauer	Manager	412-276-0663	jkauer@heidelbergborough.com
	Homestead Borough	Mr. Ian McMeans	Manager		
	Ingram Borough	Ms. Debbie Stecko	Secretary		
	Jefferson Hills Borough	Mr. Doug Arndt	Manager		
	Kennedy Township	Mr. Jerry Orsini	Manager		
	McDonald Borough	Ms. Marie Maximovich	Secretary		
	McKees Rocks Borough	Ms. Tricia Levander	Secretary		
	Montour Run Watershed Association	Mr. Mark Fedosick	President		president@mrwa.info
	Moon Township	Ms. Lora Dombrowski	Assistant Planning Director	412-262-1700	ldombrowski@moontwp.com
	Mount Lebanon	Mr. Stephen Feller	Manager	412-343-3620	sfeller@mtlebanon.org
	Mount Oliver Borough	Ms. Ruthann Omer	Borough Engineer	412-921-4030	romer@gatewayengineers.com
	Munhall Borough	Ms. Rebecca M. Wehrer	Interim Manager		
	Neville Township	Ms. Cindy Alexander	Secretary		
	North Fayette Township	Mr. Robert Grimm	Manager	724-693-3103	rgrimm@north-fayette.com
	Oakdale Borough	Ms. Kelly Rohbeck	Secretary		
✓	Office of the County Manager	Mr. William McKain	County Manager	412-350-5300	wmckain@alleghenycounty.us
	PA Dep't of Community & Economic Dev't	Mr. Denny Puko	Planning Program Manager	412-770-1660	dpuko@pa.gov
	PA Fish & Boat Commission	Mr. Thomas Shetterly	Commissioner		
	PennDOT, District 11-0	Mr. Dan Cessna	District Executive	412-429-5000	hcessna@pa.gov

Region 1: Watershed Plan Advisory Committee (WPAC)

November 28, 2012

Initial	Representing	Name	Title	Phone	Email
	Pennsbury Village Borough	Mr. Irvin Foreman	Manager		
	Penn State Center	Dr. Deno De Ciantis	Director	412-263-1000	dwd5@psu.edu
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	Peters Creek Watershed Association	Mr. Tim Schumann	President	412 233-6628	peterscreekwsa@verizon.net
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/	South Park Township	Ms. Karen Fosbaugh	Manager	412-831-7000	SOUTHPARKPW@SOUTHPARKPA.COM
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	Streets Run Watershed Association	Ms. Ann Scott	Secretary		
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/	US Army Corp of Engineers	Mr. Mark Zaitsoff	Hydraulic Engineer	412-395-7351	Mark.P.Zaitsoff@USACE.Army.mil
	Washington County Conservation District	Mr. Gary Stokum	District Manager	724-705-7098	gstokum@pawccd.org
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	West Mifflin Borough	Mr. Brian Kamauf	Manager		
	Whitaker Borough	Ms. Jean Warren	Secretary	412-462-8940	whitaker@rdm-inc.com
	PLEASANT HILLS	NED MITROVICH	BOROUGH ENGINEER	412-261-4400	NMITROVICH@LSSE.COM
	OAKDALE	ROB ARNOLD	BOROUGH ENGINEER	412.809-6687	RARNOLD@CHESTERENGINEERS.COM
	SOUTH PARK TOWNSHIP	BRUCE BEAVER	PUBLIC WORKS DIR	412-831-7000	BRUCEL BEAVER@HOTMAIL.COM
	Bethel Park	James Hannan	Councilman	412-851-1053	jhannan@bethelpark.net
	Allegheny County + Upper Chartiers Creek Watershed Association - Board Member	Carrilee L. Hemington	Consultant	724-941-5613	clhemington@verizon.net

Region 1: Watershed Plan Advisory Committee (WPAC)

November 28, 2012

Initial	Representing	Name	Title	Phone	Email
		Scott Dunn	Pres. SKC	412-854-8280	rudidunn1@verizon.net
	ALCOSAN	David Borneman	Dir. Engineering	412 734 8369	david.borneman@alcosan.org

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	Baldwin Township	Ms. Mary McGinley	Secretary		
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	Brentwood Borough	Mr. George Zboyovsky	Manager	412-884-1500	gzboyovsky@brentwoodboro.com
	Bridgeville Borough	Ms. Lori Collins	Manager		
	Carnegie Borough	Mr. Steve Beuter	Administraton	412-276-1414	sbeuter.carnegieboro@comcast.net
	Carnegie Borough	Mr. Jeffrey Harbin	Manager	412-276-1414	
	Carnegie Borough	Mr. Terry Roma	Code/ Zoning Officer	412-276-1414	troma.carnegieboro@comcast.net
	Castle Shannon Borough	Mr. Thomas Hartswick	Manager		
	Chartiers Creek Watershed Association	Ms. Susan Morgan	President		susanlm@comcast.net
	Char-West Council of Governments	Mr. George Scarborough	Executive Director	412-279-3333	admin@cwcog.com

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✓	Collier Township	Mr. Sal Sirabella ✓	Manager	412 279-2525	ssirabella@colliertwp.net
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	Coraopolis Water & Sewer Authority	Mr. John Schombert	Board Chairperson		
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	Crescent Township	Ms. Patience Eckhardt	Secretary		
	Dormont Borough	Mr. Jeff Naftal	Manager	412-561-8900	jnaftal@boro.dormont.pa.us
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	Heidelberg Borough	Mr. Joseph Kauer	Manager	412-276-0663	jkauer@heidelbergborough.com
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✓	Mount Lebanon	Mr. Stephen Feller	Manager	412-343-3620	sfeller@mtlebanon.org
	Mount Oliver Borough	Ms. Ruthann Omer	Borough Engineer	412-921-4030	romer@gatewayengineers.com
	Munhall Borough	Ms. Rebecca M. Wehrer	Interim Manager		
	Neville Township	Ms. Cindy Alexander	Secretary		
	North Fayette Township	Mr. Robert Grimm	Manager	724-693-3103	rgrimm@north-fayette.com
	Oakdale Borough	Ms. Kelly Rohbeck	Secretary		
	Office of the County Manager	Mr. William McKain	County Manager	412-350-5300	wmckain@alleghenycounty.us
	PA Dep't of Community & Economic Dev't	Mr. Denny Puko	Planning Program Manager	412-770-1660	dpuko@pa.gov
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	PennDOT, District 11-0	Mr. Dan Cessna	District Executive	412-429-5000	hcessna@pa.gov

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	Dan Deiseroth	GATEWAY ENGIN	Mr. GEBO ENG.	412-921-4030	DDEISEROTH@GATEWAYENGINEERS.COM
	US Army Corps of Engineers	Deborah L Campbell	Chief Env. Section	412-395-7218	deborah.campbell@usace.army.mil
	Municipality of Bethel Park	Mike Pomposelli	Asst Env. Engr.	412-831-6800	MPomposelli@BethelPark.Net

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	Whitaker Borough	Ms. Jean Warren	Secretary	412-462-8940	whitaker@rdm-inc.com
P		RYAN BERNER		412-921-4030 x165	Rberner@gatewayengineers.com
Bethel Park		Jerry Duke		412-833-6800	GDuke@bethelpark.net

APPENDIX D-2

Watershed Plan Advisory Committee (WPAC) #2
July 8, 2013 Meeting

COUNTY OF ALLEGHENY
RICH FITZGERALD
COUNTY EXECUTIVE

Watershed Plan Advisory Committee (WPAC)
Meeting No. 2

Welcome & Introductions

1. Act 167 Overview
2. Role of the Watershed Plan Advisory Committee (WPAC)
3. Background for the Allegheny County Act 167
4. Coordination with other Plans
5. Scope of Work
    1. Phase I – Initial Assessment
    2. Phase II – Stormwater Management Plan Study and Plan
6. Review of Municipal Survey Results
7. Open Discussion on Stormwater Problems
8. Schedule/Timeline

Questions

DENNIS M. DAVIN, DIRECTOR
ALLEGHENY COUNTY ECONOMIC DEVELOPMENT
ONE CHATHAM CENTER • SUITE 900 • 112 WASHINGTON PLACE • PITTSBURGH, PA 15219
PHONE (412) 350-1000 • WWW.ALLEGHENYCOUNTY.US/ECONOMIC/

Monday, July 8th - WPAC #2: O'Hara Twp.

O'Hara Township
Meeting Notes

Overview:

- Kay Pierce gave opening remarks
- Chad Davis from Baker provided an overview of the first WPAC and what was covered in those meetings
    - He proceeded then to discuss the results of municipal questionnaire, municipal problem areas map, and the overall process of phase 2
    - He also went over each municipalities map
    - He opened up the room for questions:

Questions asked by Audience:

- Dave Borneman of ALCOSAN asked about municipal maps and suggested that Baker or the County create a map showing municipal participation of the municipal problem areas map.
    - Chad and the County agreed it would be a good idea to do such
- Dan Sentz from the City of Pittsburgh:
    - Dan commented that he will provide additional point data from Pittsburgh EMS and DPW for other areas of the city because only the PWSA provided points are currently shown on the map.
- Chuck Steinert, the O'Hara Engineer said that point 142 should be changed to accelerated erosion.
- Dan Sentz from the City of Pittsburgh:
    - Dan asked if we will consider FEMA flood plain data – Chad said it will be considered
    - Dan asked about the old Act 167 plan for the Mon Valley – he suggested it would be a good idea to transfer data from that plan.
        - Chad said it is a good idea, however we don't know if some of those problems have been fixed – it is something we can look into
    - Dan stated that most of the problem areas identified in the current Mon plan still exist
- Wayne Roller from the NHCOG:
    - Wayne Roller asked if municipalities can provide problem area information for the plan
        - Chad said yes, but the information will be included in an appendix of the report
    - He asked how Region 2 ranked in regards to other regions for providing information
        - Chad said other regions have more information but that could be due to a number of reasons: there is a NHCOG plan, there might not be as many problems, etc.

At this point the guest speaker – Bakers Hazard mitigation team presented

More questions from the Audience:

- Steve Wilharm from ACES
    - Steve stated that municipalities have to adopt the County's or adopt their own Hazardous Mitigation Plan to be reimbursed for disaster funds.

Monday, July 8th - WPAC #2: O'Hara Twp.

- Michael Bett from Ben Avon
    - Mike asked how does this stormwater plan fit together with the ALCOSAN plan
        - Chad stated that they work together but this plan is broad, and does not have the same level of detail as the ALCOSAN plan
        - Dave Boreman from ALCOSAN said that ALCOSAN is concerned with stormwater only in the areas where there is combined stormwater and sewer
    - Mike asked if the plan suggest locations for detention ponds.
        - Chad stated yes
- Lisa Kunst Vavro from PSU
    - Lisa asked if green infrastructure will be utilized in this plan at all
        - Chad said that there will be GI, where it is most logical
- John Orndorff from Glen Osborne
    - John asked if the municipalities have to work together to address the issues since most if his municipalities issues are coming from upstram
        - Chad stated yes, the goal of the plan is to address stormwater issues throughout the county, not just in individual municipalities
- Dan Sentz from the City of Pittsburgh:
    - Dan commented on no-harm on Act 167 plans, specifically in the Monongahalea Rivers Plan: the existing Mon River Act 167 plan has a no-harm option if the first release point is to the Mon River. It does not consider that the source may release into pipes/infrastructure and travel a long time or distance before it reaches the point of release. There is development in Oakland, for example, that has no-harm status because the first point of release is at the Mon. This needs to be looked at.
    - Dan Sentz asked if, in this plan, there will be a release time limit on the no harm areas that were in previously adopted Act 167 plans
        - Chad said that it will be addressed area by area
- Pete Ramage - Etna Borough
    - Peter asked if the plan has any teeth to require municipalities to adopt the ordinance that goes along with the plan
        - Chad said that DEP does have that power but generally does not have adequate resources to enforce it.
- Someone asked if you have to adopt the ordinance verbatim
    - Chad said that no, you just have to adopt the key features of the ordinance.

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Region 2: Watershed Plan Advisory Committee (WPAC)

July 8, 2013

Initial	Representing	Name	Title	Phone	Email
X	**ALCOSAN**	Mr. Dave Borneman	Director of Engineering & Construction	412 734 8369	david.borneman@alcosan.org
	Aleppo Township	Ms. Gwen Patterson	Manager	(412) 741-6555	
X	**Allegheny County Conservation District**	Ms. Janet Lauer	District Manager	412-241-7645	
	Allegheny County Council	Ms. Krista Harris	Councilwoman		
	Allegheny County Council	Mr. James Burn	Councilman		
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	Allegheny County Council	Ms. Amanda Hawkins	Councilwoman		
	Allegheny County Council	Mr. John DeFazio	Councilman		
	Allegheny County Council	Ms. Heather Heidelbaugh	Councilwoman		
	Allegheny County Dept. of Public Works	Mr. Steven Johnson	Director	412-350-4005	
	Allegheny County Emergency Services	Mr. Alvin Henderson	Chief		

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July 8, 2013

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	Allegheny County Emergency Services	Mr. Steve Wilharm	Emergeny Manager	412-473-2592	swilharm@alleghenycounty.us
	Allegheny County Health Department	Dr. Ronald Voorhees	Interim Director	412-578-8009	rvoorhees@achd.net
	Allegheny County Law Department	Mr. Andrew Szefi	County Solicitor	412-350-1120	
	Allegheny Valley North COG	Mr. Tom Benecki	Executive Director	412-826-5170	avncog@earthlink.net
	Aspinwall Borough	Ms. Melissa Lang	Manager	(412) 781-0213	
	Avalon Borough	Mr. Harry Dilmore	Manager	(412) 761-5820	
	Beaver County Conservation District	Mr. James Shaner	Executive Director	724-378-1701	jim.shaner@bccdpa.us
	Bell Acres Borough	Mr. Charles Kulbaki	Manager	(412) 741-5448	
	Bell Acres Borough	Mr. Chris Abell	Council member	412 716 4082	cabell717@verizon.net
	Bellevue Borough	Ms. Whitney Bradey	Manager	(412) 766-5930	
	Ben Avon Borough	Mr. Michael Bett	Council Member	412-736-0047	bett@benavon.org
	Ben Avon Borough	Ms. Carmella Hallstein	Secretary	(412) 766-7704	
	Ben Avon Heights Borough	Ms. Denise Raves	Secretary/Treasurer	(412) 766-1561	
	Blawnox Borough	Ms. Sherry Kordas	Manager	(412) 828-4141	
	Brackenridge Borough	Ms. Denise Tocco	Secretary	(724) 224-0800	
	Bradford Woods Borough	Ms. Mary Ann Moretti	Manager	(724) 9345-2990	
	Butler County Conservation District	Mr. Ronald Fodor	District Manager	724-285-5515	rfodor@co.butler.pa.us
	CDM Smith /	Mr. Joshua Jedlicka	Engineer	412-208-2437	jedlickajj@cdmsmith.com
	CDM Smith / ALCOSAN	Mr. Edward Kluitenberg	Engineer	412-208-2440	kluitenbergeh@cdmsmith.com
	Cheswick Borough	Mr. Andrew Bock	Secretary	(724) 274-5125	

Region 2: Watershed Plan Advisory Committee (WPAC)

July 8, 2013

Initial	Representing	Name	Title	Phone	Email
	City of Pittsburgh	Ms. Darlene Harris	Council President	412-255-2626	
	City of Pittsburgh Dept. of Planning	Ms. Noor Ismail	Director	412-255-2200	
X	**City of Pittsburgh Dept. of Planning**	Mr. Dan Sentz	Environmental Planner	412-255-2233	dan.sentz@pittsburghpa.gov
	East Deer Township	Ms. Bettina Lesoon	Manager	(724) 224-3434	
	Edgeworth Borough	Mr. Martin McDaniel	Manager	(412) 741-2866	
	Emsworth Borough	Ms. Cathy Jones	Secretary	(412) 761-1161	
	Etna Borough	Ms. Mary Ellen Ramage	Secretary/Manager	(412) 781-0569	
	Etna Borough	Mr. Peter Ramage	Council President	(412) 781-0569	
	Fawn Township	Ms. Patricia Bryant	Secretary/Treasurer	(724) 226-0666	
	Fox Chapel Borough	Mr. Gary Koehler	Manager	(412) 963-1100	
	Franklin Park Borough	Mr. Ambrose Rocca	Manager	(412) 364-4115	
	Frazer Township	Ms. Lori Ziencik	Secretary	(724) 274-4202	
	Glen Osborne Borough	Ms. Diane Vierling	Secretary	(412) 741-3775	
	Glenfield Borough	Ms. Janet Mascara	Secretary	(412) 749-1610	
	Hampton Township	Mr. Chris Lochner	Manager	(412) 486-0400	
	Harmar Township	Ms. Annette Dietz	Secretary/Treasurer	(724) 274-4550	harmar701@comcast.net
	Harrison Township	Ms. Faith Payne	Executive Secretary	(724) 226-1393	
	Haysville Borough	Ms. Mary Conlin	Secretary	(412) 741-3236	
	Indiana Township	Mr. Daniel L. Anderson	Manager	(412) 767-5333	
	Kilbuck Township	Mr. Harry Dilmore	Manager	(412) 761-3945	

Region 2: Watershed Plan Advisory Committee (WPAC)

July 8, 2013

Initial	Representing	Name	Title	Phone	Email
	Leet Township	Ms. Anna Oswald	Secretary	(724) 266-2280	
	Leetsdale Borough	Ms. Elizabeth Petalino	Secretary	(724) 266-4820	
	Lennon, Smith, Souleret / FOX CHAPEL PUBS TWP SHARED WORDS	Mr. Matt Carroll	Assistant Engineer	412-264-4400 x231	mcarroll@lsse.com
	Marshall Township	Mr. Neil McFadden	Manager	(724) 935-3090	
	McCandless Township	Mr. Tobias Cordek	Manager	(412) 364-0616	
	Millvale Borough	Ms. Amy Rockwell	Manager	(412) 821-2777	arockwell@millvaleboro.com
	North Hills Council of Governments	Mr. Wayne Roller WR.	Executive Director	412-487-5230	wroller@northhillscog.org
	Office of the County Executive	Ms. Darla Cravotta	Special Projects	412-350-4318	dcravotta@alleghenycounty.us
	Office of the County Manager	Mr. William McKain	County Manager	412-350-5300	
	O'Hara Township	Ms. Julie Jakubec	Manager	(412) 782-1400	
	O'Hara Township	Mr. Samuel Gibson	E.I.T./Project Designer	412-494-0510	sgibson@klhengineers.com
	O'Hara Township C.S.	Mr. Charles Steinert	Township Engineeer	412-784-1784 x217	csteinert@ohara.pa.us
	Ohio Township	Mr. John Sullivan	Manager	(412) 364-6321	
	PA Dep't of Community & Economic Dev't	Mr. Denny Puko	Planning Program Manager	412-770-1660	dpuko@pa.gov
	PA Fish & Boat Commission	Mr. Bob Ventorini	Three Rivers Biologist		
555	**Penn Hills**	Mr. Scott Shepard	Asst Superintendent DPW	412-798-2151	sshepard@pennhills.org
	PennDOT, District 11-0	Mr. Dan Cessna	District Executive	412-429-5000	hcessna@pa.gov
	Pennsylvania DEP Southwest Section	Mr. Jim Kuncelman	MS4 Coordinator	412-442-4000	
	Pennsylvania Environmental Council	Ms. Janie French	Director of Water Programs	412-481-9400	jfrench@pecpa.org
	Pine Township	Ms. Cheryl Fischer	Township Manager	(724) 625-1591	

Region 2: Watershed Plan Advisory Committee (WPAC)

July 8, 2013

Initial	Representing	Name	Title	Phone	Email
	Pine Township	Mr. Scott Anderson	Assistant Manager	724-625-1591	sanderso@twp.pine.pa.us
	Pittsburgh Water & Sewer Authority	Mr. Tom Palmosina	Director of Water Operations	412-255-8800	tpalmosina@pgh20.com
	Quaker Valley Council of Governments	Mr. John Jakiela	Executive Director	412-766-7458	qvcog@verizon.net
	Reserve Township	Mr. Robert Kipp	Manager	(412)-322-1551	
	Richland Township	Mr. Dean Bastianini	Manager	(724) 443-5921	
	Ross Township	Mr. Doug Sample	Manager	(412) 931-7055	
	Sewickley Borough	Mr. Kevin Flannery	Manager	(412) 741-4015	
	Sewickley Heights Borough	Mr. William Rohe	Manager	(412) 741-5119	billrohe@comcast.net
	Sewickley Heights Borough	Mr. S. Phil Hundley	President of Council	412-391-4850	phil_hundley@drsarchitects.com
	Sewickley Hills Borough	Ms. Diane Steele	Secretary	(412) 364-8911	
	Shaler Township	Mr. Timothy Rogers	Manager	(412) 486-9700	
	Shaler Township	Mr. Kevin Creagh	Township Engineer	412-486-9700	kcreagh@shaler.org
	Sharpsburg Borough	Ms. Jan Barbus	Secretary	(412)-781-0546	
	Springdale Borough	Mr. Ron Borcyzk	Manager	(724) 274-6800	
	Springdale Township	Ms. Dawn Biery	Secretary	(724) 274-4034	
WR	**Tarentum Borough**	Mr. William Rossey	Manager	(724) 224-1818	manager@tarentumboro.,com
	The Penn State Center	Ms. Lisa Kunst Vavro	Sustainable Landscape Coordinator	412-263-1753	lkv10@psu.edu ✓
✓	**Three Rivers Wet Weather Demo Program**	Mr. John Schombert	Executive Director	412-578-8375	jschombert@3rww.org
	Three Rivers Wet Weather Demo Program	Ms. Beth Dutton	Program Manager	412.578.8376	bdutton@3rww.org
	Three Rivers Waterkeeper	Mr. John Stephen	Executive Director	412-589-9411	john@threeriverswaterkeeper.org

Region 2: Watershed Plan Advisory Committee (WPAC)

July 8, 2013

Initial	Representing	Name	Title	Phone	Email
MP	**U.S. Army Corps of Engineers**	Mr. Mark Zaitsoff	C/H&H Section	412-395-7351	Mark.P.Zaitsoff@USACE.Army.mil
	West Deer Township	Mr. Daniel Mator	Manager	(724) 265-3680	
	West View Borough	Mr. Bruce Fromlak	Manager	(412) 931-2800	
	Western Pennsylvania Conservancy	Mr. Mark Killar	Interim Associate Vice President	412-288-2777	mkillar@paconserve.org
	Michael Baker	Christine Caggiano	Planner	215-446-5193	ccaggiano@mbakercorp.com
	"	Shelley Hull	Planner	215-446-5197	shull@mbakercorp.com
	Township of O'Hara	Charles Vogel	VP of Council	412 828 7535	cvogel@ohara.pa.us
	Glen Osborne	John Orndorff			

Michael Baker
INTERNATIONAL

Michael Baker International

APPENDIX D-2

Watershed Plan Advisory Committee (WPAC) #2
July 29, 2013 Meeting

COUNTY OF ALLEGHENY
RICH FITZGERALD
COUNTY EXECUTIVE

Watershed Plan Advisory Committee (WPAC)
Meeting No. 2

Welcome & Introductions

1. Act 167 Overview
2. Role of the Watershed Plan Advisory Committee (WPAC)
3. Background for the Allegheny County Act 167
4. Coordination with other Plans
5. Scope of Work
    1. Phase I – Initial Assessment
    2. Phase II – Stormwater Management Plan Study and Plan
6. Review of Municipal Survey Results
7. Open Discussion on Stormwater Problems
8. Schedule/Timeline

Questions

DENNIS M. DAVIN, DIRECTOR
ALLEGHENY COUNTY ECONOMIC DEVELOPMENT
ONE CHATHAM CENTER • SUITE 900 • 112 WASHINGTON PLACE • PITTSBURGH, PA 15219
PHONE (412) 350-1000 • WWW.ALLEGHENYCOUNTY.US/ECONOMIC/

Andrew Hartwell

July 28, 2013
Twp. Of Upper Saint Clair
Recreation Center

Stormwater Meeting Notes

- Nine Mile Run Representative:
  - Brenda Smith
    - How does the ordinance work? Is it like a land use ordinance?
      - Chad: Works in conjunction with land use ordinances
- Findlay Township:
  - Gary Klingman
    - Township has been working with Randy Forester at the Airport Authority to solve problems within the Township as the airport develops sites
- North Fayette Township:
  - Bob Grimm
    - Robinson Run needs modeled, especially around Oakdale Borough
- Westmoreland County CD:
  - Jim Pillsbury
    - County Agencies (public works, county police, etc.) should fill out forms for municipalities that did not respond
      - Dave Wright (ACPW)
        - Public works keeps a list of county roads with flooding issues and the list could be provided if requested
        - PennDOT also tracks this information for state roads
- Pleasant Hills Borough
  - Willy Trimbath
    - AC Airport contributes to flooding in the Borough and does not have any stormwater controls in place.

Allegheny County Act 167 Stormwater Management Plan
WPAC #2, USC Community & Recreation Center
July 29, 2013
Goswick

Meeting Notes

Brenda, Nine Mile Run Watershed Assoc. –

- How does the stormwater management ordinance relate to land use ordinances?
- What will be the timetable for municipalities to adopt the model ordinance?
- Will there be penalties if the model is not adopted?

Bob Grimm & Mike Benton –

- Both North and South Fayette need to add to the map to include flooding from the July 10th event.

Gary Klingman, Findlay Twp –

- Findlay has been working with Randy Forester at the PIT airport about stormwater problems in the airport area, particularly along Rt. 30.

Someone suggested that modeling be done for some creeks that are on the border of municipalities.

Bob Grimm, North Fayette -

- Robinson Run floods Oakdale and should be studied further – there are also sedimentation issues

Amy, ACCD -

- ACCD receives a lot of complaints regarding flooding and other stormwater issues; she will share that information with Chad.

Dave Wright, DPW -

- Should get information from DPW about county road areas that need to be cleaned up after a storm.
- PennDOT can provide same information on state roads.

Lewis Run near the County Airport in West Mifflin has flooding issues.

Someone asked if additional data can be entered on the website. Chad indicated that the stormwater website is still up to show existing data, but forms are now being sent out in hardcopy form.

Chris Goswick, Whitehall resident –

- On July 10th, there was a lot of flooding in Whitehall and Castle Shannon; both are in the Saw Mill Run watershed.

Allegheny County Act 167 Stormwater Management Plan
WPAC #2, USC Community & Recreation Center
July 29, 2013
Goswick

Gary Klingman, Findlay Twp –

- On July 10th, the Route 51 corridor near Mt. Oliver had severe flooding.

Brenda, Nine Mile Run Watershed Assn. –

- There are stormwater problems within the Nine Mile Run Watershed where municipalities have indicated there were no problems. She will provide data.

Ryan from Gateway Engineers said that they are gathering data from the July 10th event from several municipalities in the South Hills and should be able to share that data with Chad. (Bill has his card, and he has Bill's card.)

Allegheny County Act 167 Stormwater Management Ordinance
WPAC #2, USC Community & Rec Center
28/7/13
Pierce

Meeting notes

Need to add PennDOT to WPAC member list; Dan Cessna was invited. Last night Mark young attended for him.

For next WPAC, please make a separate list for those invited to any/all WPACs.

Brenda, Nine Mile Run Watershed Assoc.:

- Do municipalities adopt the model ordinance? Is there a time-frame for adoption? Is there any penalty if municipalities don't adopt?
- What connection will there be between a municipality's land use ordinances and the model stormwater ordinance?

Gary Klingman, Findlay Twp.:

- Findlay has been working with ACAA (Randy Forister) to manage runoff from PIT in the Rt. 30 area.

Lora Dombrowski, Moon Twp.:

- Montour Run flooded significantly on 7/10/13; Moon Twp. recommended following up with the Montour Run Watershed Assoc. & Hollow Oak Land Trust for information. Mal Petroccia commented that if a creek is a municipality boundary, it may not have had problem area points placed on them by either adjoining municipality (jurisdictional issue?).

Bob Grimm, N. Fayette:

- We need to look at Robinson Run in particular, it has major impact on Oakdale Borough flooding.

Jim Pillsbury, WCCD:

- His county got a very poor response when they asked municipalities for input during their Act 167 planning process. They had to really go after data; recommends asking other agencies for help / data (?not sure I got this one completely right)

Amy, ACCD:

- ACCD gets a lot of calls/complaints related to stormwater. She will provide that data to Baker.

Mike Benton, S. Fayette:

- Millers Run floods and Twp. has mapped flood damage areas; he gave Chad a map showing this.

Gary Klingman, Findlay Twp.:

- Has pictures someone sent him after 7/10 floods that shows water the depth of a jersey barrier on Rt. 51 in Mt. Oliver; cars couldn't pass and were stacked in parking lots.

Ryan, Gateway Engineers:

- Chris Goswick commented on 7/10 severe flood impacts on Whitehall Boro, which hadn't put any points on the problem are map. Ryan responded that they are the Borough's engineer and will provide data.

Allegheny County Act 167 Stormwater Management Ordinance
WPAC #2, USC Community & Rec Center
28/7/13
Pierce

Dave Wright, ACDPW.

- Said the County's roads Operation Mgr. will have information on county roads that have flooding/stormwater problems. We should ask for that information.
- Someone (Dave?) said PennDOT will also have this kind of info on PennDOT roads.

Regions 1 and 3: Watershed Plan Advisory Committee (WPAC)

July 29, 2013

Initial	Representing	Name	Title	Phone	Email
	ALCOSAN	Mr. Dave Borneman	Director of Engineering & Construction		
	Allegheny County Conservation District	Ms. Janet Lauer	District Manager	412-241-7645	
	Allegheny County Council	Ms. Krista Harris	Councilwoman		
	Allegheny County Council	Mr. James Burn	Councilman		
	Allegheny County Council	Mr. Matt Drozd	Councilman		
	Allegheny County Council	Ms. Jan Rea	Councilwoman		
	Allegheny County Council	Mr. Michael Finnerty	Councilman		
	Allegheny County Council	Mr. John Palmiere	Councilman		
	Allegheny County Council	Mr. Nicholas Futules	Councilman		
	Allegheny County Council	Dr. Charles Martoni	Councilman		
	Allegheny County Council	Mr. Robert Macey	Councilman		
	Allegheny County Council	Mr. William Robinson	Councilman		
	Allegheny County Council	Ms. Barbara Danko	Councilwoman		
	Allegheny County Council	Mr. James Ellenbogen	Councilman		
	Allegheny County Council	Ms. Amanda Hawkins	Councilwoman		
	Allegheny County Council	Mr. John DeFazio	Councilman		
	Allegheny County Council	Ms. Heather Heidelbaugh	Councilwoman		
	Allegheny County Dept. of Public Works	Mr. Dave Wright	~~Civil Engineer~~ Project Manager	412-350-6645	dwright@alleghenycounty.us DEW
	Allegheny County Dept. of Public Works	Ms. Cathy Trexler	Management Analyst	412-350-2501	ctrexler@alleghenycounty.us
	Allegheny County Emergency Services	Mr. Alvin Henderson	Chief		

Regions 1 and 3: Watershed Plan Advisory Committee (WPAC)

July 29, 2013

Initial	Representing	Name	Title	Phone	Email
	Allegheny County Emergency Services	Mr. Rob McCafferty	Assistant Hazard Mitigation Officer		
	Allegheny County Health Department	Ms. Michelle Buys, P.E.	Environmental Health Engineer	412-578-8040	mbuys@achd.net
	Allegheny County Law Department	Mr. Andrew Szefi	County Solicitor	412-350-1120	
	Baldwin Borough	Mr. John Barrett	Manager	(412) 882-9600	
	Baldwin Township	Ms. Mary McGinley	Secretary	(412) 341-9597	
	Bethel Park	Mr. William Spagnol	Manager	412831 6800	jstatler@bethelpark.net JEAN STATLER
	Braddock Borough	Ms. Maria McCool	Manager	(412) 271-1018	
	Braddock Hills Borough	Ms. Cheryl Sorrentino	Secretary	(412) 241-5080	
	Brentwood Borough	Mr. George Zboyovsky	Manager	412-884-1500	gzboyovsky@brentwoodboro.com
	Bridgeville Borough	Ms. Lori Collins	Manager		
	Carnegie Borough	Mr. Steve Beuter	Administration	412-276-1414	sbeuter.carnegieboro@comcast.net
	Castle Shannon Borough	Mr. Thomas Hartswick	Manager		
	Chalfant Borough	Ms. Kirsten Schwoegl	Secretary	(412) 823-6500	
	Chartiers Creek Watershed Association	Ms. Susan Morgan	President		susanlm@comcast.net
	Char-West Council of Governments	Ms. Janet Snak	Executive Director	412-279-3333	jsnak@cwcog.com
	Churchill Borough	Mr. Craig Robinson	Manager	(412) 241-7113	
	City of Duquesne	Mr. Frank Piccolino	Manager		
	City of McKeesport	Mr. Matthew Gergely	Manager	(412) 675-5020	
	City of Pittsburgh	Ms. Darlene Harris	Council President	412-255-2626	
	City of Pittsburgh Dept. of Planning	Ms. Noor Ismail	Director	412-255-2200	

Regions 1 and 3: Watershed Plan Advisory Committee (WPAC)

July 29, 2013

Initial	Representing	Name	Title	Phone	Email
	City of Pittsburgh Dept. of Planning	Mr. Dan Sentz	Environmental Planner	412-255-2233	dan.sentz@pittsburghpa.gov
	Clairton City	Mr. Howard Bednar	Manager		
	Collier Township	Mr. Sal Sirabella	Manager	412 279-2525	ssirabella@colliertwp.net
	Coraopolis Borough	Mr. Raymond McCutcheon	Manager		
	Crafton Borough	Mr. Robert Callen	Manager		rcallen@craftonborough.com
	Crescent Township	Ms. Kellie Crago	Asst. Secretary		
	Dormont Borough	Mr. Jeff Naftal	Manager	412-561-8900	jnaftal@boro.dormont.pa.us
	Dravosburg Borough	Ms. Brenda Honick	Secretary/Treasurer		
	East McKeesport Borough	Ms. Connie Rosenbayger	Secretary	(412) 824-2531	
	East Pittsburgh Borough	Ms. Eileen Navish	Manager	(412) 823-7124	
	Edgewood Borough	Mr. Warren Cecconi	Manager	(412) 242-4824	
	Elizabeth Borough	Mr. John Grossi	Public Works	(724) 350-1782	jgrossi@elizabeth.com
	Elizabeth Township	Mr. Aaron Sukenik	Secretary	(412) 751-2880	
	Findlay Township	Mr. Gary Klingman	Manager	724-695-0500	gklingman@findlaytwp.org
	Forest Hills Borough	Mr. Steven Morus	Borough Manager/Secretary	412-351-7330	manager@foresthillspa.com
	Forward Township	Ms. Karen Stetor	Secretary	(724) 258-7895	
RRB	Gateway Engineers /	Mr. Ryan Berner	Project Manager	412-921-4030x 165	rberner@gatewayengineers.com
RRB	Gateway Engineers /	Ms. Ruthann Omer	President	412-921-4030	romer@gatewayengineers.com
RRB	Gateway Engineers / Mt. Lebanon	Mr. Dan Deiseroth	Exec. Vice President	412-921-4030 x110	ddeiseroth@gatewayengineers.com
	Glassport Borough	Ms. Nancy Piazza-Whaby	Secretary	(412) 672-7400	

Regions 1 and 3: Watershed Plan Advisory Committee (WPAC)

July 29, 2013

Initial	Representing	Name	Title	Phone	Email
	Green Tree Borough	~~Mr. John Novac~~ DAVE MONTZ	~~Council~~ MANAGER	~~412-498-7480~~ 412-921-9019	JNovak6204@aol.com DMONTZ@GREENTREEBORO.COM
	Heidelberg Borough	Mr. Joseph Kauer	Manager	412-276-0663	jkauer@heidelbergborough.com
	Homestead Borough	Mr. Ian McMeans	Manager		
	Ingram Borough	Ms. Debbie Stecko	Secretary		
	Jefferson Hills Borough	Mr. Doug Arndt	Manager		
	Kennedy Township	Mr. Jerry Orsini	Manager		
	Liberty Borough	Ms. Debra Helderlein	Secretary	(412) 678-3286	
	Lincoln Borough	Ms. Sharon Jageman	Manager	(412) 751-2655	
	McDonald Borough	Ms. Marie Maximovich	Secretary		
	McKees Rocks Borough	Ms. Tricia Levander	Secretary		
	Monroeville	Ms. Lynett McKinney	Manager		
	Montour Run Watershed Association	Mr. David McMilen	Vice President		
LD	**Moon Township**	Ms. Lora Dombrowski	Code Administrator	412-262-1700	ldombrowski@moontwp.com
	Moon Township	Ms. Rebecca Kiernan	Stormwater Intern		rkiernan@moontwp.com
	Mount Lebanon	Mr. Stephen Feller	Manager	412-343-3620	sfeller@mtlebanon.org
	Mount Oliver Borough	Ms. Kathy Connolly	Secretary		
	Munhall Borough	Mr. Matt Galla	Manager		
	Neville Township	Ms. Cindy Alexander	Secretary		
	Nine Mile Run Watershed Association	Mr. Mike Hiller	Director of Policy and Outreach	412-371-8779	mike@ninemilerun.org
BS	**Nine Mile Run Watershed Association**	Ms. Brenda Smith	Executive Director	412-371-8779	brenda@ninemilerun.org

Regions 1 and 3: Watershed Plan Advisory Committee (WPAC)

July 29, 2013

Initial	Representing	Name	Title	Phone	Email
	North Braddock Borough	Mr. Douglas Marguriet	Manager/Secretary	(412) 271-1306	
	North Fayette Township	Mr. Robert Grimm	Manager	724-693-3103	rgrimm@north-fayette.com
	North Versailles Township	Ms. Patricia Logo	Manager	(412) 823-6602	
	Oakdale Borough	Ms. Kelly Rohbeck	Secretary		
	Oakmont Borough	Ms. Lisa Jensen	Manager	(412) 828-3232	
	Office of the County Executive	Ms. Darla Cravotta	Special Projects	412-350-4318	dcravotta@alleghenycounty.us
	Office of the County Manager	Mr. William McKain	County Manager	412-350-5300	
	PA Dep't of Community & Economic Dev't	Mr. Denny Puko	Planning Program Manager	412-770-1660	dpuko@pa.gov
	PA Fish & Boat Commission	Mr. Bob Ventorini	Three Rivers Biologist		
	Pennsylvania DEP Southwest Section	Mr. Jim Kuncelman	MS4 Coordinator	412-442-4000	
	Pennsylvania Environmental Council	Ms. Janie French	Director of Water Programs	412-481-9400	jfrench@pecpa.org
	Penn Hills	Mr. Scott Shepard	Asst. Superintendent DPW	412-798-2151	sshepard@pennhills.org
	Penn State Center	Ms. Lisa Kunst Vavro	Sustainable Landscape Coordinator	412-263-1753	lkv10@psu.edu
	Pennsbury Village Borough	Mr. Irv Foreman	Manager		
	Peters Creek Watershed Association	Mr. Tim Schumann	President	412 233-6628	peterscreekwsa@verizon.net
	Pleasant Hills Borough	Ms. Deborah Englert	Manager		
	Pleasant Hills Borough / Michael Baker Jr.	Mr. William Trimbath	Councilmember / Vice President		
	Plum Borough	Mr. Michael Thomas	Executive Director		
	Port Vue Borough	Ms. Joan Winters	Manager	(412) 664-9323	
	PWSA	Mr. James Stitt	Sustainability Coordinator	(412) 255-8800	jstitt@pgh2o.com

Regions 1 and 3: Watershed Plan Advisory Committee (WPAC)

July 29, 2013

Initial	Representing	Name	Title	Phone	Email
	Raccoon Creek Watershed Association	Mr. Wayne Cumer	Executive Director		
	Rankin Borough	Ms. Patricia DiNinno	Secretary	(412) 271-1027	
	Robinson Township	Mr. Jeff Silka	Manager		
	Rosslyn Farms Borough	Mr. Samuel Maccarone	Secretary/Treasurer		
	Scott Township	Ms. Denise Fitzgerald	Township Engineer		
	South Fayette Township	Mr. Mike Benton	Township Engineer		
	South Hills Area COG	Mr. Lou Gorski	Executive Director	412-341-3750	lou.gorski@shacog.com
	South Park Township	Ms. Karen Fosbaugh	Manager		
	South Versailles Township	Ms. Carla Barron	Secretary	(412) 466-7377	
	Steel Valley COG	Ms. An Lewis	Executive Director	412-462-7600	al@svcog.org
	Streets Run Watershed Association	Ms. Ann Scott	Secretary		
	Stowe Township	Ms. Marie Incorvati	Secretary		
	Swissvale Borough	Ms. Amanda Ford	Manager	(412) 271-7101	
	Thornburg Borough	Ms. Dorothy Falk	Secretary		
	Three Rivers Waterkeeper	Mr. John Stephen	Executive Director	412-589-9411	john@threeriverswaterkeeper.org
	Three Rivers Wet Weather Demo. Program	Ms. Beth Dutton	Municipal Support Coordinator	412-578-8376	bdutton@3rww.org
	Three Rivers Wet Weather Demo. Program	Mr. John Schombert	Executive Director	412-578-8375	jschombert@3rww.org
	Trafford Borough	Ms. Lisa Mallik	Manager	(412) 372-7652	
	Turtle Creek Borough	Ms. Julie Pantalone	Manager	(412) 824-2500	
	Turtle Creek Valley COG	Ms. Amanda Settlemaier	Executive Director	412-858-5115	asett@tcvcog.com

Regions 1 and 3: Watershed Plan Advisory Committee (WPAC)

July 29, 2013

Initial	Representing	Name	Title	Phone	Email
	Twin Rivers Council of Governments	Mr. John Palyo	Executive Director	412-466-7377	jpalyotrcog@choiceonemail.com
	Upper St. Clair Township	Mr. George Kostelich, Jr.	Director of Public Works	412-831-9000	kostelich@twpusc.org
	Upper St. Clair Township	Mr. Matt Serakowski	Township Manager	412-831-9000	serakowski@twpusc.org
	Upper St. Clair Township	Ms. Katie Stringent	Planning and Zoning Coordinator	412-831-9000	stringent@twpusc.org
	US Army Corp of Engineers	Mr. Mark Zaitsoff	Hydraulic Engineer	412-395-7351	Mark.P.Zaitsoff@USACE.Army.mil
	Verona Borough	Ms. Bonita Conway	Manager	(412) 828-8080	
	Versailles Borough	Ms. Jennifer Richards	Secretary	(412) 751-3922	
	Wall Borough	Ms. Julie Donolo	Secretary	(412) 824-3333	
	Washington County Conservation District	Mr. Gary Stokum	District Manager	724-705-7098	gstokum@pawccd.org
	West Elizabeth Borough	Ms. Robin Stockton	Secretary		
	West Homestead Borough	Mr. Raymond Fonos	Manager		
	Western Pennsylvania Conservancy	Mr. Mark Killar	Interim Associate Vice President	412-288-2777	mkillar@paconserve.org
X	**Westmoreland County Conservation District**	Mr. Jim Pillsbury	Hydraulic Engineer	724-837-5271	~~greg@wcdpa.com~~ jim@wcdpa.com
	West Mifflin Borough	Mr. Brian Kamauf	Manager		
	Whitaker Borough	Ms. Jean Warren	Manager		
	White Oak Borough	Ms. Nancy Greeland	Manager		
	Whitehall Borough	Mr. James Leventry	Manager		
	Wilkins Township	Ms. Rebecca Bradley	Commissioner	412-303-0431	rbradley@wilkinstownship.com
	Wilkinsburg Borough	Ms. Marla Marcinko	Manager	(412) 244-2900	
	Wilmerding Borough	Mr. Joseph Hartzell	Secretary	(412) 823-0420	

Regions 1 and 3: Watershed Plan Advisory Committee (WPAC)

July 29, 2013

Initial	Representing	Name	Title	Phone	Email
	MARK YOUNG	PENNDOT	for Dan Cessna		MARKYOUNG@PA.GOV

Regions 1 and 3: Watershed Plan Advisory Committee (WPAC)

July 29, 2013

Initial	Representing	Name	Title	Phone	Email
	ALCOSAN	Mr. Dave Borneman	Director of Engineering & Construction		
	Allegheny County Conservation District	Ms. Janet Lauer Amy Miller	District Manager Watershed Specialist	412-241-7645	abmiller@accdpa.org
	Allegheny County Council	Ms. Krista Harris	Councilwoman		
	Allegheny County Council	Mr. James Burn	Councilman		
	Allegheny County Council	Mr. Matt Drozd	Councilman		
	Allegheny County Council	Ms. Jan Rea	Councilwoman		
	Allegheny County Council	Mr. Michael Finnerty	Councilman		
	Allegheny County Council	Mr. John Palmiere	Councilman		
	Allegheny County Council	Mr. Nicholas Futules	Councilman		
	Allegheny County Council	Dr. Charles Martoni	Councilman		
	Allegheny County Council	Mr. Robert Macey	Councilman		
	Allegheny County Council	Mr. William Robinson	Councilman		
	Allegheny County Council	Ms. Barbara Danko	Councilwoman		
	Allegheny County Council	Mr. James Ellenbogen	Councilman		
	Allegheny County Council	Ms. Amanda Hawkins	Councilwoman		
	Allegheny County Council	Mr. John DeFazio	Councilman		
	Allegheny County Council	Ms. Heather Heidelbaugh	Councilwoman		
	Allegheny County Dept. of Public Works	Mr. Dave Wright	Civil Engineer	412-350-6645	dwright@alleghenycounty.us
	Allegheny County Dept. of Public Works	Ms. Cathy Trexler	Management Analyst	412-350-2501	ctrexler@alleghenycounty.us
	Allegheny County Emergency Services	Mr. Alvin Henderson	Chief		

Regions 1 and 3: Watershed Plan Advisory Committee (WPAC)

July 29, 2013

Initial	Representing	Name	Title	Phone	Email
	Allegheny County Emergency Services	Mr. Rob McCafferty	Assistant Hazard Mitigation Officer		
	Allegheny County Health Department	Ms. Michelle Buys, P.E. M.B.	Environmental Health Engineer	412-578-8040	mbuys@achd.net
	Allegheny County Law Department	Mr. Andrew Szefi	County Solicitor	412-350-1120	
	Baldwin Borough	Mr. John Barrett	Manager	(412) 882-9600	
	Baldwin Township	Ms. Mary McGinley	Secretary	(412) 341-9597	
	Bethel Park	Mr. William Spagnol	Manager		
	Braddock Borough	Ms. Maria McCool	Manager	(412) 271-1018	
	Braddock Hills Borough	Ms. Cheryl Sorrentino	Secretary	(412) 241-5080	
	Brentwood Borough	Mr. George Zboyovsky	Manager	412-884-1500	gzboyovsky@brentwoodboro.com
	Bridgeville Borough	Ms. Lori Collins	Manager		
	Carnegie Borough	Mr. Steve Beuter	Administration	412-276-1414	sbeuter.carnegieboro@comcast.net
	Castle Shannon Borough	Mr. Thomas Hartswick	Manager		
	Chalfant Borough	Ms. Kirsten Schwoegl	Secretary	(412) 823-6500	
	Chartiers Creek Watershed Association	Ms. Susan Morgan	President		susanlm@comcast.net
	Char-West Council of Governments	Ms. Janet Snak	Executive Director	412-279-3333	jsnak@cwcog.com
	Churchill Borough	Mr. Craig Robinson	Manager	(412) 241-7113	
	City of Duquesne	Mr. Frank Piccolino	Manager		
	City of McKeesport	Mr. Matthew Gergely	Manager	(412) 675-5020	
	City of Pittsburgh	Ms. Darlene Harris	Council President	412-255-2626	
	City of Pittsburgh Dept. of Planning	Ms. Noor Ismail	Director	412-255-2200	

Regions 1 and 3: Watershed Plan Advisory Committee (WPAC)

July 29, 2013

Initial	Representing	Name	Title	Phone	Email
	City of Pittsburgh Dept. of Planning	Mr. Dan Sentz	Environmental Planner	412-255-2233	dan.sentz@pittsburghpa.gov
	Clairton City	Mr. Howard Bednar	Manager		
	Collier Township	Mr. Sal Sirabella	Manager	412 279-2525	ssirabella@colliertwp.net
	Coraopolis Borough	Mr. Raymond McCutcheon	Manager		
	Crafton Borough	Mr. Robert Callen	Manager		
	Crescent Township	Ms. Kellie Crago	Asst. Secretary		
	Dormont Borough	Mr. Jeff Naftal	Manager	412-561-8900	jnaftal@boro.dormont.pa.us
	Dravosburg Borough	Ms. Brenda Honick	Secretary/Treasurer		
	East McKeesport Borough	Ms. Connie Rosenbayger	Secretary	(412) 824-2531	
	East Pittsburgh Borough	Ms. Eileen Navish	Manager	(412) 823-7124	
	Edgewood Borough	Mr. Warren Cecconi	Manager	(412) 242-4824	
	Elizabeth Borough	Mr. John Grossi	Public Works	(724) 350-1782	jgrossi@elizabeth.com
	Elizabeth Township	Mr. Aaron Sukenik	Secretary	(412) 751-2880	
	Findlay Township	Mr. Gary Klingman	Manager	724-695-0500	gklingman@findlaytwp.org
	Forest Hills Borough	Mr. Steven Morus	Borough Manager/Secretary	412-351-7330	manager@foresthillspa.com
	Forward Township	Ms. Karen Stetor	Secretary	(724) 258-7895	
	Gateway Engineers /	Mr. Ryan Berner	Project Manager	412-921-4030x 165	rberner@gatewayengineers.com
	Gateway Engineers /	Ms. Ruthann Omer	President	412-921-4030	romer@gatewayengineers.com
	Gateway Engineers / Mt. Lebanon	Mr. Dan Deiseroth	Exec. Vice President	412-921-4030 x110	ddeiseroth@gatewayengineers.com
	Glassport Borough	Ms. Nancy Piazza-Whaby	Secretary	(412) 672-7400	

Regions 1 and 3: Watershed Plan Advisory Committee (WPAC)

July 29, 2013

Initial	Representing	Name	Title	Phone	Email
	Green Tree Borough	Mr. John Novac	Council	412-498-7480	JNovak6204@aol.com
	Heidelberg Borough	Mr. Joseph Kauer	Manager	412-276-0663	jkauer@heidelbergborough.com
	Homestead Borough	Mr. Ian McMeans	Manager		
	Ingram Borough	Ms. Debbie Stecko	Secretary		
	Jefferson Hills Borough	Mr. Doug Arndt	Manager		
	Kennedy Township	Mr. Jerry Orsini	Manager		
	Liberty Borough	Ms. Debra Helderlein	Secretary	(412) 678-3286	
	Lincoln Borough	Ms. Sharon Jageman	Manager	(412) 751-2655	
	McDonald Borough	Ms. Marie Maximovich	Secretary		
	McKees Rocks Borough	Ms. Tricia Levander	Secretary		
	Monroeville	Ms. Lynett McKinney	Manager		
	Montour Run Watershed Association	Mr. David McMilen	Vice President		
	Moon Township	Ms. Lora Dombrowski	Code Administrator	412-262-1700	ldombrowski@moontwp.com
	Moon Township	Ms. Rebecca Kiernan	Stormwater Intern		rkiernan@moontwp.com
	Mount Lebanon	Mr. Stephen Feller	Manager	412-343-3620	sfeller@mtlebanon.org
	Mount Oliver Borough	Ms. Kathy Connolly	Secretary		
	Munhall Borough	Mr. Matt Galla	Manager		
	Neville Township	Ms. Cindy Alexander	Secretary		
	Nine Mile Run Watershed Association	Mr. Mike Hiller	Director of Policy and Outreach		
	Nine Mile Run Watershed Association	Ms. Brenda Smith	Executive Director	412-371-8779	brenda@ninemilerun.org

Regions 1 and 3: Watershed Plan Advisory Committee (WPAC)

July 29, 2013

Initial	Representing	Name	Title	Phone	Email
	North Braddock Borough	Mr. Douglas Marguriet	Manager/Secretary	(412) 271-1306	
RFG	North Fayette Township	Mr. Robert Grimm	Manager	724-693-3103	rgrimm@north-fayette.com
	North Versailles Township	Ms. Patricia Logo	Manager	(412) 823-6602	
	Oakdale Borough	Ms. Kelly Rohbeck	Secretary		
	Oakmont Borough	Ms. Lisa Jensen	Manager	(412) 828-3232	
	Office of the County Executive	Ms. Darla Cravotta	Special Projects	412-350-4318	dcravotta@alleghenycounty.us
	Office of the County Manager	Mr. William McKain	County Manager	412-350-5300	
	PA Dep't of Community & Economic Dev't	Mr. Denny Puko	Planning Program Manager	412-770-1660	dpuko@pa.gov
	PA Fish & Boat Commission	Mr. Bob Ventorini	Three Rivers Biologist		
	Pennsylvania DEP Southwest Section	Mr. Jim Kuncelman	MS4 Coordinator	412-442-4000	
	Pennsylvania Environmental Council	Ms. Janie French	Director of Water Programs	412-481-9400	jfrench@pecpa.org
	Penn Hills	Mr. Scott Shepard	Asst. Superintendent DPW	412-798-2151	sshepard@pennhills.org
	Penn State Center	Ms. Lisa Kunst Vavro	Sustainable Landscape Coordinator	412-263-1753	lkv10@psu.edu
	Pennsbury Village Borough	Mr. Irv Foreman	Manager		
TLS	Peters Creek Watershed Association	Mr. Tim Schumann	President	412 233-6628	peterscreekwsa@verizon.net
	Pleasant Hills Borough	Ms. Deborah Englert	Manager		
WDT	Pleasant Hills Borough / Michael Baker Jr.	Mr. William Trimbath	Councilmember / Vice President	724 495 4302	btrimbath@mbakercorp.com
	Plum Borough	Mr. Michael Thomas	Executive Director		
	Port Vue Borough	Ms. Joan Winters	Manager	(412) 664-9323	
	PWSA	Mr. James Stitt	Sustainability Coordinator	(412) 255-8800	jstitt@pgh2o.com

Regions 1 and 3: Watershed Plan Advisory Committee (WPAC)

July 29, 2013

Initial	Representing	Name	Title	Phone	Email
	Raccoon Creek Watershed Association	Mr. Wayne Cumer	Executive Director		
	Rankin Borough	Ms. Patricia DiNinno	Secretary	(412) 271-1027	
	Robinson Township	Mr. Jeff Silka	Manager		
	Rosslyn Farms Borough	Mr. Samuel Maccarone	Secretary/Treasurer		
	Scott Township	Ms. Denise Fitzgerald	Township Engineer		
✓	**South Fayette Township**	Mr. Mike Benton	Township Engineer	412-221-8700	mbenton@sftwp.com
	South Hills Area COG	Mr. Lou Gorski	Executive Director	412-341-3750	lou.gorski@shacog.com
	South Park Township	Ms. Karen Fosbaugh	Manager	412-831-7000	SOUTHPARKTWP@SOUTHPARKTWP.COM
	South Versailles Township	Ms. Carla Barron	Secretary	(412) 466-7377	
	Steel Valley COG	Ms. An Lewis	Executive Director	412-462-7600	al@svcog.org
	Streets Run Watershed Association	Ms. Ann Scott	Secretary		
	Stowe Township	Ms. Marie Incorvati	Secretary		
	Swissvale Borough	Ms. Amanda Ford	Manager	(412) 271-7101	
	Thornburg Borough	Ms. Dorothy Falk	Secretary		
	Three Rivers Waterkeeper	Mr. John Stephen	Executive Director	412-589-9411	john@threeriverswaterkeeper.org
	Three Rivers Wet Weather Demo. Program	Ms. Beth Dutton	Municipal Support Coordinator	412-578-8376	bdutton@3rww.org
	Three Rivers Wet Weather Demo. Program	Mr. John Schombert	Executive Director	412-578-8375	jschombert@3rww.org
	Trafford Borough	Ms. Lisa Mallik	Manager	(412) 372-7652	
	Turtle Creek Borough	Ms. Julie Pantalone	Manager	(412) 824-2500	
	Turtle Creek Valley COG	Ms. Amanda Settlemaier	Executive Director	412-858-5115	asett@tcvcog.com

Regions 1 and 3: Watershed Plan Advisory Committee (WPAC)

July 29, 2013

Initial	Representing	Name	Title	Phone	Email
	Twin Rivers Council of Governments	Mr. John Palyo	Executive Director	412-466-7377	jpalyotrcog@choiceonemail.com
	Upper St. Clair Township	Mr. George Kostelich, Jr.	Director of Public Works	412-831-9000	kostelich@twpusc.org
	Upper St. Clair Township	Mr. Matt Serakowski	Township Manager	412-831-9000	serakowski@twpusc.org
	Upper St. Clair Township	Ms. Katie Stringent	Planning and Zoning Coordinator	412-831-9000	stringent@twpusc.org
	US Army Corp of Engineers	Mr. Mark Zaitsoff	Hydraulic Engineer	412-395-7351	Mark.P.Zaitsoff@USACE.Army.mil
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	Wall Borough	Ms. Julie Donolo	Secretary	(412) 824-3333	
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	West Elizabeth Borough	Ms. Robin Stockton	Secretary		
	West Homestead Borough	Mr. Raymond Fonos	Manager		
	Western Pennsylvania Conservancy	Mr. Mark Killar	Interim Associate Vice President	412-288-2777	mkillar@paconserve.org
	Westmoreland County Conservation District	Mr. Jim Pillsbury	Hydraulic Engineer	724-837-5271	greg@wcdpa.com
	West Mifflin Borough	Mr. Brian Kamauf	Manager		
	Whitaker Borough	Ms. Jean Warren	Manager		
	White Oak Borough	Ms. Nancy Greeland	Manager		
	Whitehall Borough	Mr. James Leventry	Manager		
	Wilkins Township	Ms. Rebecca Bradley	Commissioner	412-303-0431	rbradley@wilkinstownship.com
	Wilkinsburg Borough	Ms. Marla Marcinko	Manager	(412) 244-2900	
	Wilmerding Borough	Mr. Joseph Hartzell	Secretary	(412) 823-0420	

Regions 1 and 3: Watershed Plan Advisory Committee (WPAC)

July 29, 2013

Initial	Representing	Name	Title	Phone	Email
JB	~~Bob~~ SFMUTTE MUNICIPAL AUTHORITY	JERRY BROWN	MANAGING DIRECTOR	412-257-5100	jbrown@sfmp.com
	Michael Baker Eng	Mel Petroccia	Proj. Mgr	724-495-4307	mpetrocc@mbakercorp.com

APPENDIX D-3

Watershed Plan Advisory Committee (WPAC) #3
February 3, 2015 Meeting

COUNTY OF ALLEGHENY

RICH FITZGERALD
COUNTY EXECUTIVE

Watershed Plan Advisory Committee (WPAC)

Meeting No. 3

Green Tree Municipal Building

February 3, 2015

6:30 PM

Welcome & Introductions

1. Act 167 Overview
2. Role of the Watershed Plan Advisory Committee (WPAC)
3. Background for the Allegheny County Act 167
4. Brief review of the Phase I Report
5. Overview of the Phase II Scope of Study & Goals
6. Review of Municipal Survey Results
    a. Reported Problem Areas and Obstructions
    b. Additional Municipal Responses
7. Phase II Schedule/Timeline
8. Coordination with the 2015 Allegheny County Hazard Mitigation Plan Update
9. Open Discussion on Stormwater Problems/Questions

ROBERT D. HURLEY, DIRECTOR
ALLEGHENY COUNTY ECONOMIC DEVELOPMENT
ONE CHATHAM CENTER • SUITE 900 • 112 WASHINGTON PLACE • PITTSBURGH, PA 15219
PHONE (412) 350-1000 • WWW.ALLEGHENYCOUNTY.US/ECONOMIC/

Allegheny County Stormwater Management Plan
Phase II
WPAC #3 Meeting Notes
Green Tree Municipal Building
2.3.15 6:30 PM

Q: When was the first set of WPACs and will there be smaller advisory committees that meet more often than the remaining group meetings?
A: Thought first meetings were in late 2012 and we can consider smaller advisory committee meetings

Q: Do you have a critical timeline to complete this project?
A: We will address that later on in the presentation.

Q: Is tonight's PowerPoint presentation going to be available somewhere?
A: Yes, we can put it on the website

Q: When was the Phase I report finished?
A: The Phase I report was finished in December of 2014 and is available on the website.

Q: Does the FEMA mapping you have include any information that shows a correlation between SWMP and economics?
A: Response indicated that there is not a specific map regarding that but you could extrapolate economics by looking at how much has been paid out to clean up flood damage.
A: The County's Hazard Mitigation Plan may address the correlation between reduced flooding and a positive economic impact.

Q: Do DEP's BMPs address the amount of clay soils in our area?
A: Yes

> Q: Will soil testing be required as part of SWMP?
> A: Infiltration testing will be required as part of the ordinance (no testing during Phase II)

Q: In regards to stormwater retention areas, if a forebay grows cattails will the area be designated as a wetland by DEP and be regulated as such?
A: There is a waiver for this type of situation; area can be maintained and is not regulated by DEP

Q: How much field work will be needed in a typical area for Phase 2 of SWMP?
A: It depends on what kind of problem area is being looked at, and the density. It can take a lot of time to look at one or if minimal issues you can look at one to two dozen areas per hour

Q: How much maintenance is involved with detention basins?
A: Not a lot unless you have a lot of sediment deposit
Q: How much maintenance is involved in wetlands?
A: Little to no maintenance needed.

Q: Is there potential to get funding for additional hydrologic modeling?
A: We continue to keep this on our radar and will do additional modeling as we are able.

Q: Who will update the SWMP?
A: The County will update the SWMP after Phase II

Q: Will justification be given for which municipalities will have modeling done?
A: Yes, and modeling done for existing plans can be used as well.

Q: Will municipal managers be invited to the meeting with municipal engineers?

A: Yes. Will also be reaching out to Municipal Solicitors through bar
Dormont Borough Manager requested to be notified for solicitors as well.

COMMENT: Some stormwater facilities have been retrofitted using Growing Greener grant money. The grant funds are still available to muncipalites.

Q: Will municipalities be required to adopt this SWM ordinance?
A: According to 167, once DEP approves the plan, municipalities will have 6 months to adopt

Q: How does this plan impact North Hills which already has a 167 plan and ordinance?
A: North Hills plan will be considered when creating this plan; County scope includes highlighting work that has already been done. Will also be used as guidance and "lessons learned". The new county model ordinance will still need to be adopted by the North Hills municipalities. The adoption of the new ordinance is one step in the process of meeting the MS4 requirements.

Q: Whose responsibility is it to advise/educate elected municipal officials about this plan?
A: Onus is on WPAC reps/municipalities; Kay and Will (and County) will continue to promote.
A: It will be the municipal manager's responsibility.

GOVERNMENT DEPARTMENTS / AGENCIES

INITIAL	DEPT/AGENCY	NAME & TITLE	E-MAIL	COMMENTS
	3RWW Demonstration Program	John Schombert, Executive Director	jschombert@3rww.org	
	3RWW Demonstration Program	Beth Dutton, Municipal Support Coordinator	bdutton@3rww.org	
	ALCOSAN	Arletta Williams, Executive Director	arletta.williams@alcosan.org	
	ALCOSAN	Dave Borneman, Director, Engineering & Construction	David.Borneman@alcosan.org	
	Allegheny County Conservation District	Jan Lauer, District Manager	jlauer@accdpa.org	Amy Miller
	Allegheny County Council	Sue Means, Councilwoman	smeans@alleghenycounty.us	
	Allegheny County Council	William Robinson, Councilman	wrobinson@alleghenycounty.us	
	Allegheny County Council	Barbara Danko, Councilwoman	Barbara.Danko@alleghenycounty.us	
	Allegheny County Council	James Ellenbogen, Councilman	jellenbogen@alleghenycounty.us	
	Allegheny County Council	Amanda Hawkins, Councilwoman	agreen@alleghenycounty.us	
	Allegheny County Council	John DeFazio, Councilman	jdefazio@alleghenycounty.us	
	Allegheny County Council	Heather Heidelbaugh, Councilwoman	hheidelbaugh@alleghenycounty.us	
	Allegheny County Council	John Palmiere, Councilman	jpalmiere@alleghenycounty.us	
	Allegheny County Council	Charles Martoni, Councilman	cmartoni@alleghenycounty.us	
	Allegheny County Council	Robert Macey, Councilman	rmacey@alleghenycounty.us	
	Allegheny County Council	Thomas Baker, Councilman	tbaker@alleghenycounty.us	
	Allegheny County Council	Jan Rea, Councilwoman	jrea@alleghenycounty.us	

GOVERNMENT DEPARTMENTS / AGENCIES

INITIAL	DEPT/AGENCY	NAME & TITLE	E-MAIL	COMMENTS
	Allegheny County Council	Michael Finnerty, Councilman	mfinnerty@alleghenycounty.us	
	Allegheny County Council	Nicholas Futules, Councilman	nfutules@alleghenycounty.us	
	Allegheny County Council	Edward Kress, Councilman	ekress@alleghenycounty.us	
	Allegheny County DPW	Stephen Shanley, Director	stephen.shanley@alleghenycounty.us	
	Allegheny County DPW	Dave Wright, Civil Engineer	dwright@alleghenycounty.us	
	Allegheny County DPW	Ron Sander Cathy Trexler, Management Analyst	ctrexler@alleghenycounty.us	
	Allegheny County Emergency Services	Alvin Henderson, Chief	ahenderson@alleghenycounty.us	
	Allegheny County Emergency Services	Steve Wilharm	swilharm@alleghenycounty.us	
M.B.	Allegheny County Health Department	Karen Hacker, Director	khacker@achd.net	Michelle Buys for Dr. Hacker
	Allegheny County Law Department	Andrew Szefi, County Solicitor	aszefi@alleghenycounty.us	
	Beaver County Conservation District	Jim Shaner, District Manager	jim.shaner@bccdpa.us	
	Butler County Conservation District	Ronald Fodor, District Manager	rfodor@co.butler.pa.us	
	City of Pittsburgh	William Peduto, Mayor	william.peduto@pittsburghpa.gov	
	City of Pittsburgh Dept. of Planning	Ray Gastil, Director	ray.gastil@pittsburghpa.gov	
	COG: Allegheny Valley North	Tom Benecki, Executive Director	avncog@earthlink.net	
	COG: Char-West	Janet Snak, Executive Director	jsnak@cwcog.com	
W.E.R.V	COG: North Hills	Wayne Roller, Executive Director	wroller@northhillscog.org	

GOVERNMENT DEPARTMENTS / AGENCIES

INITIAL	DEPT/AGENCY	NAME & TITLE	E-MAIL	COMMENTS
	COG: Quaker Valley	John Jakiela, Executive Director	qvcog@verizon.net	
	COG: South Hills Area	Lou Gorski, Executive Director	lou.gorski@shacog.com	
	COG: Steel Valley	An Lewis, Executive Director	al@svcog.org	
	COG: Turtle Creek Valley	Amanda Settlemaier, Executive Director	asett@tcvcog.com	
	COG: Twin Rivers	John Paylo, Executive Director	jpalyotrcog@choiceonemail.com	
	Office of the County Executive	Darla Cravotta, Special Projects	darla.cravotta@alleghenycounty.us	
	Office of the County Manager	William McKain, County Manager	wmckain@alleghenycounty.us	
	PA DCED	Denny Puko, Planning Program Manager	dpuko@pa.gov	
	PA DEP Southwest Section	Susan Malone, Regional Director	sumalone@state.pa.us	
	PA DEP Southwest Section	Jeff Fliss Jeff Fliss	jfliss@pa.gov	Ron Furlan rfurlan@pa.gov
	PA Fish & Boat Commission	Bob Ventorini, Three Rivers Biologist		
	Penn State Center	Deno De Ciantis, Director	dwd5@psu.edu	
	PennDOT District 11-0	Dan Cessna, District Executive	hcessna@pa.gov	
	PWSA	Tom Palmosina, Director, Water Operations	tpalmosina@pgh20.com	
	PWSA	James Stitt, Sustainability Coordinator	jstitt@pgh2o.com	
	US Army Corp of Engineers	Bernard Lindstrom, Commander	bernard.lindstrom@usace.army.mil	
	Washington County Conservation District	Gary Stokum, District Manager	gstokum@pawccd.org	

INITIAL	DEPT/AGENCY	NAME & TITLE	E-MAIL	COMMENTS
	Westmoreland County Conservation District	Jim Pillsbury, Hydrologic Engineer	jim@wcdpa.com	
	" "	MATT ZAMBELLI, STORMWATER TECHNICIAN	MATT@WCDPA.COM	
	SPC	Erin Kepple, Water Res. Mgr	ekepple@spcregion.org	
	PWSA	Katherine Camp GI Prog Mgr	kcamp@pgh2o.com	
	SPC	Sarah Koenig Water Res Planner	skoenig@spcregion.org	

OTHER ORGANIZATIONS

INITIAL	ORGANIZATION	NAME & TITLE	E-MAIL	COMMENTS
	Chartiers Creek Watershed Assoc.	Susan Morgan, President	susanlm@comcast.net	
	Montour Run Watershed Assoc.	Mark Fedosick, President	president@mrwa.info	
DM	Montour Run Watershed Assoc.	Dave McMillen	dmcmil5378@aol.com	
	Peters Creek Watershed Assoc.	Schumann, President		
	Raccoon Creek Watershed Assoc.	Cumer, President	wcumer371@verizon.net	
	Streets Run Watershed Assoc.	Scott, Secretary		
	Nine Mile Run Watershed Assoc.	Brenda Smith, Executive Director	brenda@ninemilerun.org	
	Turtle Creek Watershed Assoc.			
	Western PA Conservancy	Thomas Saunders, C.E.O.	tsaunders@paconserve.org	
	Pennsylvania Environmental Council	Davitt Woodwell, President	dwoodwell@pecpa.org	
	PENN STATE CENTER PGH	LISA KUNST VAVRO	LVavro@psu.edu	SUSTAINABLE ENVIRONMENTS MNGR.
	Pitt	Brian Chalfant	bac84@pitt.edu	
	NMRWA	Mike Hillee	mike@ninemilerun.org	

REGION 1 - MUNICIPALITIES

INITIAL	MUNICIPALITY	NAME	E-MAIL	COMMENTS/WRITE-IN
	Baldwin Boro	Barrett John, Manager	JBarrett@baldwinborough.org	
	Baldwin Twp.	Robert Zahorchak, Manager	rob.zahorchak@baldwintownship.com	
	Brentwood Boro	George Zboyovsky, Manager	gzboyovsky@brentwoodboro.com	
	Bridgeville Boro	Lori Collins, Manager	lcollins@bridgevilleboro.com	Joe Sites / Gm Tenney
	Carnegie Boro	Stephen Beuter, Manager	sbeuter.carnegieboro@comcast.net	Veronica Bennett Bob Robinson
	Castle Shannon Boro	Thomas Hartswick, Manager	csboro@comcast.net	
	Duquesne, City of	Frank Piccolini, Manager	fpiccolino.duquesne@comcast.net	
	Clairton, City of	Howard Bednar, Manager	manager@cityofclairton.com	
	Collier Twp	Salvatore Sirabella, Manager	ssirabella@colliertwp.net	
	Coraopolis Boro	Raymond McCutcheon, Manager	Manager@coraopolisPA.com	
	Crafton Boro	John Trant, Interim Manager	jtrant@craftonborough.com	
	Crescent Twp	Crago, Kellie	info@crescenttownship.com	
	Dormont Boro	Naftal, Jeff	jnaftal@boro.dormont.pa.us	Jeff Naftal
	Dravosburg Boro	Honick, Brenda	dravoadmin@comcast.net	
	Findlay Twp	Chris Caruso ~~Gary Klingman~~, Manager	ccaruso ~~gklingman~~@findlaytwp.org	Tim Cook - Stormwater Mgmt. - TCook@findlaytwp.org
	Green Tree Boro	W. David Montz, Manager	DMontz@greentreeboro.com	
	Heidelberg Boro	Joeseph Kauer, Interim Manager	j.kauer@HeidelbergBorough.com	
	Homestead Boro	Ian McMeans, Manager	homesteadborough@comcast.net	
	Ingram Boro	Debbie Stecko, Secretary	kpendergast@ingramborough.org	
	Jefferson Hills Boro	Doug Arndt, Manager	darndt@jeffersonhills.net	
	Kennedy Twp	Gerald Orsini, Manager	mleck@kennedytwp.com	

REGION 1 - MUNICIPALITIES

INITIAL	MUNICIPALITY	NAME	E-MAIL	COMMENTS/WRITE-IN
	McDonald Boro	Marie Maximovich, Secretary	mmaximovich@mcdonaldboro.com	
	McKees Rocks Boro	Tricia Levander, Secretary	tlevander@mckeesrocksborough.com	
	Moon Twp	Jeff Zeigler, Interim Manager	ldombrowski@moontwp.com	Malcolm Petraccia Lora Dombrowski
	Mount Oliver Boro	Kathy Connolly, Secretary	kconnolly4354@comcast.net	
	Munhall Boro	Robert Callen, Manager	info@munhallpa.us	
	Bethel Park	William Spagnol, Manager	manager@bethelpark.net	Jim Lawson
	Mount Lebanon	Stephen Feller, Manager	sfeller@mtlebanon.org	
	Neville Twp	Cindy Alexander, Secretary	nevilletownship@aol.com	
RBG	North Fayette Twp	Robert Grimm, Manager	rgrimm@north-fayette.com	
	Oakdale Boro	Kelly Rohbeck, Secretary	rohbeck@oakdaleborough.com	
	Pennsbury Village Boro	Reene Freemer, Manager		
	Pleasant Hills Boro	Deborah Englert, Manager	d.englert@comcast.net	
	Robinson Twp	Jeff Silka, Manager	jsilka@townshipofrobinson.com	
	Rosslyn Farms Boro	Samuel Maccarone, Sec/Treasurer	smaccarone@hmapgh.net	
	Scott Twp	Denise Fitzgerald, Manager	scotttwp@scotttownship.com	
MAB	South Fayette Twp	~~Ryan Eggleston, Manager~~ Mike Bordas / Twp Engr	sfadmin@sftwp.com	
	South Park Twp	Karen Fosbaugh, Manager	southparktwp@southparktwp.com	
	Stowe Twp	Marie Incorvati, Secretary	mariestowepd@comcast.net	
	Thornburg Boro	Meg Alarcon, Secretary	thornburg.secretary@gmail.com	
	Upper St. Clair Twp.	Matthew Serakowski, Manager	Serakowski@twpusc.org	George Kostelich Jr David Kuhn
	West Elizabeth Boro	Bill Wolfgang, Code Enforcement	westelizabeth@comcast.net	

REGION 1 - MUNICIPALITIES

INITIAL	MUNICIPALITY	NAME	E-MAIL	COMMENTS/WRITE-IN
	West Homestead Boro	Kyle Thauvette, Manager	westhomesteadborough@gmail.com	
	West Mifflin Boro	Brian Kamauf, Manager	BKamauf@westmifflinborough.com	
	Whitaker Boro	Jean Warren, Secretary	whitaker@rdm-inc.com	
	Whitehall Boro	James Leventry, Manager	jleventry@whitehallboro.org	

Region 2 - Municipalities

INITIAL	MUNICIPALITY	NAME & TITLE	E-MAIL	COMMENTS/WRITE-IN
	Aleppo Twp	Gwen Patterson, Manager	aleppomgr@comcast.net	
	Aspinwall Boro	Melissa Lang, Manager	mlang@boroughofaspinwall.com	
	Avalon Boro	Harry Dilmore, Manager	hdilmore@boroughofavalon.org	Mark Scally
	Bell Acres Boro	Charles Kulbaki, Manager	cabell717@verizon.net	
	Bellevue Boro	Ronald Borczyk, Manager	info@bellevueboro.com	
✓	Ben Avon Boro	Carmella Hallstein, Secretary	benavon@benavon.com	
✓	Ben Avon Heights Boro	Denise Raves, Manager	benavonheightsborough6@gmail.com	Scott Dismukes (Mayor)
	Blawnox Boro	Kathy Ulanowicz, Interim Mgr.	blxoffice@blawnox.net	
	Brackenridge Boro	Denise Tocco, Manager	brackenridgeborough@comcast.net	
	Bradford Woods Boro	Colby Howe, Manager	bradfordwoods@zoominternet.net	
	Cheswick Boro	Andrew Bock, Secretary	abock.cheswick@yahoo.com	
	East Deer Twp	Bettina Lesoon, Manager	eastdeermanager@verizon.net	
	Edgeworth Boro	Martin McDaniel, Manager	marty.mcdaniel@verizon.net	
	Emsworth Boro	Cathy Jones, Secretary	emsworthborough@comcast.net	
✓	Etna Boro	Mary Ellen Ramage, Manager	meramage@etnaborough.org	Mem / + Pete Ramage Tom Rengers Dave Becki
	Fawn Twp	Patricia Bryant, Scy/Treasurer	fawntwp@comcast.net	
	Fox Chapel Boro	Gary Koehler, Manager	rjsmith@fox-chapel.pa.us	
	Franklin Park Boro	Ambrose Rocca, Manager	arocca@franklinparkborough.us	
	Frazer Twp	Lori Ziencik, Manager	frazertwp@comcast.net	
	Glen Osborne Boro	Diane Vierling, Manager	dvierling@sewickleyborough.org	
	Glen Osborne Boro	John Orndorff - B. Council	orndjo@verizon.net	
	Glenfield Boro	Robert Brown, Manager	glenfieldboro@aol.com	
	Hampton Twp	W. Christopher Lochner, Manager	susan.bernet@hampton-pa.org	
	Harmar Twp	Donna Piper, Secretary/Treasurer	harmar701@comcast.net	
	Harrison Twp	Faith Payne, Executive Secretary	fapayne@comcast.net	
	Haysville Boro	Linda Ribnicky, Secretary	haysvilleborough1@verizon.net	

Region 2 - Municipalities

INITIAL	MUNICIPALITY	NAME & TITLE	E-MAIL	COMMENTS/WRITE-IN
	Indiana Twp	Daniel L. Anderson, Manager	danderson@indianatownship.com	
	Kilbuck Twp	Harry Dilmore, Manager	avalonmgr@aol.com	
	Leet Twp	Wayne Hyjek, Manager	whyjekleet@verizon.net	
	Leetsdale Boro	Jennifer Simek, Secretary	simek@leetsdaleboro.net	
	Marshall Twp	Neil McFadden, Manager Art Gazdik	neilmc@twp.marshall.pa.us artgazdike groundworkcivil.net	
	Marshall Twp	Art Gazdik, Twp. Engineer	artgazdik@groundworkcivil.net	
	McCandless Twn	Tobias Cordek, Manager	mccmgr@townofmccandless.org	
	Millvale Boro	Amy Rockwell, Manager	ARockwell@millvaleboro.com	
	Millvale Boro	Code Enforcement	codetunstall@millvaleboro.com	
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	O'Hara Twp	C. Steinert, Twp. Engineer	csteinert@ohara.pa.us	
	Ohio Twp	John Sullivan, Jr., Manager	sully@ohiotwp.org	
	Pine Twp	Scott Anderson, Manager	sanderso@twp.pine.pa.us	
	Reserve Twp	Tom Lavorini, Manager	manager@reservetwp.com	
	Richland Twp	Dean Bastianini, Manager	rttina@zoominternet.net	
✓	Ross Twp	Douglas Sample, Manager	dsample@ross.pa.us	
	Sewickley Boro	Kevin Flannery, Manager	kflannery@sewickleyborough.org	
J	Sewickley Heights Boro	William Rohe, Manager	wrohe@sewickleyheightsboro.com	
	Sewickley Hills Boro	Diane Steele, Manager	sewickleyhillsborough@comcast.net	
	Shaler Twp	Timothy Rogers, Manager	manager@shaler.org	
	Sharpsburg Boro	Jan Barbus, Manager	secretary@sharpsburgborough.com	
	Springdale Boro	Kim McAfoose, Manager	springdaleboro@hotmail.com	
	Springdale Twp	Dawn Biery, Secretary	sprtwp@verizon.net	
	Tarentum Boro	William Rossey, Manager	manager@tarentumboro.com	
	West Deer Twp	Daniel L. Mator, Manager	dmator@westdeertownship.com	
✓	West View Boro	Bruce Fromlak, Manager	wvboro@aol.com	
	Swissvale	Darrell Rapp	Rapp4Swissvale@gmail.com	

REGION 3 - MUNICIPALITIES

INITIAL	MUNICIPALITY	NAME & TITLE	E-MAIL	COMMENTS/WRITE-IN
	Braddock Boro	Maria McCool, Manager	braddockmanager@comcast.net	
	Braddock Hills Boro	Cheryl Sorrento, Secretary	bradhillsboro@comcast.net	
	Chalfant Boro	Kirsten Schwoegl, Secretary	schwoegl@msn.com	
	Churchill Boro	Craig Robinson, Manager	craigrobinson@churchillborough.com	
	East McKeesport Boro	Connie Rosenbayger, Secretary	administrator@eastmckeesportboro.com	
	East Pittsburgh Boro	Eileen Navish, Manager	emncpa@aol.com	
	Edgewood Boro	Julie Bastianini, Manager	manager@edgewoodboro.com	
	Elizabeth Boro	Pam Sharp, Secretary	psharp@elizabethpa.net	
	Elizabeth Twp	Harry Faulk, Manager	manager@elizabethtownshippa.com	
	Forest Hills Boro	Steven Morus, Manager	manager@foresthillspa.com	
	Forward Twp	Karen Stetor, Secretary	fwdtwp1@comcast.net	
	Glassport Boro	Nancy Piazza-Whaby, Secretary	glassportpa@yahoo.com	
	Liberty Boro	Debra Helderlein, Secretary	liberty2921@yahoo.com	
	Lincoln Boro	Sharon Jageman, Manager	lincolnboro@yahoo.com	
	McKeesport	Matthew Gergely, City Adminstrator	Matt.gergley@mckeesport-pa.gov	
	Monroeville	Timothy Little, Manager	mckinl@monroeville.pa.us	Travis Stanczyk - Chester
	North Braddock Boro	Douglas Marguriet, Mgr/Secretary		
	North Versailles Twp	Patricia Logo, Manager	PLogo@nvtpa.com	
✓	Oakmont Boro	Lisa Jensen-Cooper, Manager	ljensen@oakmontborough.com	Ryan Jeraski
	Penn Hills	Mohammed Rayan, Manager	mrayan@pennhills.org	
	Pitcairn Boro	Annette Dietz, Manager	manager@pitcairncable.com	
	Plum Boro	Michael Thomas, Manager	mthomas@plumboro.com	

REGION 3 - MUNICIPALITIES

INITIAL	MUNICIPALITY	NAME & TITLE	E-MAIL	COMMENTS
	Port Vue Boro	Joan Winters, Manager	winters.joan@comcast.net	
	Rankin Boro	Patricia DiNinno, Secretary	pmd0161@yahoo.com	
	South Versailles Twp	Carla Barron, Secretary		
	Swissvale Boro	Clyde Wilhelm, Manager	swisadm2@hotmail.com	
	Trafford Boro	Virginia Sinnegan, Manager	traffordmanager@comcast.net	
	Turtle Creek Boro	Julie Pantalone, Manager		
	Verona Boro	Bonita Conway, Manager	verona.boro@comcast.net	
	Versailles Boro	Reba Schultz, Secretary	admin@boroughofversailles.org	
	Wall Boro	Tracy Miller, Secretary	wallborough@yahoo.com	
	White Oak Boro	John Petro, Jr., Manager	whiteoak@woboro.com	
	Wilkins Twp	Rebecca Bradley, Manager	rbradley@wilkinstownship.com	
	Wilkinsburg Boro	Marla Marcinko, Manager	wilkinsburgmanager@choiceonemail.com	
	Wilmerding Boro	Joseph Hartzell, Secretary	j.hartzell@wilmerdingboro.com	

Watershed Plan Advisory Committee (WPAC) #4
January 20, 2016 Meeting

COUNTY OF ALLEGHENY

RICH FITZGERALD
COUNTY EXECUTIVE

Watershed Plan Advisory Committee (WPAC)

Meeting No. 4

Green Tree Municipal Building

January 20, 2016

6:00 PM

Welcome & Introductions

1. Act 167 Overview

2. Role of the Watershed Plan Advisory Committee

3. Review Goals of the Plan

4. Status of the Plan
    a. Stormwater and Flooding Problem Areas
    b. Flood Control Projects and Storm Water Control Facilities
    c. Watershed Modeling

5. Act 167 Model Stormwater Ordinance

6. Stormwater Management Plan Schedule

7. Questions / Open Discussion on Stormwater Problems

ROBERT D. HURLEY, DIRECTOR
ALLEGHENY COUNTY ECONOMIC DEVELOPMENT
ONE CHATHAM CENTER • SUITE 900 • 112 WASHINGTON PLACE • PITTSBURGH, PA 15219
PHONE (412) 350-1000 • WWW.ALLEGHENYCOUNTY.US/ECONOMIC/

These are notes from the discussion/questions & answers at the January 20, 2016 Watershed Plan Advisory Committee Meeting #4. For the presented information, please refer to the PowerPoint Presentation.

1. **Moon Township:** Will release rate maps from existing Act 167 Stormwater Management Plans be incorporated into the County Act 167 Plan and Ordinance? For example, Moon Township's plans for Flaugherty Run and Montour Run were completed in the 1990s. We have been requiring developers to utilize those release rates. Also, it is suggested you contact Moon's Municipal Authority for more data.
    a. **Baker Team:** Yes, the existing release rate maps will be incorporated into the Plan. However, where new modeling is being done, they will be updated. The new subareas may not match with previous subareas. Mal Petroccia agreed to contact the Moon Municipal Authority for any stream gage data that they may have.
2. If municipalities have not provided information on stormwater-related problem areas within their municipality, they can still submit that information because there is a potential for funding (grant, etc.) if problem areas are identified and incorporated into the Plan. These areas will be added to the appendices of the report.
3. **ALCOSAN:** How many calibration points will there be for each of the watersheds in the county plan?
    a. **Baker Team:** There is not readily available stream gauge or monitoring data within the streams being modeled. We will look towards adjacent watersheds for data and utilize best engineering practices to understand the conditions in the watershed we are studying.
4. **WCCD:** Setting a stricter release rate puts a burden on developers. How will you defend stricter release rates if they aren't based on modeling?
    a. **Baker Team:** The portions of the county that have not been modeled will likely be under similar release rates. Modifications to these rates can be conducted if modeling is completed for those watersheds.
5. **Green Tree Borough:** Shouldn't the ordinance deal with more frequent events such as the 1 to 2-year storm? Will it address TMDL's? PA is behind other states with respect to water quality regulations. The plan and ordinance will get more bang for the buck if the county ordinance controls for first ½ inch of rainfall.
    a. **Baker Team:** We are considering lower frequency events including retention of the first inch of rainfall which will capture over 90% of the rainfall events in the County.
6. **WCCD:** An NPDES is based on a 2-year storm event. Designing for a 100-year storm event is cost-prohibitive.
7. **Attendee:** Is an objective of the ordinance to use the ordinance for development and redevelopment purposes? Will an objective of the ordinance be to require retention only of the difference between pre- and post-development runoff?
    a. **Baker Team:** Yes. The ordinance only addresses development and redevelopment. In order to determine the release rates, we will model the watersheds we have, use other plans that exist, and then look at the rest of the county with potentially a common release rate.

8. **Moon Township:** Infiltration and ground water recharge should be prohibited at certain sites.
    a. **Baker Team:** Yes, the ordinance identifies hotspot-type areas such as polluted sites, junk yards, and the like. The ordinance may recommend a filter device where appropriate. An example is Somerset at Frick, where liners are used to prevent infiltration.
9. **ALCOSAN:** Will there be any standards as to who is qualified to review stormwater management plans? For example, will the reviewer be required to be a P.E., or someone who has gone through a certain minimum amount of training?
    a. **Baker Team:** There should be minimum requirements for a reviewer. Different possibilities are being discussed such as having ACCD do reviews, similar to WCCD. Municipalities could have an MOU with the District. There are 130 municipalities and some of them have few resources, having each municipality review could be a burden for them.
10. **WCCD:** WCCD's fees are based on disturbed acreage or revisions to the stormwater management plan. The conservation district does not review in all places; only where MOUs exist.
11. Is there any thought being given to developing a regional stormwater facility that developers could pay into?
    a. **Baker Team:** Not at this time; however, it may be considered but there may be issues with it. Municipalities would need to have available land or the ability to acquire it as well as complications typically associated with Fee (in lieu of) programs.
    b. **ACCD:** We've been looking into the use of vacant property for stormwater management.
12. **Attendee:** If additional modeling is available for other areas, can it be incorporated into the plan?
    a. **Baker Team:** Yes, and the plan can be amended after completion. The plan is considered a living document and will be updated as information becomes available.
13. **Green Tree:** Have you given consideration to previously developed land? Are you looking at watersheds that have lots of development and watersheds that have little development?
    a. **Baker Team:** The ordinance only addresses development and redevelopment. We picked watersheds based on different criteria, with a range of development.
14. **Attendee:** Who will review the municipalities' proposed stormwater management ordinances? Do all municipalities have to adopt? What happens if they don't?
    a. **Baker Team:** All 130 municipalities must adopt an ordinance with at least the minimum provisions of the model ordinance. DEP can withhold incentives / all state funds if they do not adopt but this rarely happens. The county is planning to require all municipal ordinances be provided to the county.
15. **WCCD:** Will the model have different standards for combined sewer areas?
    a. **Baker Team:** No, the standards are uniform in all areas.
    b. **WCCD:** Would there be any value in establishing different standards in combined-sewer areas?
        i. **Baker Team:** At this point, we are keeping with a global approach with the understanding that there is significant work being done within the region to address CSOs.

16. **Gateway:** Municipalities are currently dealing with MS4 and TMDL requirements. Can they be incorporated into the ordinance?
    a. **Baker Team:** Act 167 is a separate track, but a parallel one with TMDL and MS4. BMP recommendations will most likely be the same. Act 167 partly deals with runoff and sedimentation and municipalities have to meet the numbers. The Act 167 provisions will have to be combined with the provisions for MS4.
17. **Attendee:** CG2 is for 1 acres or less; what about 5,000 square feet or less?
    a. **Baker Team:** There will likely be a provision for a simplified plan with fewer requirements.

Stakeholders: Watershed Plan Advisory Committee (WPAC) #4
January 20, 2016

Initial	Representing	Name	Phone	Email	Comments
	Allegheny Valley North COG	Tom Benecki		tbenecki@verizon.net	
	Penn Hills	Chris Blackwell		CBlackwell@pennhills.org	
	ALCOSAN	David Borneman		david.borneman@alcosan.org	
	PENNDOT	Dan Cessna		hcessna@pa.gov	
	Hatch Mott McDonald	Kathy Chavara		kathy.chavara@hatchmott.com	
	Allegheny County Office of the County Executive	Darla Cravotta		dcravotta@alleghenycounty.us	
	Michael Baker Int'l	Chad Davis		CDavis@mbakerintl.com	
	The Penn State Center	Deno DeCiantis		dwd5@psu.edu	
	Army Corps of Engineers	Ryan Fisher		ryan.fisher@usace.army.mil	
	PA DEP	Jeff Fliss		jfliss@pa.gov	
	Butler County Conservation District	Robert Fodor		rfodor@co.butler.pa.us	
	Pittsburgh City Planning	Ray Gastil		ray.gastil@pittsburghpa.gov	
	South Hills Council of Governments	Lou Gorski		lou.gorski@shacog.com	
	Allegheny County Health Department	Dr. Karen Hacker		khacker@achd.net	
	City of Pittsburgh	Darlene Harris		Darlene.Harris@city.pittsburgh.pa.us	
	Allegheny County Emergency Services	Alvin Henderson		ahenderson@alleghenycounty.us	Steve.Williamson@Alleghenycounty.us
	Nine Mile Run	Mike Hiller		mike@ninemilerun.org	
	Ohio Township	Joe Jackson		jjackson@ohiotwp.org	
	Oakmont Borough	Ryan Jeroski		rjeroski@oakmontborough.com	
	SPC Water Resources Center	Erin Kepple		ekepple@spcregion.org	
	Pennsylvania Environmental Council	Paul King		pking@pecpa.org	
	City of Pittsburgh	Bruce Kraus		bruce.kraus@pittsburghpa.gov	

Stakeholders: Watershed Plan Advisory Committee (WPAC) #4
January 20, 2016

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	Pittsburgh City Planning	Josh Lippert		joshua.lippert@pittsburghpa.gov	
	Allegheny County Office of the County Manager	Willy McKain		wmckain@alleghenycounty.us	
	Pittsburgh Water and Sewer	Tom Palmosina		tpalmosina@pgh20.com	
	Twin Rivers Council of Governments	John Palyo		jpalyotrcog@choiceonemail.com	
	Allegheny County Economic Development	Kay Pierce		kpierce@alleghenycounty.us	
	Westmoreland County Conservation District	Jim Pillsbury		jim@wcdpa.com	
	Army Corps of Engineers	Nancy Piotrosky		Nancy.piotrosky@usace.army.mil	
	ALCOSAN	Timothy Prevost		Timothy.Prevost@alcosan.org	TP
	PA DCED	Denny Puko		dpuko@pa.gov	
	North Hills Council of Governments	Wayne Roller		wroller@northhillscog.org	
	3 Rivers Wet Weather	John Schombert		jschombert@3rww.org	
	Turtle Creek Valley Council of Governments	Amanda Settlemaier		asett@tcvcog.com	
	Allegheny County Public Works	Stephen Shanley		stephen.shanley@alleghenycounty.us	
	Beaver County Conservation District	James Shanner		jim.shaner@bccdpa.us	
	Michael Baker Int'l	John Shannon		jshannon@mbakerintl.com	
	Penn Hills	Scott Shepard		sshepard@pennhills.org	
	Nine Mile Run	Brenda Smith		brenda@ninemilerun.org	
	Char West Council of Governments	Janet Snak		admin@cwcog.com	
	Washington County Conservation District	Gary Stokum		gstokum@pawccd.org	
	Allegheny County Law Department	Andrew Szefi		aszefi@alleghenycounty.us	

Stakeholders: Watershed Plan Advisory Committee (WPAC) #4
January 20, 2016

Initial	Representing	Name	Phone	Email	Comments
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	Quaker Valley Council of Governments	Janet Wenger		qvcog@verizon.net	
	Allegheny County Emergency Services	Steve Wilharm		Steve.Wilharm@alleghenycounty.us	
	ALCOSAN	Arletta Williams		arletta.williams@alcosan.org	
	Army Corps of Engineers	Mark Zaitsoff		mark.p.zaitsoff@usace.army.mil	
	Westmoreland Conservation Dist	Matt Zahnzell		matt@wcdpa.com	

Municipal Managers: Watershed Plan Advisory Committee (WPAC) #4
January 20, 2016

Initial	Representing	Name	Phone	Email	Comments
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	Aspinwall Borough	Ms. Melissa Lang		mlang@boroughofaspinwall.com	
	Avalon Borough	Mr. Harry Dilmore		hdilmore@boroughofavalon.org	
	Baldwin Borough	Mr. John Barrett		JBarrett@baldwinborough.org	
	Baldwin Township	Ms. Mary McGinley		rob.zahorchak@baldwintownship.com	
	Bell Acres Borough	Mr. Charles Kulbaki			
	Bellevue Borough	Mr. Ronald Borczyk		info@bellevueboro.com	
	Ben Avon Borough	Ms. Carmella Hallstein		benavon@benavon.com	
	Ben Avon Heights Borough	Ms. Denise Raves		benavonheightsborough6@gmail.com	
	Blawnox Borough	Ms. Sherry Kordas		blxoffice@blawnox.net	
	Brackenridge Borough	Ms. Denise Tocco		brackenridgeborough@comcast.net	
	Braddock Borough	Ms. Deborah Brown		braddockmanager@comcast.net	
	Braddock Hills Borough	Ms. Cheryl Sorrentino		bradhillsboro@comcast.net	
	Bradford Woods Borough	Ms. Caresse Schweitzer		bradfordwoods@zoominternet.net	
	Brentwood Borough	Mr. George Zboyovsky		gzboyovsky@brentwoodboro.com	
	Bridgeville Borough	Ms. Lori Collins		lcollins@bridgevilleboro.com	
	Carnegie Borough	Mr. Stephen Beuter		sbeuter.carnegieboro@comcast.net	
	Castle Shannon Borough	Mr. Thomas Hartswick		csboro@comcast.net	
	Chalfant Borough	Ms. Kirsten Schwoegl		schwoegl@msn.com	
	Cheswick Borough	Mr. Andrew Bock		abock.cheswick@yahoo.com	
	Churchill Borough	Mr. Craig Robinson		craigrobinson@churchillborough.com	
	City of Duquesne	Mr. Frank Piccolino		fpiccolino.duquesne@comcast.net	

Municipal Managers: Watershed Plan Advisory Committee (WPAC) #4
January 20, 2016

Initial	Representing	Name	Phone	Email	Comments
	City of McKeesport	Ms. Annette James		Annette.james@mckeesport-pa.gov	
	City of Pittsburgh	Mr. Ray Gastil		ray.gastil@pittsburghpa.gov	
	Clairton City	Mr. Howard Bednar		manager@cityofclairton.com	
SW	Collier Township	Mr. Salvatore Sirabella		ssirabella@colliertwp.net	
	Coraopolis Borough	Mr. Raymond McCutcheon		Manager@coraopolisPA.com	
	Crafton Borough	Ms. Ann Scott		ascott@craftonborough.com	
	Crescent Township	Ms. Kellie Crago		info@crescenttownship.com	
	Dormont Borough	Mr. Benjamin Estell		bestell@boro.dormont.pa.us	
	Dravosburg Borough	Ms. Brenda Honick		dravoadmin@comcast.net	
	East Deer Township	Ms. Chrystal Carmen		eastdeermanager@outlook.com	
	East McKeesport Borough	Ms. Connie Rosenbayger		administrator@eastmckeesportboro.com	
	East Pittsburgh Borough	Ms. Eileen Navish		emncpa@aol.com	
	Edgewood Borough	Mr. Warren Cecconi		manager@edgewoodboro.com	
	Edgeworth Borough	Mr. Martin McDaniel		marty.mcdaniel@verizon.net	
	Elizabeth Borough	Ms. Pam Sharp		psharp@elizabethpa.net	
	Elizabeth Township	Mr. Harry Faulk		manager@elizabethtownshippa.com	
	Emsworth Borough	Ms. Cathy Jones		emsworthborough@comcast.net	
	Etna Borough	Ms. Mary Ellen Ramage		meramage@etnaborough.org	
	Fawn Township	Ms. Julie Pater		fawntwp@comcast.net	
	Findlay Township	Mr. Christopher Caruso		ccaruso@findlaytwp.org	
	Forest Hills Borough	Mr. Steven Morus		manager@foresthillspa.com	
	Forward Township	Ms. Karen Stetor		fwdtwp1@Comcast.net	

Municipal Managers: Watershed Plan Advisory Committee (WPAC) #4
January 20, 2016

Initial	Representing	Name	Phone	Email	Comments
	Fox Chapel Borough	Mr. Gary Koehler		rjsmith@fox-chapel.pa.us	
	Franklin Park Borough	Mr. Ambrose Rocca		arocca@franklinparkborough.us	
	Frazer Township	Ms. Lori Ziencik		frazertwp@comcast.net	
	Glassport Borough	Ms. Nancy Piazza-Whaby		glassportpa@yahoo.com	
	Glen Osborne Borough	Ms. Diane Vierling		dvierling@sewickleyborough.org	
	Glenfield Borough	Ms. Janet Mascara		glenfieldboro@aol.com	
	Green Tree Borough	Mr. David Montz	412-921-1110	DMontz@greentreeboro.com	
	Hampton Township	Mr. Christopher Lochner		susan.bernet@hampton-pa.org	
	Harmar Township	Dr. Donna Piper		harmar701@comcast.net	
	Harrison Township	Ms. Faith Payne		fapayne@comcast.net	
	Haysville Borough	Ms. Mary Conlin		haysvilleborough1@verizon.net	
	Heidelberg Borough	Ms. Amanda Loutitt		info@HeidelbergBorough.com	
	Homestead Borough	Mr. Ian McMeans		homesteadborough@comcast.net	
	Indiana Township	Mr. Daniel L. Anderson		danderson@indianatownship.com	
	Ingram Borough	Ms. Debbie Stecko		dstecko@ingramborough.org	
	Jefferson Hills Borough	Mr. Doug Arndt		darndt@jeffersonhills.net	
	Kennedy Township	Mr. Jerry Orsini		mleck@kennedytwp.com	
	Kilbuck Township	Mr. Harry Dilmore		kilbucktownship@gmail.com	
	Leet Township	Mr. Wayne Hyjek		whyjekleet@verizon.net	
	Leetsdale Borough	Ms. Jennifer Simek		simek@leetsdaleboro.net	
	Liberty Borough	Ms. Debra Helderlein		liberty2921@yahoo.com	
	Lincoln Borough	Ms. Sharon Jageman		lincolnboro@yahoo.com	

Municipal Managers: Watershed Plan Advisory Committee (WPAC) #4
January 20, 2016

Initial	Representing	Name	Phone	Email	Comments
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	McCandless Township	Mr. Tobias Cordek		mccmgr@townofmccandless.org	
	McDonald Borough	Ms. Marie Maximovich		mmaximovich@mcdonaldboro.com	
	McKees Rocks Borough	Ms. Tricia Levander		tlevander@mckeesrocksborough.com	
	Millvale Borough	Ms. Amy Rockwell		ARockwell@millvaleboro.com	
	Moon Township	Ms. Dawn Lane		dlane@moontwp.com	
	Mount Oliver Borough	Ms. Kathy Connolly		kconnolly4354@comcast.net	
	Munhall Borough	Mr. Robert Callen		info@munhallpa.us	
	Municipality of Bethel Park	Mr. William Spagnol		manager@bethelpark.net	
	Municipality of Monroeville	Mr. Timothy Little		littlt@monroeville.pa.us	
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	Municipality of Penn Hills	Mr. Mohammed Rayan		mrayan@pennhills.org	
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	Oakdale Borough	Ms. Kelly Rohbeck		rohbeck@oakdaleborough.com	
	Oakmont Borough	Ms. Lisa Jensen		ljensen@oakmontborough.com	
	O'Hara Township	Ms. Julie Jakubec		jjakubec@ohara.pa.us	
	Ohio Township	Mr. John Sullivan		sully@ohiotwp.org	
	Pennsbury Village Borough	Ms. Reene Freemer		Boropv@comcast.net	
	Pine Township	Ms. Cheryl Fischer		sanderso@twp.pine.pa.us	

Municipal Managers: Watershed Plan Advisory Committee (WPAC) #4
January 20, 2016

Initial	Representing	Name	Phone	Email	Comments
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	Pleasant Hills Borough	Ms. Deborah Englert		d.englert@comcast.net	
	Plum Borough	Mr. Michael Thomas		mthomas@plumboro.com	
	Port Vue Borough	Ms. Malisa Migliori		mmmigloriportvueboro@comcast.net	
	Rankin Borough	Ms. Patricia DiNinno		rankinboro@yahoo.com	
	Reserve Township	Mr. Robert Kipp		manager@reservetwp.com	
	Richland Township	Mr. Dean Bastianini		rttina@zoominternet.net	
	Robinson Township	Mr. Jeffrey Silka		jsilka@townshipofrobinson.com	
	Ross Township	Mr. Doug Sample		dsample@ross.pa.us	
	Rosslyn Farms Borough	Mr. Samuel Maccarone		smaccarone@hmapgh.net	
	Scott Township	Ms. Denise Fitzgerald		scotttwp@scotttownship.com	
	Sewickley Borough	Mr. Kevin Flannery		kflannery@sewickleyborough.org	
	Sewickley Heights	Mr. William Rohe		wrohe@sewickleyheightsboro.com	
	Sewickley Hills Borough	Ms. Diane Steele		sewickleyhillsborough@comcast.net	
	Shaler Township	Mr. Timothy Rogers		manager@shaler.org	
	Sharpsburg Borough	Mr. William Rossey		secretary@sharpsburgborough.com	
	South Fayette Township	Mr. Ryan Eggleston		sfadmin@sftwp.com	
	South Park Township	Ms. Karen Fosbaugh		southparktwp@southparktwp.com	
	South Versailles Township	Ms. Carla Barron			
	Springdale Borough	Ms. Kim McAfoose		springdaleboro@hotmail.com	
	Springdale Township	Ms. Dawn Biery		sprtwp@verizon.net	
	Stowe Township	Ms. Marie Incorvati		mariestowepd@comcast.net	

Municipal Managers: Watershed Plan Advisory Committee (WPAC) #4
January 20, 2016

Initial	Representing	Name	Phone	Email	Comments
	Swissvale Borough	Ms. Amanda Ford		administrative@swissvaleborough.com	
	Tarentum Borough	Mr. Michael Gutonski		manager@tarentumboro.com	
	Thornburg Borough	Ms. Dorothy Falk		thornburg.secretary@gmail.com	
	Trafford Borough	Ms. Nina Solivan		traffordmanager@comcast.net	
	Turtle Creek Borough	Ms. Julie Pantalone		julie@tcboro.com	
	Upper St. Clair Township	Mr. Matthew Serakowski		Serakowski@twpusc.org	
	Verona Borough	Ms. Bonita Conway		bcveronaboro@yahoo.com	
	Versailles Borough	Ms. Reba Schultz		admin@boroughofversailles.org	
	Wall Borough	Ms. Tracy Miller		WALLBOROUGH@YAHOO.COM	
	West Deer Township	Mr. Daniel Mator		dmator@westdeertownship.com	
	West Elizabeth Borough	Ms. Robin Stockton		westelizabeth@comcast.net	
	West Homestead Borough	Mr. Kyle Thauvette		westhomesteadborough@gmail.com	
	West Mifflin Borough	Mr. Brian Kamauf		BKamauf@westmifflinborough.com	
	West View Borough	Mr. Bruce Fromlak		info@wvboro.com	
	Whitaker Borough	Ms. Jean Warren		whitaker@rdm-inc.com	
	White Oak Borough	Ms. Nancy Greeland		whiteoak@woboro.com	
	Whitehall Borough	Mr. James Leventry		jleventry@whitehallboro.org	
	Wilkins Township	Ms. Rebecca Bradley		rbradley@wilkinstownship.com	
	Wilkinsburg Borough	Ms. Amanda Ford		wilkinsburgmanager@choiceonemail.com	
	Wilmerding Borough	Mr. Joseph Hartzell		j.hartzell@wilmerdingboro.com	

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #4
January 20, 2016

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		John Balewski		jbalewski@chesterengineers.com	
MB	South Fayette Twp	Michael Benton		mbenton@sftwp.com	
		Don Black		dblack@eadsgroup.com	
		Andy Blenko		ablenko@nhtpa.us	
		Brad Boddy		bboddy@wadetrim.com	
		Kevin Brett		kbrett@lsse.com	
	Green Tree	Louis Casadei		lcasadei@greentreeboro.com	
		Bob Christian		rchristian@pgh2o.com	
		David Coldren		dcoldren@klhengineers.com	

Initial	Representing Which Municipalities	Name	Phone	Email	Email
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Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #4
January 20, 2016

Initial	Representing Which Municipalities	Name	Phone	Email	Comments
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		Don Hultberg		dhultberg@eadsgroup.com	
		Lindsey Jewart		ljewart@chesterengineers.com	
		Glenn Jonnet		gjonnet@hotmail.com	
		Charles Jordan		cjordan@chesterengineers.com	
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		Lawrence Lennon		ljlennonjr@lsse.com	

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #4
January 20, 2016

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		Ed McGee		edmcgee12@centurylink.net	
		Wayne McVicar		wmcvicar@boro.dormont.pa.us	
		Michael Meyer		michael.meyer@rve.com	
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		Ned Mitrovich		Nmitrovich@lsse.com	
		John Mowry		jmowry@klhengineers.com	

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		Jim Pritchard		jpritchard@mbakercorp.com	
		Clint Reilly		creilly@niraengineers.com	
		Robert Robinson		r.robinson@twp.marshall.pa.us	
		Shawn Rosensteel		srosensteel@chesterengineers.com	
		Mark Scally		mscally@chesterengineers.com	
		Gregory Scott		gscott@bh-ba.com	

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #4
January 20, 2016

Initial	Representing Which Municipalities	Name	Phone	Email	Comments
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		Larry Seiler		laseiler@senateengineering.com	
		Scott Shoup		shoupeng@comcast.net	
		Karl Sieg		kpspe@fyi.net	
JRS	BRidgeville	Joe Sites		jsites@Gatewayengineers.com	
		Dan Slagle		dslagle@nichols-slagle.com	
JS	Various municipalities	Jennifer Slagle		jslagle@gatewayengineers.com	
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		Jean Statler		jstatler@bethelpark.net	
		Charles Steinert		csteinert@ohara.pa.us	

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #4
January 20, 2016

Initial	Representing Which Municipalities	Name	Phone	Email	Comments
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		Bill Wengerd		billw@senateengineering.com	
		Mark Zemaitis		MAZemaitis@peterstownship.com	
		Robert Zischkau		bobz@glennengr.com	
	Aleppo Twp Bellevue Borough South Park Twp Forward Twp.	BenGilberti		bgilberti@hrg-inc.com	
	Borough of Carnegie	Jeff Marcink		jmarcink@klhengineers.com	

Michael Baker
INTERNATIONAL

Michael Baker International

APPENDIX D-5

Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016 Meeting

COUNTY OF ALLEGHENY

RICH FITZGERALD
COUNTY EXECUTIVE

Watershed Plan Advisory Committee (WPAC)

Meeting No. 5

Green Tree Municipal Building

September 20, 2016

6:00 PM

Welcome & Introductions

1. Act 167 Overview

2. Review Goals of the Plan

3. Status of the Plan
    1. Problem Areas
    2. GIS/Hydrologic Modeling
    3. Model Calibration
    4. Future Land Use Analysis
    5. Regional Detention Analysis
    6. Stormwater Management Districts

4. Model Stormwater Ordinance

5. Plan Schedule

6. Questions and Open Discussion on Stormwater Problems

ROBERT D. HURLEY, DIRECTOR
ALLEGHENY COUNTY ECONOMIC DEVELOPMENT
ONE CHATHAM CENTER • SUITE 900 • 112 WASHINGTON PLACE • PITTSBURGH, PA 15219
PHONE (412) 350-1000 • WWW.ALLEGHENYCOUNTY.US/ECONOMIC/

COUNTY OF ALLEGHENY

RICH FITZGERALD
COUNTY EXECUTIVE

August 25, 2016

EXAMPLE

Ms. An Lewis
Co-Executive Director
Steel Rivers COG
1705 Maple St.
Homestead, PA 15120

Re: Watershed Plan Advisory Committee (WPAC)
Draft Allegheny County Phase II Stormwater Management Plan

Dear Ms. Lewis:

I'm pleased to announce that the draft Phase II Allegheny County Stormwater Management Plan (Plan) will be released at the Watershed Plan Advisory Committee (WPAC) meeting No. 5. This WPAC meeting will be held from 6:00 p.m. – 8:00 p.m. on Tuesday, September 20, 2016, at the Green Tree Municipal Building, located at 10 West Manilla Avenue; Pittsburgh, PA 15220.

We urge you to attend this crucial meeting, at which we will present the draft Phase II Plan, highlights of the model stormwater management ordinance, and discuss provisions for stormwater management. At this September 20 presentation, WPAC members will also be given a disk, on which will be the Executive Summary, the draft Plan, Model Ordinance, maps, and appendices.

Please especially note that since it is critical that the final document truly reflects your community's stormwater concerns and needs, we will be asking for and encourage your very important feedback within two months of the draft Plan's release. This two-month comment period will end on Monday, November 21, 2016.

I thank you for your time and for your continued participation in this important endeavor on which both you and the County have embarked. Without your contribution; continued involvement; and desire for comprehensive, sound stormwater management practices in Allegheny County, this draft Plan would not be possible.

If you have any questions or comments about this initiative, please direct them to William McLain at 412-350-1361. Additionally, please RSVP for the September 20 meeting to Mr. McLain at wmclain@alleghenycounty.us by Friday, September 9, 2016.

Sincerely,

Robert D. Hurley
Director

WM/mac

ROBERT D. HURLEY, DIRECTOR
ALLEGHENY COUNTY ECONOMIC DEVELOPMENT
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WPAC #5 Meeting Notes

- There are 25 DEP Act 167 Designated Watersheds in Allegheny County.

Q. What do you consider redevelopment?

A. Redevelopment is considered to be a certain amount of earth disturbance. Areas under an acre are discussed in Section 302 of the plan

- Out of all of the problem areas, 21 have been field verified.
- The Plan is the basis for producing the Model Ordinance.
- Modeling was conducted using HEC-HMS.
    - Modeling was conducted for a range of storm events.

Q. Have there been any conversations with municipalities about the location of regional water storage facilities identified by the plan?

A. This is just a conceptual study, if storage is considered in any of these watersheds, detailed discussions would be held before proceeding with any site.

Q. Would the proposed dams hold water continuously?

A. They could be designed to be either dry or to hold water.

- Steep slopes ruled out some detention basins in Allegheny County, as well as wetlands.
- Without any controls there will be an increase of issues.

Q. West Deer and Hampton both proposed dams for stormwater management. DEP said under no circumstances would any new dams be approved in PA.

A. Possibly it was based on the expected classification (Low, Moderate or High Hazard). We are aware it's an issue with DEP.

Q. Why are we proposing them if that isn't the reason why dams were not approved by DEP?

A. PA Act 167 requires us to identify potential impoundment areas. There is a significant difference between a DEP permitted dam and a local stormwater management facility designed to drain within 72 hours.

Q. Why does the plan not contain any cross sections? Aren't they required to be provided?

A: The potential areas for siting a stormwater facility were sited, but not designed.

Q: How many cross sections were done to determine release rates for Robinson Run?
A: None were taken due to issues of costs and the type of analysis. We used the Muskingum-Cunge reach routing method that doesn't require cross sections. (DeBarry).
A: Peak flows / rates only were determined for modeled watersheds (Flaugherty; Robinson Thompson)

Q: Which Thompson Run? There are several creeks named Thompson Run in the County.
A: It's the one in Penn Hills.

Q: Did we try to determine the actual occurrences of the 5, 10, and 100 year storms in recent years? (maybe SPC?)
A: No, but FEMA has changed the names of these storms, recognizing that the old named lead to misconceptions about the frequency accurately. For example, the 100-year storm is now called the 1% annual chance storm.

Q: Did we account for the more intense conditions that could be caused by climate change?

A: No, but the way the SWM ordinance works, it wouldn't be affected anyway even if the conditions change. The ordinance requires a specific outcome, which must be achieved regardless of the conditions.

Q: How was the CN value for future conditions determined?

A: CN Values were developed for the release rate analysis. This was based on the "Future Land Use Conditions 2025" included as part of the Draft document.

Q: Impervious surfaces are defined, but not pervious. Does the model account for pervious/semi-pervious surfaces? They can fail over time, and become impervious. Mt. Lebanon has a SWM ordinance that requires applicants to submit an annual report certifying as to the condition of pervious/semi-pervious pavement they may have on their site.

Sect. 302 Exemptions

Comment: 5,000 SF is the threshold for the WCCD.

Q: Should the threshold, whatever may be decided, be uniform across the County?

A: Uniformity would be nice, but in Allegheny County there are major differences between municipalities. Many are older municipalities with existing development in the 100-year floodplain. It could hurt their tax base.

Comment: If the 302 exemption was removed, it would be governed by NPDES (LSSE).

Comment: If there were different thresholds in the same watershed it could hurt the downstream municipalities.

Comment: Start with 5,000 SF – it would parallel E & S (Chapter 102) requirements.

Comment: What is the approval process?

A: County Council and Rich Fitzgerald have to approve. Consider the politics. (Brian Jensen).

Comment: Section 402 site plan requirements apply to 302.A.

Sect. 303 Water Volume

A percentage of existing impervious surface shall be considered "meadow" for modeling purposes. The County is trying to decide whether to use 20%, or 50-100%

Comment: Per Act 102, 20% of the existing impervious area to be disturbed must be considered meadow

Q: How does it affect a developed 5,000 SF parcel? Would it have a stricter release rate than a larger parcel with no existing impervious?

A: The Plan only applies to development or redevelopment. The volume requirement applies to different conditions as per Section 303.

Sect. 305 Riparian Buffer

The County is considering whether to include Riparian Buffers in the Plan and if so, should they be 35 feet or the 100 year floodplain.

Q: What about municipalities with significant existing development in the floodplain? (Jim Pillsbury)

A: The Plan only applies to development or redevelopment.

Q: What is the potential impact on the NFIP? If municipalities in the program let someone build in the 100-year floodplain, they (municipality) can't stay in the program.

A: FEMA regulates the floodway fringe, not the 100-year (Paul DeBarry)

Comment: Councilwoman Means noted that she isn't comfortable making decisions for municipalities that aren't here.

Q: What qualifies as "earth disturbance"? What is the cost of developing a site plan for a "small project"? Say a landscaper is improving a site and meets the definition of earth disturbance, what would it (compliance) cost? (Councilman DeMarco)

A: The Model Ordinance has a definition of earth disturbance that says ... activity that disturbs the surface of the land ...
A: We do not have an estimate of the cost, but the small plan provision is intended that it could be done by a homeowner. The County is currently evaluating when the ordinance would apply, but at 5,000 square feet or a larger number under consideration, normal residential landscaping would likely be under the threshold.

Comment: There is no "no harm" exemption in the new model ordinance. Tim Rogers, Shaler Twp.; also expressed dislike for the stream buffer requirement.

Q: Who approves SWM plans? Engineer, consultant, CCD or municipal governing body?

A: It is the municipal responsibility, but they can designate a reviewer including the option to enter into an MOU with the Conservation District.

County Council: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Name	Phone	Email	Comments	Received CD?
	Hon. Thomas Baker				
	Hon. John DeFazio				
	Hon. Samuel DeMarco III				
	Hon. James Ellenbogen				
	Hon. Michael Finnerty				
	Hon. Nicolas Futules				
	Hon. Cindy Kirk				
	Hon. Paul Klein				
	Hon. Edward Kress				
	Hon. Robert Macey				
	Hon. Dr. Charles Martoni				
	Hon. Sue Means				
	Hon. John Palmiere				
	Hon. Denise Russell				
	Hon. DeWitt Walton				

Regional Stakeholders: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Representing	Name	Phone	Email	Comments	Received CD?
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MJW	3RWW	Mark Wolinsky	412 578 8374	mwolinsky@3rww.org		✓
	3RWW	John Schombert		jschombert@3rww.org		
	ALCOSAN	David Borneman		david.borneman@alcosan.org		
	ALCOSAN	Timothy Prevost		Timothy.Prevost@alcosan.org		
	ALCOSAN	Arletta Williams		arletta.williams@alcosan.org		
	Allegheny County Conservation District	Rebecca Zeyzus + 1		rzeyzus@accdpa.org		✓
	Allegheny County Economic Development	Kay Pierce		kpierce@alleghenycounty.us		
	Allegheny County Emergency Services (1)	Matthew Brown		mbrown6@alleghenycounty.us		
	Allegheny County Emergency Services (2)	Steve Wilharm		Steve.Wilharm@alleghenycounty.us		
	Allegheny County Health Department	Mike Moskorsin		Mike.Moskorsin@alleghenycounty.us		✓
	Allegheny County Law Department	Andrew Szefi		aszefi@alleghenycounty.us		
	Allegheny County Office of the County Executive	Darla Cravotta		dcravotta@alleghenycounty.us		
	Allegheny County Office of the County Manager	Willy McKain		wmckain@alleghenycounty.us		
	Allegheny County Public Works	Stephen Shanley		stephen.shanley@alleghenycounty.us		
	Allegheny Valley North COG	Tom Benecki		tbenecki@verizon.net		
	Army Corps of Engineers	Ryan Fisher		ryan.fisher@usace.army.mil		
	Army Corps of Engineers	Nancy Piotrosky		Nancy.piotrosky@usace.army.mil		
	Army Corps of Engineers	Mark Zaitsoff		mark.p.zaitsoff@usace.army.mil		
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	Butler County Conservation District	Robert Fodor		rfodor@co.butler.pa.us		
	Char West Council of Governments	Janet Snak		admin@cwcog.com		

Regional Stakeholders: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Representing	Name	Phone	Email	Comments	Received CD?
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	City of Pittsburgh	Bruce Kraus				
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	Michael Baker Int'l	Chad Davis		Cdavis@mbakerintl.com		
	Michael Baker Int'l	John Shannon		jshannon@mbakerintl.com		
	Nine Mile Run	Mike Hiller		mike@ninemilerun.org		
BG	Nine Mile Run	Brenda Smith		brenda@ninemilerun.org		✓
	North Hills Council of Governments	Wayne Roller		wroller@northhillscog.org		
	Ohio Township	Joe Jackson				
	PA DCED	Denny Puko		dpuko@pa.gov		
	PA DEP	Jeff Fliss		jfliss@pa.gov		
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	Penn Hills	Chris Blackwell				
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	PENNDOT	Dan Cessna		hcessna@pa.gov		
	Pennsylvania Environmental Council	Paul King		paenvironmentalcouncil@gmail.com		
	Pittsburgh City Planning	Ray Gastil		ray.gastil@pittsburghpa.gov		
	Pittsburgh City Planning	Josh Lippert		joshua.lippert@pittsburghpa.gov		
	Pittsburgh Water and Sewer	Tom Palmosina		tpalmosina@pgh20.com		
	Quaker Valley Council of Governments	Janet Wenger		qvcog.secretary@gmail.com		
	South Hills Council of Governments	Lou Gorski		lou.gorski@shacog.com		

Regional Stakeholders: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Representing	Name	Phone	Email	Comments	Received CD?
EK AS	SPC Water Resources Center – 2	Erin Kepple & Abby Stark		ekepple@spcregion.org		✓
	Steel Rivers COG	An Lewis		al@svcog.org		
	Steel Rivers COG	John Palyo		jp@steelriverscog.org		
	~~The Penn State Center~~	~~Dino De Ciantis~~		~~dwd5@psu.edu~~		
	Turtle Creek Valley Council of Governments	Amanda Settelmaier		asett@tcvcog.com		
	Washington County Conservation District	Gary Stokum		gstokum@pawccd.org		
JP	Westmoreland County Conservation District	Jim Pillsbury		jim@wcdpa.com		
MZ	Westmoreland County Conservation District	Matt Zambelli		matt@wcdpa.com		✓
	Alleghany Conference	BRIAN TEDSEN				✓
	Penn State Center PGH	David Himes		DAVIDHIMES @PSU.EDU		✓

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Representing	Name	Phone	Email	Comments	Received CD?
	Aleppo Township	Ms. Gwen Patterson		aleppomgr@comcast.net		
	Aspinwall Borough	Ms. Melissa Lang		mlang@boroughofaspinwall.com		
	Avalon Borough	Mr. Harry Dilmore Kerry Patterson		hdilmore@boroughofavalon.org		✓
	Baldwin Borough	Mr. John Barrett		JBarrett@baldwinborough.org		
	Baldwin Township	Mr. Rob Zahorchak		rob.zahorchak@baldwintownship.com		
	Bell Acres Borough	Mr. Charles Kulbaki		buzztrap@comcast.net		
	Bellevue Borough	Mr. Ronald Borczyk		borczyk@bellevueboro.com		
	Ben Avon Borough	Hon. Ken Opipery, Councilman				
	Ben Avon Heights Borough	Ms. Denise Raves		benavonheightsborough6@gmail.com		
	Blawnox Borough	Ms. Cindy Bahn Cindy Bahn		manager@blawnox.net		—
	Brackenridge Borough	Ms. Denise Tocco		brackenridgeborough@comcast.net		
	Braddock Borough	Ms. Deborah Brown		braddockmanager@comcast.net		
	Braddock Hills Borough	Ms. Cheryl Sorrentino		bradhillsboro@comcast.net		
	Bradford Woods Borough	Ms. Caresse Schweitzer		bradfordwoods@zoominternet.net		
	Brentwood Borough	Mr. George Zboyovsky		gzboyovsky@brentwoodboro.com		
	Bridgeville Borough	Ms. Lori Collins		lcollins@bridgevilleboro.com		
4/7	Carnegie Borough	Mr. Stephen Beuter		sbeuter.carnegieboro@comcast.net		✓
	Castle Shannon Borough	Mr. Thomas Hartswick		csboro@comcast.net		
	Chalfant Borough	Ms. Kirsten Schwoegl		schwoegl@msn.com		
	Cheswick Borough	Mr. Andrew Bock		abock.cheswick@yahoo.com		
	Churchill Borough	Mr. Craig Robinson		craigrobinson@churchillborough.com		
	City of Duquesne	Mr. Frank Piccolino		fpiccolino.duquesne@comcast.net		

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Representing	Name	Phone	Email	Comments	Received CD?
	City of McKeesport	Mr. Matthew Ernst				
	City of Pittsburgh	Mr. Ray Gastil		ray.gastil@pittsburghpa.gov		
	Clairton City	Mr. Howard Bednar		manager@cityofclairton.com		
	Collier Township	Mr. Salvatore Sirabella		ssirabella@colliertwp.net		✓
	Coraopolis Borough	Mr. Raymond McCutcheon		Manager@coraopolisPA.com		✓
	Crafton Borough	Ms. Ann Scott		ascott@craftonborough.com		
	Crescent Township	Ms. Kellie Crago		info@crescenttownship.com		
	Dormont Borough	Mr. Benjamin Estell		bestell@boro.dormont.pa.us		
	Dravosburg Borough	Ms. Brenda Honick		dravoadmin@comcast.net		
	East Deer Township	Ms. Chrystal Carmen		eastdeermanager@outlook.com		
	East McKeesport Borough	Ms. Connie Rosenbayger		administrator@eastmckeesportboro.com		
	East Pittsburgh Borough	Ms. Eileen Navish		emncpa@aol.com		
	Edgewood Borough	Ms. Julie Bastianini		manager@edgewoodboro.com		
	Edgeworth Borough	Mr. John Schwend		john.schwend@edgeworthborough.org		
	Elizabeth Borough	Ms. Pam Sharp		psharp@elizabethpa.net		
	Elizabeth Township	Mr. Harry Faulk		manager@elizabethtownshippa.com		
	Emsworth Borough	Ms. Cathy Jones		emsworthborough@comcast.net		
DWB	Etna Borough	Hon. Dave Becki, Councilman				✓
	Fawn Township	Ms. Julie Pater		fawntwp@comcast.net		
TDC	Findlay Township	Mr. Tim Cook		TCook@Findlaytwp.org.		✓
	Forest Hills Borough	Mr. Steven Morus		manager@foresthillspa.com		
	Forward Township	Ms. Karen Stetor		fwdtwp1@Comcast.net		

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Representing	Name	Phone	Email	Comments	Received CD?
	Fox Chapel Borough	Mr. Robert J. Smith		rjsmith@fox-chapel.pa.us		
	Franklin Park Borough	Mr. Ambrose Rocca		arocca@franklinparkborough.us		
	Frazer Township	Ms. Lori Ziencik		frazertwp@comcast.net		
	Glassport Borough	Ms. Nancy Piazza-Whaby		glassportpa@yahoo.com		
	Glen Osborne Borough	Ms. Diane Vierling		dvierling@sewickleyborough.org		
	Glenfield Borough	Ms. Connie Klauck		glenfieldboro@aol.com		
	Green Tree Borough	Mr. David Montz		DMontz@greentreeboro.com		✓
	Hampton Township	Mr. Christopher Lochner		susan.bernet@hampton-pa.org		
	Harmar Township	Dr. Donna Piper		harmar701@comcast.net		
	Harrison Township	Ms. Faith Payne		fapayne@comcast.net		
	Haysville Borough	Ms. Mary Conlin		haysvilleborough1@verizon.net		
	Heidelberg Borough	Ms. Amanda Loutitt		info@HeidelbergBorough.com		
	Homestead Borough	Mr. Warren Cecconi		homesteadborough@comcast.net		
	Indiana Township	Mr. Daniel L. Anderson		danderson@indianatownship.com		
	Ingram Borough	Ms. Debbie Stecko		dstecko@ingramborough.org		
	Jefferson Hills Borough	Mr. Charles Bennett		darndt@jeffersonhills.net		
	Kennedy Township	Mr. Jerry Orsini		mleck@kennedytwp.com		
	Kilbuck Township	Mr. Harry Dilmore		kilbucktownship@gmail.com		
	Leet Township	Mr. Andy Wanto				
	Leetsdale Borough	Ms. Jennifer Simek		simek@leetsdaleboro.net		
	Liberty Borough	Ms. Debra Helderlein		liberty2921@yahoo.com		
	Lincoln Borough	Ms. Denise Murrin-Macey		lincolnboro@yahoo.com		

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Representing	Name	Phone	Email	Comments	Received CD?
	Marshall Township	Mr. Neil McFadden		neilmc@twp.marshall.pa.us		
	McCandless Township	Mr. Tobias Cordek		mccmgr@townofmccandless.org		
	McDonald Borough	Ms. Marie Maximovich		mmaximovich@mcdonaldboro.com		
	McKees Rocks Borough	Ms. Tricia Levander		tlevander@mckeesrocksborough.com		
	Millvale Borough	Ms. Amy Rockwell		ARockwell@millvaleboro.com		
	Moon Township	Ms. Lora Dombroski Heather Dixon		dlane@moontwp.com		✓
	Moon Township	Mr. Scott Brilhart		sbrilhart@moontwp.us		✓
	Mount Oliver Borough	Ms. Kathy Connolly		kconnolly4354@comcast.net		
	Munhall Borough	Ms. Becki Wirth		bwirth@munhallpa.us		
	Municipality of Bethel Park	Mr. William Spagnol		manager@bethelpark.net		
	Municipality of Monroeville	Mr. Timothy Little		littlt@monroeville.pa.us		✓
KGM	Muni. of Mount Lebanon	Mr. Keith McGill		kmcgill@mtlebanon.org		✓
	Municipality of Penn Hills	Mr. Mohammed Rayan		mrayan@pennhills.org		
	Neville Township	Ms. Jeanne Creese		jcreese@nevilletownship.us		
	North Braddock Borough	Mr. Douglas Marguriet		Nbmgr@comcast.net		
	North Fayette Township	Ms. Johnna Zona				✓
	North Versailles Township	Ms. Patricia Logo		PLogo@nvtpa.com		
	Oakdale Borough	Ms. Kelly Rohbeck		rohbeck@oakdaleborough.com		
	Oakdale Borough	Hon. Paul Hennemuth, Mayor		phennemuth@Comcast.net		✓
	Oakdale Borough	Hon. William Hartman, Jr.				
	Oakmont Borough	Ms. Lisa Jensen		ljensen@oakmontborough.com		
	O'Hara Township	Ms. Julie Jakubec		jjakubec@ohara.pa.us		

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Representing	Name	Phone	Email	Comments	Received CD?
	Ohio Township	Mr. John Sullivan	412 364 6321	sully@ohiotwp.org		✓
	Pennsbury Village Borough	Ms. Reene Freemer		Boropv@comcast.net		
	Pine Township	Mr. Scott Anderson		sanderso@twp.pine.pa.us		
	Pitcairn Borough	Ms. Annette Dietz		Manager@PitcairnBorough.us		
	Pleasant Hills Borough	Ms. Deborah Englert		d.englert@comcast.net		
	Plum Borough	Mr. Michael Thomas		mthomas@plumboro.com		
	Port Vue Borough	Ms. Malisa Migliori		mmigloriportvueboro@comcast.net		
	Rankin Borough	Mr. Ed Crates		rankinboro@yahoo.com		
	Reserve Township	Mr. Tom Lavorini		manager@reservetwp.com		
	Richland Township	Mr. Dean Bastianini	Sara Knapp	rttina@zoominternet.net		✓
	Robinson Township	Mr. Jeffrey Silka		jsilka@townshipofrobinson.com		
	Ross Township	Mr. Doug Sample		dsample@ross.pa.us		
	Rosslyn Farms Borough	Mr. Samuel Maccarone		smaccarone@hmapgh.net		
	Scott Township	Ms. Denise Fitzgerald		scotttwp@scotttownship.com		
	Sewickley Borough	Mr. Kevin Flannery		kflannery@sewickleyborough.org		
	Sewickley Heights	Mr. William Rohe		wrohe@sewickleyheightsboro.com		
KS	Sewickley Heights	Ms. Katie Stringent		Kstringent@sewickleyheightsboro.com		✓
	Sewickley Hills Borough	Ms. Diane Steele		sewickleyhillsborough@comcast.net		
	Shaler Township	Mr. Timothy Rogers	Tim Rogers	manager@shaler.org		✓
	Sharpsburg Borough	Mr. William Rossey		secretary@sharpsburgborough.com		
	South Fayette Township	Mr. Ryan Eggleston		sfadmin@sftwp.com		
	South Park Township	Ms. Karen Fosbaugh	Karen Fosbaugh	southparktwp@southparktwp.com		✓

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Representing	Name	Phone	Email	Comments	Received CD?
	South Park Township	Mr. Bruce Beaver				✓
	South Versailles Township	Ms. Carla Barron				
	Springdale Borough	Ms. Kim McAfoose		springdaleboro@hotmail.com		
	Springdale Township	Ms. Dawn Biery		sprtwp@verizon.net		
	Stowe Township	Ms. Marie Incorvati		mariestowepd@comcast.net		
	Swissvale Borough	Mr. Clyde Wilhelm		administrative@swissvaleborough.com		
	Tarentum Borough	Mr. Michael Gutonski		manager@tarentumboro.com		
	Thornburg Borough	Ms. Dorothy Falk		thornburg.secretary@gmail.com		
	Trafford Borough	Ms. Nina Solivan		traffordmanager@comcast.net		
	Turtle Creek Borough	Ms. Julie Pantalone		julie@tcboro.com		
	Upper St. Clair Township	Mr. Matthew Serakowski Charles Succop		Serakowski@twpusc.org		✓
	Verona Borough	Mr. Mark Stanton		bcveronaboro@yahoo.com		
	Versailles Borough	Ms. Reba Schultz		admin@boroughofversailles.org		
	Wall Borough	Ms. Tracy Miller		WALLBOROUGH@YAHOO.COM		
	West Deer Township	Mr. Daniel Mator		dmator@westdeertownship.com		
	West Elizabeth Borough	Ms. Robin Schmidt		westelizabeth@comcast.net		
	West Homestead Borough	Mr. Kyle Thauvette Kyle Thauvette		westhomesteadborough@gmail.com		✓
	West Mifflin Borough	Mr. Brian Kamauf		BKamauf@westmifflinborough.com		
	West View Borough	Mr. Bruce Fromlak		info@wvboro.com		
JW	Whitaker Borough	Ms. Jean Warren	412-462-3940	whitaker@rdm-inc.com		✓
	White Oak Borough	Ms. Nancy Greenland		whiteoak@woboro.com		
	Whitehall Borough	Mr. James Leventry		jleventry@whitehallboro.org		

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Representing	Name	Phone	Email	Comments	Received CD?
	Wilkins Township	Ms. Rebecca Bradley		rbradley@wilkinstownship.com		
	Wilkinsburg Borough	Ms. Amanda Ford		wilkinsburgmanager@choiceonemail.com		
	Wilmerding Borough	Mr. Joseph Hartzell		j.hartzell@wilmerdingboro.com		

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Representing What Municipalities? List. (attach extra sheet if needed)	Name	Phone	Email	Received CD?
		Ray Antonelli		rantonelli@niraengineers.com	
		Rob Arnold		rarnold@chesterengineers.com	
		John Balewski		jbalewski@chesterengineers.com	
		Michael Benton		mbenton@sftwp.com	
		Don Black		dblack@eadsgroup.com	
		Andy Blenko		ablenko@nhtpa.us	
		Brad Boddy		bboddy@wadetrim.com	
		Kevin Brett		kbrett@lsse.com	
		Louis Casadei		lcasadei@greentreeboro.com	
		Bob Christian		rchristian@pgh2o.com	
		David Coldren		dcoldren@klhengineers.com	

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Representing Which Municipalities	Name	Phone	Email	Received CD?
		Daniel Deiseroth		ddeiseroth@gatewayengineers.com	
	~~CSSP~~ Castle Shannon, Pleasant Hills Scott Twp, Fox Chapel, North Fayette Baldwin Borough, Rosslyn Farms, Burton Heights	Doug Evans JASON STANTON ~~Robert Firek~~		devans@niraengineers.com jstanton@ssse.com ~~rfirek@ssse.com~~	✓
		Bryan Flaugh		bflaugh@gatewayengineers.com	
		Dennis Flynn		dflynn@gatewayengineers.com	
		Jim Garvin		jsgarvin@garvineng.com	
		Art Gazdik		artgazdik@groundworkcivil.net	
		Dave Gilliland		daveg@glennengr.com	
		Don Glenn			
		Susan Glenn		susang@glennengr.com	
		Mike Glister		mglister@gatewayengineers.com	

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Representing Which Municipalities	Name	Phone	Email	Received CD?
		Bob Grigas		rjgrigas@senateengineering.com	
		Phil Herman		pdherman@senateengineering.com	
		Ken Hillman		klhillman@senateengineering.com	
PAH	Municipality of Monroeville	Paul Hugus	412-856-3385	hugusp@monroeville.pa.us	✓
		Don Hultberg		dhultberg@eadsgroup.com	
		Lindsey Jewart		ljewart@chesterengineers.com	
		Glenn Jonnet		gjonnet@hotmail.com	
		Charles Jordan		cjordan@chesterengineers.com	
		Emile Ketterer		eketterer@niraengineers.com	
		Rich Knapek		rjknapek@senateengineering.com	
		Lawrence Lennon		ljlennonjr@lsse.com	

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Representing Which Municipalities	Name	Phone	Email	Received CD?
		Larry Lennon		ljlennon@lsse.com	
		Michael Malak		mcmalak@senateengineering.com	
		Dan Martone		djmartone@aol.com	
		Henry Martone		djmartone@aol.com	
		Ed McGee		edmcgee12@centurylink.net	
		Wayne McVicar		wmcvicar@boro.dormont.pa.us	
		Michael Meyer		michael.meyer@rve.com	
		Rick Minsterman		rminsterman@gatewayengineers.com	
		Robert Mitall		rmitall@mitallengineering.com	
		Ned Mitrovich		Nmitrovich@lsse.com	
		John Mowry		jmowry@klhengineers.com	

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Representing Which Municipalities	Name	Phone	Email	Received CD?
		Don Newman		dnewman@bh-ba.com	
		Jim Nordquist		jnordquist@niraengineers.com	
		Ruthann Omer		romer@gatewayengineers.com	
		Ken Orie		keno@gibson-thomas.com	
		Malcolm Petroccia		mpetroccia@moontwp.com	
		Jim Pritchard		jpritchard@mbakercorp.com	
		Clint Reilly		creilly@niraengineers.com	
		Robert Robinson		r.robinson@twp.marshall.pa.us	
		Shawn Rosensteel		srosensteel@chesterengineers.com	
		Mark Scally		mscally@chesterengineers.com	
		Gregory Scott		gscott@bh-ba.com	

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Representing Which Municipalities	Name	Phone	Email	Received CD?
		Matt Sebastian		msebastian@shaler.org	
		Larry Seiler		laseiler@senateengineering.com	
		Scott Shoup		shoupeng@comcast.net	
		Karl Sieg		kpspe@fyi.net	
		Joe Sites		jsites@Gatewayengineers.com	
		Dan Slagle		dslagle@nichols-slagle.com	
	See list	Jennifer Slagle		jslagle@gatewayengineers.com	
		Larry Souleret		lsouleret@lsse.com	
	See Robert Frul	Jason Stanton		jstanton@lsse.com	
		Jean Statler		jstatler@bethelpark.net	
		Charles Steinert		csteinert@ohara.pa.us	

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #5
September 20, 2016

Initial	Representing Which Municipalities	Name	Phone	Email	Received CD?
		Philip Strunk		pstrunk@gatewayengineers.com	
		Gordon Taylor		gttaylor@senateengineering.com	
		Kurt Todd		ktodd@gatewayengineers.com	
		Bill Wengerd		billw@senateengineering.com	
		Mark Zemaitis		MAZemaitis@peterstownship.com	
		Robert Zischkau		bobz@glennengr.com	
n/gy	Oakdale Borough	Norbert Lindner	412-809-6060	nlindner@chesterengineers.com	✓
RRB		Ryan R. Berner	412-921-4030	rberner@gatewayengineers.com	✓
LW	PLUM / NORTH HUNTINGDON / S. TWP	Len White		LWHITE@MITALL ENGINEERING.COM	✓
MH	Elizabeth Twp	Scott Hoffman		shoffman@ETHENGINEERS.COM	✓

Municipal Engineer – List the Municipalities You Are Representing

Firm and Engineer:

Name of Firm: Gateway

Name of Engineer: Jenn Slayk & Ryan Benner

Municipalities:

Sewickley Heights	Emsworth
Crafton	McCandless
Ross Township	
Whitehall	
Mt. Lebanon	
Brentwood	
Ingram	
Bridgeville	
Hampton	
Heidelberg	
Mt. Oliver	
Shaler	
Churchill	
Penn Hills	

Michael Baker
INTERNATIONAL

Michael Baker International

APPENDIX D-6

Watershed Plan Advisory Committee (WPAC) #6
February 15, 2017 Meeting

COUNTY OF ALLEGHENY

RICH FITZGERALD
COUNTY EXECUTIVE

Watershed Plan Advisory Committee (WPAC)

Meeting No. 6

Solicitor Focused Meeting

Green Tree Municipal Building

February 15, 2017

6:00 PM

Welcome & Introductions

1. Role of the Watershed Plan Advisory Committee
2. Act 167 Overview
3. Implementation of the Stormwater Management Plan
4. WPAC Review of the Draft Plan
5. Plan Schedule
6. Questions and Open Discussion on the Stormwater Management Plan and Ordinance

ROBERT D. HURLEY, DIRECTOR
ALLEGHENY COUNTY ECONOMIC DEVELOPMENT
ONE CHATHAM CENTER • SUITE 900 • 112 WASHINGTON PLACE • PITTSBURGH, PA 15219
PHONE (412) 350-1000 • WWW.ALLEGHENYCOUNTY.US/ECONOMIC/

Shannon, John

From: McLain, William D. <William.McLain@AlleghenyCounty.US>
Sent: Friday, February 03, 2017 2:55 PM
To: Shannon, John
Cc: Pierce, Kay
Subject: WPAC #6 and the Model Stormwater Management Ordinance
Attachments: 170201 Model Ordinance for WPAC #6 .pdf

Dear Watershed Plan Advisory Committee Member:

WPAC #6 will be held at the Green Tree Municipal Building on February 15, 2017 from 6:00 – 8:00 pm.

This is an important meeting; please make every effort to attend. A copy of the Model Ordinance is attached and will be a major focus of this WPAC.

This version of the Model Stormwater Management Ordinance has been revised in response to comments received from the WPAC members regarding the September 2016 SWM Plan. Revisions are shown in the document. Comments on the attached version of the Model Stormwater Management Ordinance will be received at the February 15, 2017 WPAC #6 meeting or until February 24 by letter or e-mail to William McLain at wmclain@alleghenycounty.us.

Please note that this is the last WPAC meeting that is scheduled to be held before the Allegheny County Stormwater Management Plan and Model Ordinance is submitted to Allegheny County Council for review and adoption.

If you have any questions don't hesitate to call or email me. Please RSVP to William McLain at wmclain@alleghenycounty.us or by phone at 412.350.1361.

Sincerely,

William McLain

William McLain | Planning Division
Allegheny County Economic Development
Chatham One, Suite 900 | 112 Washington Place | Pittsburgh, PA 15219
P 412.350.1361 | **F** 412.350.1050 | **E** wmclain@alleghenycounty.us
www.alleghenycounty.us/econdev
www.alleghenycountyswmp.com

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Notes from WPAC #6, February 15, 2017

As taken by ACED staff & Michael Baker International

- John Shannon (Baker)
    - Explained the purpose of the solicitor's meeting and provided a brief overview of the project.
    - Eric Parrish, Wilkinsburg Borough: Q: When municipalities prepare their draft stormwater management ordinances will someone form the County review them? A: Pierce: not required by Act 167; the municipal engineer or representative should prepare the stormwater management ordinance and the review must be done internally at the Municipality.

<u>Section 110.C. – Waivers</u>

1. Tom McDermott – greater than a 30 day deadline for PADEP or ACCD response is too long.
2. Jessie Albright (ACCD) – NPDES permits are issued within 60 days if application is complete. There is a procedure where if the application is complete the review time is 60 days, however if the application is incomplete the timeframe is longer. This may be a good idea. Should consider making the time period the same as with an NPDES permit; the time period should be 60 days, but only if the application is complete, if not, the application would not be subject to the review time period.
3. David Robb, Rosslyn Farms: 60 days – is in favor of 60 days; 30 days isn't enough time to receive department feedback. Small municipalities will need to leverage outside resources to manage. He explained that small municipalities need the support of DEP and Allegheny County in making decisions regarding waivers because they lack the resources of larger municipalities, these agencies should be provided with enough time to make a recommendation.
4. Chuck (Arthur?): developers need specific time frames so they can coordinate all approvals
5. Tom McDermott (?) said conditional approvals cannot be used for stormwater management plans, because if the SWM isn't approved it could change the site plan.
6. Brenda Smith (9 Mile Run) – Q: Have we received feedback from the agencies? A: No.
7. Keith McGill, Mt. Lebanon: Q: the waiver provision says that both ACCD and DEP approve – which one is it? Expressed his concern that if two parties have authority to provide waivers, that developers will submit waivers to both agencies and hope that one grants the request. Asked what happens if one agency grants a waiver, but the other agency denies the waiver.
8. Pete McGrail (...) - How can you prevent applicants sending application to both the DEP and the Conservation District?
9. Joe Sites (Gateway Engineers): developers should request that any waivers be submitted to the Municipalities during preliminary planning and provide proof of submittal to the municipality during the Land Development Submissions.
10. Jen Slagle, Gateway: Couldn't this be a pre-application process? Don't want to end up with deemed approvals.
    a. Response to 7, 8, 9 & 10: The Designated Plan Reviewer for the Municipality must first determine the merits of the waiver request, then follow municipality-specific

procedures to determine if they will consider the waiver, and if yes, then they will forward it to one of the two agencies as they deem appropriate.

11. Sam DeMarco (AC Council) – Q: The DEP is behind on permit applications; how will they be able to review more applications?
    a. A: The DEP is proposing this requirement so they will be required to review waiver requests.
12. Darrell Rapp, Swissvale Borough: Q: Which municipal body needs to authorize waivers? If it's the governing body, has to be done a regularly scheduled meeting; timing is an issue.
13. Joe Sites (Gateway) – Q: Who approves waiver at municipal level?
    a. Response to 12 & 13: Each municipality designates a plan reviewer, e.g. the ACCD, or the municipal engineer (1st step in process).
14. Jen Slagle (Gateway Engineers) Q: Is there a pre application process, in order to see if the municipality is willing to approve the waiver before it is sent to DEP or the Conservation District for approval?
    a. A: Yes. The first approval is the role of the municipal reviewer and municipal staff as required. If the municipality decides they are not willing to approve the waiver the waiver request does not get sent to DEP or the Conservation District.
15. Mary Ellen Ramage, Etna Borough: our concern is that waivers will be granted by upstream communities.

<u>Section 301.F - Stormwater flows onto adjacent property</u>

1. Jim Pillsbury (WCCD) – add "impeded" to F, e.g. "...shall not be created, increased, decreased, relocated, impeded, or otherwise altered..."
2. Art Gazdik: Need consent if decreasing? (Yes, this is standard PaDEP language/requirements.)
3. Art Gazdik (Marshall Twp. engineer) – question concerning "and consent by" with reference to the affected property owner(s).
4. John Cassidy: How can one property owner be given the authority to approve or disapprove another property owner's development? It's not legal.
   a. Response to 2, 3 & 4: (§301.F - John Shannon: we'll reconsider removing the wording "and consent by").
5. Tim Rogers (Shaler) – Upstream communities may be more inclined to grant waivers. If there is an existing watercourse running through an adjacent property, and the development will affect the flow of that watercourse, can the property owner stop the development by virtue of not consenting? Response: Good comment to consider.
6. Jim Pillsbury (WCCD) - Stated that rights for upstream property owners should be added to the plan so that downstream property owners cannot block a stream
7. Mal Petroccia (Moon Twp.) – Should add definition of "adjacent" to ordinance.
8. Eric Parrish (Wilkinsburg Borough): Please define "adjacent". Q: Could municipalities add their own definitions? A: Yes, municipalities can add their own definitions to clarify the ordinance, but cannot lessen the requirements/intent of this section.
9. Ken LaSota (Heidelberg Borough), Q: Asked if the ordinance applied to properties only one acre and larger in size and what restrictions were provided for properties smaller than one acre. A: Ordinance applies to earth disturbance over ¼ acre with fuller provisions for earth disturbance over 1 acre.

10. Wayne Roller (NHCOG) – Q: Asked if the County will be providing a depository of approved ordinances, plans, etc., and who will be auditing the waivers? A: The County will not be doing these tasks.

Section 302.B – Minimum area of earth disturbance

1. Jim Pillsbury (WCCD) – Q: The minimum amount of earth disturbance area can be left up to the municipality to make more restrictive if they desire, but not less restrictive. A: Yes, that is correct, but the minimum threshold cannot be raised above 0.25 acres (this was the general consensus for minimum earth disturbance for many of the municipalities).
2. Art Gazdik: N. Hills plan is much stricter; will this create a race for municipalities to have much less strict standards? Very big difference in N. Hills COG plan.
3. Art Gazdik – NHCOG Act 167 Plan requires stormwater management for a disturbed area between 400 sq. ft. up to 4,000 sq. ft.; this is more restrictive than the County's proposed ordinance which may cause communities in this region to lessen their restrictions.
4. Mary Ellen Ramage (Etna) – The restriction standards should be watershed based. Effect of different standards?
5. Jim Pillsbury (WCCD): it doesn't have to be one-size-fits-all. Could there be three model ordinances, for example?

Section 304. Rate Control

1. Keith McGill, Mt. Lebanon: Chapter 8 - add "or any subsequent amendments or changes thereto..." so it's not necessary to amend if the law changes.
2. Joe Sites (Gateway): Plan reviewer certification: concerned about liability of certifying as to another designer's plan.

Section 303. Volume Control

1. Tom McDermott on §302.A.3: 20% standards – what is the basis for this? (Jim Pillsbury – it's a factor of safety) A. this is also directly from PaDEP Stormwater BMP Volume Control Guideline 1 requirements.

Section 305. Riparian Buffer

1. Art Gazdik: stream buffer averaging – what does the DEP say about it? Set buffer standard by watershed?
2. Jim Pillsbury: "Stream" should be defined in the plan/ordinance (i.e. intermittent and perennial streams)
3. Jen Slagle: Asked if a waiver can be applied for to not provide a riparian buffer
    a. A: Only if justification is provided that meets the requirements of the waiver provisions as written in the ordinance.

Section 401. Plan Requirements

1. Mal Petroccia (Moon Twp.): §401.C.3: there is no specific requirement for a computational method. A calculation method should be provided in section 401.C.3, even if methods are specified in other parts of the plan.
    a. A: Add references to Sections 303, and 304 to this statement with the existing Section 301 requirement.

Other

1. Mary Ellen Ramage (Etna Borough)
    - Standards should be set by watershed; NHCOG should be required to follow the standards currently in place.
    - It is not good if other municipalities can lower their standards; was told that existing Act 167 plans would be incorporated in the new plan.
2. Art Gazdik
    - The required riparian buffer should be based on watershed area and calculated using EPA standards.
3. Joe Sites (Gateway)
    - The signature block for the plan reviewer should state that the information on the plan has been provided by the plan designer.
    - Is concerned about signing and/or sealing a plan with inaccurate information could affect his PE license.
4. Jim Pillsbury
    - Stated that in his opinion, section 401.C.10 should be listed first, not last
5. Keith McGill
    - Q: Asked if the required three-year inspection specified in 502.A could be satisfied by having the developer provide a review letter from an inspector stating that the facility is functioning appropriately. A: That would be for the municipality to decide if that can meet the intent of the Ordinance.

County Council: Watershed Plan Advisory Committee (WPAC) #6
February 15, 2017

Initial	Name	Phone	Email	Comments
	Hon. Thomas Baker			
	Hon. John DeFazio			
	Hon. Samuel DeMàrco III			
	Hon. James Ellenbogen			
	Hon. Patrick J. Catena			
	Hon. Nicolas Futules			
	Hon. Cindy Kirk			
	Hon. Paul Klein			
	Hon. Edward Kress			
	Hon. Robert Macey			
	Hon. Dr. Charles Martoni			
	Hon. Sue Means			
	Hon. John Palmiere			
	Hon. Denise Russell			
	Hon. DeWitt Walton			
	~~Rep. to Sol. Mayor of Hewlett Bay~~			

Regional Stakeholders: Watershed Plan Advisory Committee (WPAC) #6
February 15, 2017

Initial	Representing	Name	Phone	Email	Comments
MJW	3RWW	Mark Wolinsky		mwolinsky@3rww.org	
BD	3RWW	Beth Dutton			
	ALCOSAN	David Borneman		david.borneman@alcosan.org	
	ALCOSAN	Timothy Prevost		Timothy.Prevost@alcosan.org	
	ALCOSAN	Jeanne Clark			
	Allegheny County Conservation District	Jan Lauer			
	Allegheny County Economic Development	Kay Pierce		kpierce@alleghenycounty.us	
	Allegheny County Emergency Services	Steve Wilharm		Steve.Wilharm@alleghenycounty.us	
	Allegheny County Health Department	Mike Moskorsin			
	Allegheny County Health Department	Michael Parker, Esq.			
	Allegheny County Law Department	Andrew Szefi		aszefi@alleghenycounty.us	
	Allegheny County Office of the County Executive	Darla Cravotta		dcravotta@alleghenycounty.us	
	Allegheny County Office of the County Manager	Willy McKain		wmckain@alleghenycounty.us	
	Allegheny County Public Works	Michael Babusci			
	Allegheny Valley North COG	Tom Benecki		tbenecki@verizon.net	
	Army Corps of Engineers	Ryan Fisher		ryan.fisher@usace.army.mil	
	Army Corps of Engineers	Nancy Piotrosky		Nancy.piotrosky@usace.army.mil	
	Army Corps of Engineers	Mark Zaitsoff		mark.p.zaitsoff@usace.army.mil	
	Beaver County Conservation District	James Shanner		jim.shaner@bccdpa.us	
	Butler County Conservation District	Robert Fodor		rfodor@co.butler.pa.us	
	Char West Council of Governments	Janet Snak		admin@cwcog.com	
Alleg Cons Dist		Rebecca Zeyzus		rzeyzus@accdpa.org	

Regional Stakeholders: Watershed Plan Advisory Committee (WPAC) #6
February 15, 2017

Initial	Representing	Name	Phone	Email	Comments
	Hatch Mott McDonald	Kathy Chavara		kathy.chavara@mottmac.com	
	Michael Baker Int'l	Chad Davis		Cdavis@mbakerintl.com	
	Michael Baker Int'l	John Shannon		jshannon@mbakerintl.com	
	Nine Mile Run	Mike Hiller		mike@ninemilerun.org	
	Nine Mile Run	Brenda Smith		brenda@ninemilerun.org	
	North Hills Council of Governments	Wayne Roller		wroller@northhillscog.org	
	Ohio Township	Joe Jackson			
	PA DCED	Denny Puko		dpuko@pa.gov	
	PA DEP	Jeff Fliss		jfliss@pa.gov	
	PA Fish and Boat Commission	Bob Venturini		bventurini@pa.gov	
	Penn Hills	Chris Blackwell			
	Penn Hills	Scott Shepard		sshepard@pennhills.org	
	PENNDOT	Dan Cessna		hcessna@pa.gov	
	Pennsylvania Environmental Council	Paul King		paenvironmentalcouncil@gmail.com	
	Pittsburgh City Planning	Ray Gastil		ray.gastil@pittsburghpa.gov	
	Pittsburgh City Planning	Josh Lippert		joshua.lippert@pittsburghpa.gov	
	Pittsburgh Water and Sewer	~~Tom Palmosina~~ Katherine Camp		~~tpalmosina~~@pgh20.com KCamp	
	Quaker Valley Council of Governments	Janet Wenger		qvcog.secretary@gmail.com	
	South Hills Council of Governments	Lou Gorski		lou.gorski@shacog.com	

Regional Stakeholders: Watershed Plan Advisory Committee (WPAC) #6
February 15, 2017

Initial	Representing	Name	Phone	Email	Comments
AS	SPC Water Resources Center	Abby Stark			
EKA	SPC Water Resources Center	Erin Kepple Adams		ekepple@spcregion.org	
	Steel Rivers COG	An Lewis		al@svcog.org	
	The Penn State Center	Lisa Kunst Vavro			
	Turtle Creek Valley Council of Governments	Amanda Settelmaier		asett@tcvcog.com	
	Washington County Conservation District	Gary Stokum		gstokum@pawccd.org	
	Westmoreland County Conservation District	Jim Pillsbury		jim@wcdpa.com	
	Westmoreland County Conservation District	Matt Zambelli		matt@wcdpa.com ✓	
	Allegheny County Conservation District.	Jessie Freund Albright.		jalbright@accdpa.org.	
	ACOPW	Mike Babrs;		michael.babrs@alleghenycounty.us	

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Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #56

~~September 20, 2016~~
Feb 15, 2017

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Initial	Representing	Name	Phone	Email	Comments
	Aleppo Township	Ms. Gwen Patterson		aleppomgr@comcast.net	
	Aspinwall Borough	Ms. Melissa Lang		mlang@boroughofaspinwall.com	
	Avalon Borough	Mr. Harry Dilmore		hdilmore@boroughofavalon.org	
	Baldwin Borough	Mr. John Barrett		JBarrett@baldwinborough.org	
	Baldwin Township	Mr. Rob Zahorchak		rob.zahorchak@baldwintownship.com	
	Bell Acres Borough	Mr. Charles Kulbaki		buzztrap@comcast.net	
	Bellevue Borough	Mr. Ronald Borczyk		borczyk@bellevueboro.com	
	Ben Avon Borough	Hon. Ken Opipery, Councilman			
	Ben Avon Heights Borough	Ms. Denise Raves		benavonheightsborough6@gmail.com	
	Blawnox Borough	Ms. Cindy Bahn		manager@blawnox.net	
	Brackenridge Borough	Ms. Denise Tocco		brackenridgeborough@comcast.net	
	Braddock Borough	Ms. Deborah Brown		braddockmanager@comcast.net	
	Braddock Hills Borough	Ms. Cheryl Sorrentino		bradhillsboro@comcast.net	CHUCK ARTHRELL PRESIDENT COUNCIL CHUCKBHBORO@LEVEL3.COM
	Bradford Woods Borough	Ms. Caresse Schweitzer		bradfordwoods@zoominternet.net	
	Brentwood Borough	Mr. George Zboyovsky		gzboyovsky@brentwoodboro.com	
	Bridgeville Borough	Ms. Lori Collins		lcollins@bridgevilleboro.com	
	Carnegie Borough	Mr. Stephen Beuter		sbeuter.carnegieboro@comcast.net	
	Castle Shannon Borough	Mr. Thomas Hartswick		csboro@comcast.net	
	Chalfant Borough	Ms. Kirsten Schwoegl		schwoegl@msn.com	
	Cheswick Borough	Mr. Andrew Bock		abock.cheswick@yahoo.com	
	Churchill Borough	Mr. Craig Robinson		craigrobinson@churchillborough.com	
	City of Duquesne	Mr. Frank Piccolino		fpiccolino.duquesne@comcast.net	

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #6

~~September 20, 2016~~
Feb 15, 2019

Initial	Representing	Name	Phone	Email	Comments
	City of McKeesport	Mr. Matthew Ernst			
	City of Pittsburgh	Mr. Ray Gastil		ray.gastil@pittsburghpa.gov	
	Clairton City	Mr. Howard Bednar		manager@cityofclairton.com	
	Collier Township	Mr. Salvatore Sirabella		ssirabella@colliertwp.net	
	Coraopolis Borough	Mr. Raymond McCutcheon		Manager@coraopolisPA.com	
	Crafton Borough	Ms. Ann Scott		ascott@craftonborough.com	
	Crescent Township	Ms. Kellie Crago		info@crescenttownship.com	
	Dormont Borough	Mr. Benjamin Estell		bestell@boro.dormont.pa.us	
	Dravosburg Borough	Ms. Brenda Honick		dravoadmin@comcast.net	
	East Deer Township	Ms. Chrystal Carmen		eastdeermanager@outlook.com	
	East McKeesport Borough	Ms. Connie Rosenbayger		administrator@eastmckeesportboro.com	
	East Pittsburgh Borough	Ms. Eileen Navish		emncpa@aol.com	
	Edgewood Borough	Ms. Julie Bastianini		manager@edgewoodboro.com	
	Edgeworth Borough	Mr. John Schwend		john.schwend@edgeworthborough.org	
	Elizabeth Borough	Ms. Pam Sharp		psharp@elizabethpa.net	
	Elizabeth Township	Mr. Harry Faulk		manager@elizabethtownshippa.com	
	Emsworth Borough	Ms. Cathy Jones		emsworthborough@comcast.net	
	Etna Borough	Mr. Dave Becki DSB			
	Etna Borough	Ms. Mary Ellen Ramage			
	Etna Borough	Mr. Peter Ramage			
	Etna Borough	Mr. Ronald Heck			
	Etna Borough	Mr. Ed Burke			

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #~~5~~6

~~September 20, 2016~~ Feb 15, 2017

Initial	Representing	Name	Phone	Email	Comments
	Fawn Township	Ms. Julie Pater		fawntwp@comcast.net	
	Findlay Township	Mr. Tim Cook			
✓	Forest Hills Borough	Ms. Patricia DeMarco		demarcop6@gmail.com ~~manager@foresthillspa.com~~	
	Forest Hills Borough	Mayor			
	Forward Township	Ms. Karen Stetor		fwdtwp1@Comcast.net	
	Fox Chapel Borough	Mr. Robert J. Smith		rjsmith@fox-chapel.pa.us	
	Franklin Park Borough	Mr. Ambrose Rocca		arocca@franklinparkborough.us	
	Frazer Township	Ms. Lori Ziencik		frazertwp@comcast.net	
	Glassport Borough	Ms. Nancy Piazza-Whaby		glassportpa@yahoo.com	
	Glen Osborne Borough	Ms. Diane Vierling		dvierling@sewickleyborough.org	
	Glenfield Borough	Ms. Connie Klauck		glenfieldboro@aol.com	
	Green Tree Borough	Mr. David Montz		DMontz@greentreeboro.com	
	Hampton Township	Mr. Christopher Lochner		susan.bernet@hampton-pa.org	
	Harmar Township	Dr. Donna Piper		harmar701@comcast.net	
	Harrison Township	Ms. Faith Payne		fapayne@comcast.net	
	Haysville Borough	Ms. Mary Conlin		haysvilleborough1@verizon.net	
	Heidelberg Borough	[redacted] KpN LaSata		info@HeidelbergBorough.com	
	Homestead Borough	Mr. Matt Staniszewski			
	Indiana Township	Mr. Daniel L. Anderson		danderson@indianatownship.com	
	Ingram Borough	Ms. Debbie Stecko		dstecko@ingramborough.org	
	Jefferson Hills Borough	Mr. Charles Bennett		darndt@jeffersonhills.net	
	Kennedy Township	Mr. Jerry Orsini		mleck@kennedytwp.com	
	Green Tree	Mark Sampogna		msampogna@greentreeboro.com	

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #6

~~September 20, 2016~~
Feb 15, 2017

Initial	Representing	Name	Phone	Email	Comments
	Kilbuck Township	Mr. Harry Dilmore		kilbucktownship@gmail.com	
	Leet Township	Mr. Andy Wanto			
	Leetsdale Borough	Ms. Jennifer Simek		simek@leetsdaleboro.net	
	Liberty Borough	Ms. Debra Helderlein		liberty2921@yahoo.com	
	Lincoln Borough	Ms. Denise Murrin-Macey		lincolnboro@yahoo.com	
	Marshall Township	Mr. Neil McFadden		neilmc@twp.marshall.pa.us	
	McCandless Township	Mr. Tobias Cordek		mccmgr@townofmccandless.org	
	McDonald Borough	Ms. Marie Maximovich		mmaximovich@mcdonaldboro.com	
	McKees Rocks Borough	Ms. Tricia Levander		tlevander@mckeesrocksborough.com	
	Millvale Borough	Ms. Amy Rockwell		ARockwell@millvaleboro.com	
	Moon Township	Ms. Lora Dombroski		dlane@moontwp.com	
	Moon Township	Mr. Mal Petroccia		mpetrocca@moontwp.us	
	Mount Oliver Borough	Ms. Kathy Connolly		kconnolly4354@comcast.net	
	Munhall Borough	Ms. Becki Wirth		bwirth@munhallpa.us	
	Municipality of Bethel Park	Mr. Shawn Arbaugh			
	Municipality of Monroeville	Mr. Timothy Little		littlt@monroeville.pa.us	
	Muni. of Mount Lebanon	Mr. Keith McGill		kmcgill@mtlebanon.org	
	Municipality of Penn Hills	Mr. Mohammed Rayan		mrayan@pennhills.org	
	Neville Township	Ms. Jeanne Creese		jcreese@nevilletownship.us	
	North Braddock Borough	Mr. Douglas Marguriet		Nbmgr@comcast.net	
	North Fayette Township	Ms. Johnna Zona			
	North Versailles Township	Ms. Patricia Logo		PLogo@nvtpa.com	

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #6

~~September 20, 2016~~ Feb 15, 2017

Initial	Representing	Name	Phone	Email	Comments
	Oakdale Borough	Council President			
	Oakmont Borough	Ms. Lisa Jensen		ljensen@oakmontborough.com	
	O'Hara Township	Mr. Chris Vogel			
JJ	Ohio Township	Mr. Joe Jackson		jjackson@ohiotwp.org.	
	Pennsbury Village Borough	Ms. Reene Freemer		Boropv@comcast.net	
	Pine Township	Mr. Scott Anderson		sanderso@twp.pine.pa.us	
	Pitcairn Borough	Ms. Annette Dietz		Manager@PitcairnBorough.us	
	Pleasant Hills Borough	Ms. Deborah Englert		d.englert@comcast.net	
	Plum Borough	Mr. Michael Thomas		mthomas@plumboro.com	
	Port Vue Borough	Ms. Malisa Migliori		mmigloriportvueboro@comcast.net	
	Rankin Borough	Mr. Ed Crates		rankinboro@yahoo.com	
	Reserve Township	Mr. Tom Lavorini		manager@reservetwp.com	
	Richland Township	Mr. Dean Bastianini		rttina@zoominternet.net	
	Robinson Township	Mr. Jeffrey Silka		jsilka@townshipofrobinson.com	
	Ross Township	Mr. Doug Sample		dsample@ross.pa.us	
	Rosslyn Farms Borough	Mr. David Robb			
	Scott Township	Ms. Denise Fitzgerald		scotttwp@scotttownship.com	
	Sewickley Borough	Mr. Kevin Flannery		kflannery@sewickleyborough.org	
	Sewickley Heights	Mr. William Rohe		wrohe@sewickleyheightsboro.com	
	Sewickley Heights	Ms. Katie Stringent		Kstringent@sewickleyheightsboro.com	
	Sewickley Hills Borough	Ms. Diane Steele		sewickleyhillsborough@comcast.net	
	Shaler Township	Mr. Timothy Rogers		manager@shaler.org	

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #6

~~September 20, 2016~~
Feb 15, 2019

Initial	Representing	Name	Phone	Email	Comments
	Sharpsburg Borough	Mr. William Rossey		secretary@sharpsburgborough.com	
	South Fayette Township	Mr. Mike Benton			
	South Park Township	Ms. Karen Fosbaugh		southparktwp@southparktwp.com KF	
	South Park Township	Mr. Bruce Beaver		BruceRBeaver@Hotmail.com	
	South Versailles Township	Ms. Carla Barron			
	Springdale Borough	Ms. Kim McAfoose		springdaleboro@hotmail.com	
	Springdale Township	Ms. Dawn Biery		sprtwp@verizon.net	
	Stowe Township	Ms. Marie Incorvati		mariestowepd@comcast.net	
	Swissvale Borough	Mr. Clyde Wilhelm		administrative@swissvaleborough.com	
	Tarentum Borough	Mr. Michael Gutonski		manager@tarentumboro.com	
	Thornburg Borough	Ms. Dawn L. Karadeema			
	Trafford Borough	Ms. Nina Solivan		traffordmanager@comcast.net	
	Turtle Creek Borough	Ms. Julie Pantalone		julie@tcboro.com	
	Upper St. Clair Township	Mr. Matthew Serakowski		Serakowski@twpusc.org	
	Verona Borough	Mr. Mark Stanton		bcveronaboro@yahoo.com	
	Versailles Borough	Ms. Reba Schultz		admin@boroughofversailles.org	
	Wall Borough	Ms. Tracy Miller		WALLBOROUGH@YAHOO.COM	
	West Deer Township	Mr. Daniel Mator		dmator@westdeertownship.com	
	West Elizabeth Borough	Ms. Robin Schmidt		westelizabeth@comcast.net	
	West Homestead Borough	Mr. Kyle Thauvette		westhomesteadborough@gmail.com	
	West Mifflin Borough	Mr. Brian Kamauf		BKamauf@westmifflinborough.com	
	West View Borough	Mr. Bruce Fromlak		info@wvboro.com	

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #6

~~September 20, 2016~~
Feb 15, 2017

Initial	Representing	Name	Phone	Email	Comments
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	Whitehall Borough	Mr. James Leventry		jleventry@whitehallboro.org	
	Wilkins Township	Ms. Rebecca Bradley		rbradley@wilkinstownship.com	
	Wilkinsburg Borough	Mr. Eric Parish EP		eparrish@wilkinsburgpa.gov	
	Wilkinsburg Borough	Mr. Donn Henderson DH		DHenderson@wilkinsburgpa.gov	
	Wilmerding Borough	Mr. Joseph Hartzell		j.hartzell@wilmerdingboro.com	

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Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #56

~~September 20, 2016~~
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Initial	Representing	Name	Phone	Email	Comments
	Aleppo Township	Ms. Gwen Patterson		aleppomgr@comcast.net	
	Aspinwall Borough	Ms. Melissa Lang		mlang@boroughofaspinwall.com	
	Avalon Borough	Mr. Harry Dilmore		hdilmore@boroughofavalon.org	
	Baldwin Borough	Mr. John Barrett		JBarrett@baldwinborough.org	
	Baldwin Township	Mr. Rob Zahorchak / Tom McDermott		rob.zahorchak@baldwintownship.com	TMcDermott@GTNLaw.com
	Bell Acres Borough	Mr. Charles Kulbaki		buzztrap@comcast.net	
	Bellevue Borough	Mr. Ronald Borczyk		borczyk@bellevueboro.com	
	Ben Avon Borough	Hon. Ken Opipery, Councilman			
	Ben Avon Heights Borough	Ms. Denise Raves		benavonheightsborough6@gmail.com	
	Blawnox Borough	Ms. Cindy Bahn		manager@blawnox.net	
	Brackenridge Borough	Ms. Denise Tocco		brackenridgeborough@comcast.net	
	Braddock Borough	Ms. Deborah Brown		braddockmanager@comcast.net	
	Braddock Hills Borough	Ms. Cheryl Sorrentino		bradhillsboro@comcast.net	
	Bradford Woods Borough	Ms. Caresse Schweitzer		bradfordwoods@zoominternet.net	
	Brentwood Borough	Mr. George Zboyovsky		gzboyovsky@brentwoodboro.com	
	Bridgeville Borough	Ms. Lori Collins	Lori Collins / Tom McDermott	lcollins@bridgevilleboro.com	& TMcDermott@GTNLaw.com
STB	Carnegie Borough	Mr. Stephen Beuter	Steve Beuter	sbeuter.carnegieboro@comcast.net	
	Castle Shannon Borough	Mr. Thomas Hartswick		csboro@comcast.net	
	Chalfant Borough	Ms. Kirsten Schwoegl		schwoegl@msn.com	
	Cheswick Borough	Mr. Andrew Bock		abock.cheswick@yahoo.com	
	Churchill Borough	Mr. Craig Robinson		craigrobinson@churchillborough.com	
	City of Duquesne	Mr. Frank Piccolino		fpiccolino.duquesne@comcast.net	

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #~~5~~ 6

~~September 20, 2016~~
Feb 15, 2017

Initial	Representing	Name	Phone	Email	Comments
	City of McKeesport	Mr. Matthew Ernst			
	City of Pittsburgh	Mr. Ray Gastil		ray.gastil@pittsburghpa.gov	
	Clairton City	Mr. Howard Bednar		manager@cityofclairton.com	
	Collier Township	~~Mr. Salvatore Sirabella~~ Kyle Thauvette		~~ssirabella@colliertwp.net~~ kthauvette@colliertwp.net	
	Coraopolis Borough	Mr. Raymond McCutcheon		Manager@coraopolisPA.com	
	Crafton Borough	Ms. Ann Scott		ascott@craftonborough.com	
	Crescent Township	Ms. Kellie Crago		info@crescenttownship.com	
	Dormont Borough	Mr. Benjamin Estell		bestell@boro.dormont.pa.us	
	Dravosburg Borough	Ms. Brenda Honick		dravoadmin@comcast.net	
	East Deer Township	Ms. Chrystal Carmen		eastdeermanager@outlook.com	
	East McKeesport Borough	Ms. Connie Rosenbayger		administrator@eastmckeesportboro.com	
	East Pittsburgh Borough	Ms. Eileen Navish		emncpa@aol.com	
	Edgewood Borough	Ms. Julie Bastianini		manager@edgewoodboro.com	
	Edgeworth Borough	Mr. John Schwend		john.schwend@edgeworthborough.org	
	Elizabeth Borough	Ms. Pam Sharp		psharp@elizabethpa.net	
	Elizabeth Township	Mr. Harry Faulk		manager@elizabethtownshippa.com	
	Emsworth Borough	Ms. Cathy Jones		emsworthborough@comcast.net	
	Etna Borough	Mr. Dave Becki			
MR	Etna Borough	Ms. Mary Ellen Ramage		merAmage@etnaborough.org	
	Etna Borough	Mr. Peter Ramage		Rosiesmom@etnaborough.org	
	Etna Borough	Mr. Ronald Heck			
	Etna Borough	Mr. Ed Burke			
	ETNA Borough	Tom Rengers			

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #6

~~September 20, 2016~~ Feb 15, 2017

Initial	Representing	Name	Phone	Email	Comments
	Fawn Township	Ms. Julie Pater		fawntwp@comcast.net	
	Findlay Township	Mr. Tim Cook		TCook@Findlaytwp.org.	
	Forest Hills Borough	Ms. Patricia DeMarco		manager@foresthillspa.com	
	Forest Hills Borough	Mayor			
	Forward Township	Ms. Karen Stetor		fwdtwp1@Comcast.net	
	Fox Chapel Borough	Mr. Robert J. Smith		rjsmith@fox-chapel.pa.us	
	Franklin Park Borough	Mr. Ambrose Rocca		arocca@franklinparkborough.us	
	Frazer Township	Ms. Lori Ziencik		frazertwp@comcast.net	
	Glassport Borough	Ms. Nancy Piazza-Whaby		glassportpa@yahoo.com	
	Glen Osborne Borough	Ms. Diane Vierling		dvierling@sewickleyborough.org	
	Glenfield Borough	Ms. Connie Klauck		glenfieldboro@aol.com	
	Green Tree Borough	Mr. David Montz		DMontz@greentreeboro.com	
	Hampton Township	Mr. Christopher Lochner		susan.bernet@hampton-pa.org	
	Harmar Township	Dr. Donna Piper		harmar701@comcast.net	
	Harrison Township	Ms. Faith Payne		fapayne@comcast.net	
	Haysville Borough	Ms. Mary Conlin		haysvilleborough1@verizon.net	
	Heidelberg Borough	Ms. Amanda Loutitt		info@HeidelbergBorough.com	
	Homestead Borough	Mr. Matt Staniszewski			
	Indiana Township	Mr. Daniel L. Anderson		danderson@indianatownship.com	
	Ingram Borough	Ms. Debbie Stecko		dstecko@ingramborough.org	
	Jefferson Hills Borough	Mr. Charles Bennett		darndt@jeffersonhills.net	
	Kennedy Township	Mr. Jerry Orsini		mleck@kennedytwp.com	
	Findlay	Gretchen Moore		gmoore@smgs law.com	

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #6

~~September 20, 2016~~
Feb 15, 2019

Initial	Representing	Name	Phone	Email	Comments
	Kilbuck Township	Mr. Harry Dilmore		kilbucktownship@gmail.com	
	Leet Township	Mr. Andy Wanto			
	Leetsdale Borough	Ms. Jennifer Simek		simek@leetsdaleboro.net	
	Liberty Borough	Ms. Debra Helderlein		liberty2921@yahoo.com	
	Lincoln Borough	Ms. Denise Murrin-Macey		lincolnboro@yahoo.com	
	Marshall Township	Mr. Neil McFadden		neilmc@twp.marshall.pa.us	
	McCandless Township	Mr. Tobias Cordek		mccmgr@townofmccandless.org	
	McDonald Borough	Ms. Marie Maximovich		mmaximovich@mcdonaldboro.com	
	McKees Rocks Borough	Ms. Tricia Levander		tlevander@mckeesrocksborough.com	
	Millvale Borough	Ms. Amy Rockwell		ARockwell@millvaleboro.com	
	Moon Township	Ms. Lora Dombroski		dlane@moontwp.com	
	Moon Township	Mr. Mal Petroccia			
	Mount Oliver Borough	Ms. Kathy Connolly		kconnolly4354@comcast.net	
	Munhall Borough	Ms. Becki Wirth		bwirth@munhallpa.us	
	Municipality of Bethel Park	Mr. Shawn Arbaugh			
	Municipality of Monroeville	Mr. Timothy Little		littlt@monroeville.pa.us	
	Muni. of Mount Lebanon	Mr. Keith McGill		kmcgill@mtlebanon.org	
	Municipality of Penn Hills	Mr. Mohammed Rayan		mrayan@pennhills.org	
	Neville Township	Ms. Jeanne Creese		jcreese@nevilletownship.us	
	North Braddock Borough	Mr. Douglas Marguriet		Nbmgr@comcast.net	
	North Fayette Township	Ms. Johnna Zona / Tom McDermott		TMcDermott@GDLAW.com	
	North Versailles Township	Ms. Patricia Logo		PLogo@nvtpa.com	

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #~~5~~6

~~September 20, 2016~~ Feb 15, 2017

Initial	Representing	Name	Phone	Email	Comments
	Oakdale Borough	Council ~~President~~ William Hartman Jr	412-996-4186	215chief@oakdalelhosecompany.org	
	Oakmont Borough	Ms. Lisa Jensen		ljensen@oakmontborough.com	
	O'Hara Township	Mr. ~~Chris~~ Charles Vogel		CVogel@ohara.pa.us	
	Ohio Township	Mr. Joe Jackson			
	Pennsbury Village Borough	Ms. Reene Freemer		Boropv@comcast.net	
	Pine Township	Mr. Scott Anderson		sanderso@twp.pine.pa.us	
	Pitcairn Borough	Ms. Annette Dietz		Manager@PitcairnBorough.us	
	Pleasant Hills Borough	Ms. Deborah Englert		d.englert@comcast.net	
	Plum Borough	Mr. Michael Thomas		mthomas@plumboro.com	
	Port Vue Borough	Ms. Malisa Migliori		mmigloriportvueboro@comcast.net	
	Rankin Borough	Mr. Ed Crates		rankinboro@yahoo.com	
	Reserve Township	Mr. Tom Lavorini		manager@reservetwp.com	
	Richland Township	Mr. Dean Bastianini		rttina@zoominternet.net	
	Robinson Township	Mr. Jeffrey Silka		jsilka@townshipofrobinson.com	
	Ross Township	Mr. Doug Sample		dsample@ross.pa.us	
	Rosslyn Farms Borough	Mr. David Robb	412.722.9845	davidrobb2014@outlook.com	
	Scott Township	Ms. Denise Fitzgerald		scotttwp@scotttownship.com	
	Sewickley Borough	Mr. Kevin Flannery		kflannery@sewickleyborough.org	
	Sewickley Heights	Mr. William Rohe		wrohe@sewickleyheightsboro.com	
	Sewickley Heights	Ms. Katie Stringent		Kstringent@sewickleyheightsboro.com	
	Sewickley Hills Borough	Ms. Diane Steele		sewickleyhillsborough@comcast.net	
	Shaler Township	Mr. Timothy Rogers	412 486 9700	manager@shaler.org	

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #~~5~~6

~~September 20, 2016~~
Feb 15, 2017

Initial	Representing	Name	Phone	Email	Comments
	Sharpsburg Borough	Mr. William Rossey		secretary@sharpsburgborough.com	
	South Fayette Township	Mr. Mike Benton MB			
	South Park Township	Ms. Karen Fosbaugh		southparktwp@southparktwp.com	
	South Park Township	Mr. Bruce Beaver			
	South Versailles Township	Ms. Carla Barron			
	Springdale Borough	Ms. Kim McAfoose		springdaleboro@hotmail.com	
	Springdale Township	Ms. Dawn Biery		sprtwp@verizon.net	
	Stowe Township	Ms. Marie Incorvati		mariestowepd@comcast.net	
	Swissvale Borough	Mr. Clyde Wilhelm		administrative@swissvaleborough.com	
	Tarentum Borough	Mr. Michael Gutonski		manager@tarentumboro.com	
	Thornburg Borough	Ms. ~~Dawn L. Karadeema~~ Kate Diersen		KD kdiersen@grblaw.com	
	Trafford Borough	Ms. Nina Solivan		traffordmanager@comcast.net	
	Turtle Creek Borough	Ms. Julie Pantalone		julie@tcboro.com	
	Upper St. Clair Township	Mr. ~~Matthew~~ Serakowski George Kostelich Jr.		Serakowski@twpusc.org	Kostelich@twpusc.org
	Verona Borough	Mr. Mark Stanton		bcveronaboro@yahoo.com	
	Versailles Borough	Ms. Reba Schultz		admin@boroughofversailles.org	
	Wall Borough	Ms. Tracy Miller		WALLBOROUGH@YAHOO.COM	
	West Deer Township	Mr. Daniel Mator		dmator@westdeertownship.com	
	West Elizabeth Borough	Ms. Robin Schmidt		westelizabeth@comcast.net	
	West Homestead Borough	Mr. Kyle Thauvette		westhomesteadborough@gmail.com	
	West Mifflin Borough	Mr. Brian Kamauf		BKamauf@westmifflinborough.com	
	West View Borough	Mr. Bruce Fromlak		info@wvboro.com	

Municipal Managers / Representatives: Watershed Plan Advisory Committee (WPAC) #6

~~September 20, 2016~~
Feb 15, 2017

Initial	Representing	Name	Phone	Email	Comments
	Whitaker Borough	Ms. Jean Warren	412-462-8940	whitaker@rdm-inc.com JW	
	White Oak Borough	Ms. Nancy Greenland		whiteoak@woboro.com	
	Whitehall Borough	Mr. James Leventry		jleventry@whitehallboro.org	
	Wilkins Township	Ms. Rebecca Bradley		rbradley@wilkinstownship.com	
	Wilkinsburg Borough E.P.	Mr. Eric Parish		EPARISH@WILKINSBURG PA.GOV	
	Wilkinsburg Borough	Mr. Donn Henderson		DHENDERSON@WILKINSBURG PA.GOV	
	Wilmerding Borough	Mr. Joseph Hartzell		j.hartzell@wilmerdingboro.com	

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #6
February 15, 2017

Initial	Representing What Municipalities? List. (attach extra sheet if needed)	Name	Phone	Email
		Ray Antonelli		rantonelli@niraengineers.com
		Rob Arnold		rarnold@chesterengineers.com
		John Balewski		jbalewski@chesterengineers.com
RB		**Ricky Burgess**		r burgess @chesterengineers.com
		Don Black		dblack@eadsgroup.com
		Andy Blenko		ablenko@nhtpa.us
		Brad Boddy		bboddy@wadetrim.com
		Kevin Brett		kbrett@lsse.com
	Corson Tree Biological	Louis Casadei		lcasadei@greentreeboro.com
		Bob Christian		rchristian@pgh2o.com
		David Coldren		dcoldren@klhengineers.com

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #6
February 15, 2017

Initial	Representing Which Municipalities	Name	Phone	Email
		Daniel Deiseroth		ddeiseroth@gatewayengineers.com
		Doug Evans		devans@niraengineers.com
		Robert Firek		rfirek@lsse.com
		Bryan Flaugh		bflaugh@gatewayengineers.com
		Dennis Flynn		dflynn@gatewayengineers.com
		Jim Garvin		jsgarvin@garvineng.com
		Art Gazdik		artgazdik@groundworkcivil.net
		Dave Gilliland		daveg@glennengr.com
		Don Glenn		
		Susan Glenn		susang@glennengr.com
		Mike Glister		mglister@gatewayengineers.com

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #6
February 15, 2017

Initial	Representing Which Municipalities	Name	Phone	Email
		Bob Grigas		rjgrigas@senateengineering.com
		Phil Herman		pdherman@senateengineering.com
		Ken Hillman		klhillman@senateengineering.com
		Paul Hugus		hugusp@monroeville.pa.us
		Don Hultberg		dhultberg@eadsgroup.com
		Lindsey Jewart		ljewart@chesterengineers.com
		Glenn Jonnet		gjonnet@hotmail.com
		Charles Jordan		cjordan@chesterengineers.com
		Emile Ketterer		eketterer@niraengineers.com
		Rich Knapek		rjknapek@senateengineering.com
		Lawrence Lennon		ljlennonjr@lsse.com

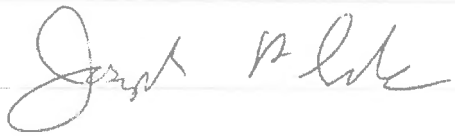
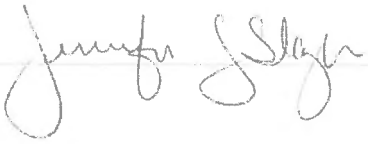
Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #6
February 15, 2017

Initial	Representing Which Municipalities	Name	Phone	Email
		Larry Lennon		ljlennon@lsse.com
		Michael Malak		mcmalak@senateengineering.com
		Dan Martone		djmartone@aol.com
		Henry Martone		djmartone@aol.com
		Ed McGee		edmcgee12@centurylink.net
		Wayne McVicar		wmcvicar@boro.dormont.pa.us
		Michael Meyer		michael.meyer@rve.com
		Rick Minsterman		rminsterman@gatewayengineers.com
		Robert Mitall		rmitall@mitallengineering.com
		Ned Mitrovich		Nmitrovich@lsse.com
		John Mowry		jmowry@klhengineers.com

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #6
February 15, 2017

Initial	Representing Which Municipalities	Name	Phone	Email
		Don Newman		dnewman@bh-ba.com
		Jim Nordquist		jnordquist@niraengineers.com
		Ruthann Omer		romer@gatewayengineers.com
		Ken Orie		keno@gibson-thomas.com
		Malcolm Petroccia		mpetroccia@moontwp.com
		Jim Pritchard		jpritchard@mbakercorp.com
		Clint Reilly		creilly@niraengineers.com
		Robert Robinson		r.robinson@twp.marshall.pa.us
		Shawn Rosensteel		srosensteel@chesterengineers.com
		Mark Scally		mscally@chesterengineers.com
		Gregory Scott		gscott@bh-ba.com

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #6
February 15, 2017

Initial	Representing Which Municipalities	Name	Phone	Email
		Matt Sebastian		msebastian@shaler.org
		Larry Seiler		laseiler@senateengineering.com
		Scott Shoup		shoupeng@comcast.net
		Karl Sieg		kpspe@fyi.net
		Joe Sites		jsites@Gatewayengineers.com
		Dan Slagle		dslagle@nichols-slagle.com
		Jennifer Slagle		jslagle@gatewayengineers.com
		Larry Souleret		lsouleret@lsse.com
		Jason Stanton		jstanton@lsse.com
		Jean Statler		jstatler@bethelpark.net
		Charles Steinert		csteinert@ohara.pa.us

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #6
February 15, 2017

Initial	Representing Which Municipalities	Name	Phone	Email
		Philip Strunk		pstrunk@gatewayengineers.com
		Gordon Taylor		gttaylor@senateengineering.com
		Kurt Todd		ktodd@gatewayengineers.com
		Bill Wengerd		billw@senateengineering.com
		Mark Zemaitis		MAZemaitis@peterstownship.com
		Robert Zischkau		bobz@glennengr.com
		Norbert Lindner		
		Ryan R. Berner		
		Len White		
	Oakdale, Carnegie	**Ross Volkwein**		rvolkwein @ klhengineers.com
	Oakdale, Carnegie	**Sam Gibson**		sgibson @ klhengineers.com

Municipal Engineers: Watershed Plan Advisory Committee (WPAC) #6
February 15, 2017

Initial	Representing Which Municipalities	Name	Phone	Email
		Dave Kovac - LSSE		dkovac@lssei.com
	West Homestead	PS&R Mark Brashear		Mbrashear@pashrock.com
	Pittsburgh	Ruari Egan		regan@pgh2o.com

APPENDIX E

SITE VISIT PHOTOS OF LOCAL STORMWATER MANAGEMENT FACIITIES

APPENDIX E – PHOTOS OF LOCAL STORMWATER MANAGEMENT FACILITIES

BAYER DAM – Bayer Road, Robinson Township, PA (Robinson Run Watershed)

PHOTOGRAPH **1**	
FACILITY TYPE **PADEP Regulated Dam**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: **Aerated wet pond.**

PHOTOGRAPH **2**	
FACILITY TYPE **PADEP Regulated Dam**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: **Aerated wet pond.**

APPENDIX E – PHOTOS OF LOCAL STORMWATER MANAGEMENT FACILITIES

CRESCENT-01 – Laurel Ridge Drive, Crescent Township, PA

PHOTOGRAPH **3**	
FACILITY TYPE **Retention Basin**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: **Inlet headwall, rip-rap lined inlet channel, and concrete riser visible.**

PHOTOGRAPH **4**	
FACILITY TYPE **Retention Basin**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments:

APPENDIX E – PHOTOS OF LOCAL STORMWATER MANAGEMENT FACILITIES

FINDLAY-27 – Pappan Drive, Findlay Township, PA

PHOTOGRAPH **5**	
FACILITY TYPE **Retention Basin**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: Overgrowth of vegetation, concrete riser visible

PHOTOGRAPH **6**	
FACILITY TYPE **Retention Basin**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: Pond is fenced.

APPENDIX E – PHOTOS OF LOCAL STORMWATER MANAGEMENT FACILITIES

FINDLAY-39 – Trotter Lane, Findlay Township, PA

PHOTOGRAPH **7**	
FACILITY TYPE **Retention Basin**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: **Wet pond, concrete riser to left in photo, dam visible in foreground.**

PHOTOGRAPH **8**	
FACILITY TYPE **Retention Basin**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments:

APPENDIX E – PHOTOS OF LOCAL STORMWATER MANAGEMENT FACILITIES

MTLEBO-02 – 900 Cedar Blvd, Mt. Lebanon, PA

PHOTOGRAPH **9**	
FACILITY TYPE **Bioretention Rain Garden**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: **Rain garden handles rainwater runoff from building roof.**

PHOTOGRAPH **10**	
FACILITY TYPE **Bioretention Rain Garden**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments:

APPENDIX E – PHOTOS OF LOCAL STORMWATER MANAGEMENT FACILITIES

NEVILLE-01 – 5701 Grand Avenue, Neville Township, PA

PHOTOGRAPH **11**	
FACILITY TYPE **Detention Basin**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: Well maintained, concrete riser in foreground.

PHOTOGRAPH **12**	
FACILITY TYPE **Detention Basin**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: Inlet pipes with rip-rap aprons in foreground.

APPENDIX E – PHOTOS OF LOCAL STORMWATER MANAGEMENT FACILITIES

NEVILLE-03 – 4900 Grand Avenue, Neville Township, PA

PHOTOGRAPH **13**	
FACILITY TYPE **Bioretention Rain Garden**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: **Lower end of rain garden/pond, partially filled with water, concrete drain in foreground.**

PHOTOGRAPH **14**	
FACILITY TYPE **Bioretention Rain Garden**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: **Upper end of rain garden.**

APPENDIX E – PHOTOS OF LOCAL STORMWATER MANAGEMENT FACILITIES	
NVERSAILLES-01 – 100 Walmart Drive, North Versailles, PA	
PHOTOGRAPH **15**	
FACILITY TYPE **Detention Basin**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	
Comments: **Basin filled with water, concrete riser visible to left in photo.**	
PHOTOGRAPH **16**	
FACILITY TYPE **Detention Basin**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	
Comments: **Inlet pipe concrete headwall visible in foreground, concrete riser visible to left.**	

APPENDIX E – PHOTOS OF LOCAL STORMWATER MANAGEMENT FACILITIES	
NVERSAILLES-02 – 625 East Pittsburgh / McKeesport Blvd, North Versailles, PA	
PHOTOGRAPH **17**	
FACILITY TYPE **Detention Basin**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	
Comments: **Grass-lined basin, well maintained. Plastic riser pipe at far end of basin.**	
PHOTOGRAPH **18**	
FACILITY TYPE **Detention Basin**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	
Comments: **Inlet pipe concrete headwall visible at far end of basin.**	

APPENDIX E – PHOTOS OF LOCAL STORMWATER MANAGEMENT FACILITIES

OAKMONT-03 – Dark Hollow Road, Oakmont, PA

PHOTOGRAPH **19**	
FACILITY TYPE **Bioretention Rain Garden**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: **Parking lot island rain garden with grated inlet.**

PHOTOGRAPH **20**	
FACILITY TYPE **Bioretention Rain Garden**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: **Parking lot island rain garden with grated inlet.**

APPENDIX E – PHOTOS OF LOCAL STORMWATER MANAGEMENT FACILITIES

OHIO-50 – Buckingham Drive, Ohio Township, PA

PHOTOGRAPH **21**	
FACILITY TYPE **Detention Basin**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: **Detention basin on benched terrace, drainage swale feeding basin visible to left in photo.**

PHOTOGRAPH **22**	
FACILITY TYPE **Detention Basin**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: **Basin is fenced, concrete riser visible in foreground.**

APPENDIX E – PHOTOS OF LOCAL STORMWATER MANAGEMENT FACILITIES

OHIO-53 – Joseph's Lane, Ohio Township, PA

PHOTOGRAPH **21**	
FACILITY TYPE **Bioretention Rain Garden**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: **Well maintained, grass-lined rain garden basin, two small grated inlets visible in photo.**

PHOTOGRAPH **22**	
FACILITY TYPE **Bioretention Rain Garden**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments:

APPENDIX E – PHOTOS OF LOCAL STORMWATER MANAGEMENT FACILITIES

WILKINSBURG-02 – Wallace Avenue, Wilkinsburg, PA

PHOTOGRAPH **21**	
FACILITY TYPE **Bioretention Rain Garden**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: **Bioretention rain garden as part of landscape.**

PHOTOGRAPH **22**	
FACILITY TYPE **Bioretention Rain Garden**	
PHOTOGRAPH BY **Sci-Tek Consultants, Inc.**	

Comments: **Rain garden inlet.**

- Introduction to the Public Comments and Responses
  August 25, 2016 example letter re: WPAC #5
  September 26, 2016 transmittal for CD of the Draft Plan
  February 3, 2017 e-mail re: WPAC #6 and transmitting the Revised Model Ordinance
  February 10, 2017 example letter transmitting responses to comments received on the Draft Plan

- Appendix F-1 Public Comments and Responses on the September 20, 2016 Draft SWM PLAN (ordered alphabetically by municipality/agency name)

- Appendix F-2 Public Comments and Responses on the February 3, 2017 Revised Draft SWM PLAN and Model Ordinance (ordered alphabetically by municipality/agency name)

INTRODUCTION TO THE PUBLIC COMMENTS AND RESPONSES

Following internal County review, the Draft Allegheny County Act 167 Phase 2 County-Wide Stormwater Management Plan (PLAN) was provided to the public at WPAC Meeting #5 on September 20, 2016. The WPAC members were notified of the meeting and encouraged to attend by letter dated August 25, 2016 (an example copy of the letter is provided on the next page) and by several reminder e-mails in advance of the meeting and during the comment period. The WPAC membership is listed in the PLAN and includes all 130 municipalities of Allegheny County since all are affected by the PLAN, and the regional planning agencies. Allegheny County is a home rule county and does not have a county planning commission. Allegheny County Economic Development is the designated planning agency for Allegheny County and is the PLAN sponsor.

The WPAC members were encouraged in the August 25 letter and during WPAC #5 to carefully review the PLAN to ensure that it meets each community's stormwater concerns and needs. While feedback/comments were requested within 2 months through November 21, 2016, we accepted and responded to comments received through January 13, 2017. The CDs of the Draft PLAN were distributed to the WPAC members at the September 20 meeting; were mailed on September 26 to those who did not attend; and was posted on the Allegheny County Stormwater Management Plan (SWMP) website on September 27 along with the WPAC #5 PowerPoint presentation.

Twenty-three WPAC members provided approximately 263 comments on the September 20 PLAN. The comments are included in this Appendix and range from comments on how to improve the wording to how the Model Ordinance is or is not consistent with other ordinances, plans, and programs for the County's watersheds. The submitted written comments encompassed all comments received during WPAC #5. Responses were developed for each comment, either describing how the comment was incorporated into the PLAN or explaining why it could not be. The responses were mailed to the respective commenter and are also included in this Appendix.

The PLAN and Model Ordinance were revised in January to address the comments received to that point. The February 15, 2017 WPAC #6 was announced and the revised Model Ordinance was distributed to the entire WPAC membership on February 3, 2017 and placed on the SWMP website. As discussed at the WPAC meeting and noted in the announcement (attached), an additional period was provided for comments on the revised Ordinance and PLAN. The comments provided by six WPAC members are included in this Appendix along with the responses which were sent to the respective commenter. The submitted written comments encompassed all comments received during WPAC #6.

COUNTY OF ALLEGHENY

RICH FITZGERALD
COUNTY EXECUTIVE

August 25, 2016

Ms. Gwen Patterson , Manager
Aleppo Township
100 North Dr.
Sewickley, PA 15143

EXAMPLE

Re: Watershed Plan Advisory Committee (WPAC)
Draft Allegheny County Phase II Stormwater Management Plan

Dear Ms. Patterson:

I'm pleased to announce that the draft Phase II Allegheny County Stormwater Management Plan (Plan) will be released at the Watershed Plan Advisory Committee (WPAC) meeting No. 5. This WPAC meeting will be held from 6:00 p.m. – 8:00 p.m. on Tuesday, September 20, 2016, at the Green Tree Municipal Building, located at 10 West Manilla Avenue; Pittsburgh, PA 15220.

We urge you to attend this crucial meeting, at which we will present the draft Phase II Plan, highlights of the model stormwater management ordinance, and discuss provisions for stormwater management. At this September 20 presentation, WPAC members will also be given a disk, on which will be the Executive Summary, the draft Plan, Model Ordinance, maps, and appendices.

Please especially note that since it is critical that the final document truly reflects your community's stormwater concerns and needs, we will be asking for and encourage your very important feedback within two months of the draft Plan's release. This two-month comment period will end on Monday, November 21, 2016.

I thank you for your time and for your continued participation in this important endeavor on which both you and the County have embarked. Without your contribution; continued involvement; and desire for comprehensive, sound stormwater management practices in Allegheny County, this draft Plan would not be possible.

If you have any questions or comments about this initiative, please direct them to William McLain at 412-350-1361. Additionally, please RSVP for the September 20 meeting to Mr. McLain at wmclain@alleghenycounty.us by Friday, September 9, 2016.

Sincerely,

Robert D. Hurley
Director

WM/mac

ROBERT D. HURLEY, DIRECTOR
ALLEGHENY COUNTY ECONOMIC DEVELOPMENT
ONE CHATHAM CENTER • SUITE 900 • 112 WASHINGTON PLACE • PITTSBURGH, PA 15219
PHONE (412) 350-1000 • WWW.ALLEGHENYCOUNTY.US/ECONOMIC/

ALLEGHENY COUNTY
ECONOMIC DEVELOPMENT

ECONOMIC DEVELOPMENT MEMORANDUM

To: Allegheny County Municipalities

From: William McLain, ACED WM

Date: September 26, 2016

Subject: **DRAFT Allegheny County Stormwater Management Plan CD**

Please find enclosed your Municipality's copy of the CD that was distributed at WPAC meeting #5, which was held at Green Tree Borough on Tuesday, September 20, 2016. The CD contains the complete DRAFT Phase II Allegheny County Stormwater Management Plan (Plan), Model Stormwater Management Ordinance, technical appendices and other materials. The review period on the DRAFT Plan commenced on the date of the WPAC #5 meeting. Comments are due Monday, November 21, 2016.

The PowerPoint presentation from the WPAC meeting and the DRAFT Plan will be available soon on the project website, http://www.alleghenycountyswmp.com.

Please send your comments on the DRAFT Plan to me at wmclain@alleghenycounty.us by Monday, November 21, 2016. If you have any questions, I can be reached at 412-350-1361.

Shannon, John

From: McLain, William D. <William.McLain@AlleghenyCounty.US>
Sent: Friday, February 03, 2017 2:55 PM
To: Shannon, John
Cc: Pierce, Kay
Subject: WPAC #6 and the Model Stormwater Management Ordinance
Attachments: 170201 Model Ordinance for WPAC #6 .pdf

Dear Watershed Plan Advisory Committee Member:

WPAC #6 will be held at the Green Tree Municipal Building on February 15, 2017 from 6:00 – 8:00 pm.

This is an important meeting; please make every effort to attend. A copy of the Model Ordinance is attached and will be a major focus of this WPAC.

This version of the Model Stormwater Management Ordinance has been revised in response to comments received from the WPAC members regarding the September 2016 SWM Plan. Revisions are shown in the document. Comments on the attached version of the Model Stormwater Management Ordinance will be received at the February 15, 2017 WPAC #6 meeting or until February 24 by letter or e-mail to William McLain at wmclain@alleghenycounty.us.

Please note that this is the last WPAC meeting that is scheduled to be held before the Allegheny County Stormwater Management Plan and Model Ordinance is submitted to Allegheny County Council for review and adoption.

If you have any questions don't hesitate to call or email me. Please RSVP to William McLain at wmclain@alleghenycounty.us or by phone at 412.350.1361.

Sincerely,

William McLain

William McLain | Planning Division
Allegheny County Economic Development
Chatham One, Suite 900 | 112 Washington Place | Pittsburgh, PA 15219
P 412.350.1361 | **F** 412.350.1050 | **E** wmclain@alleghenycounty.us
www.alleghenycounty.us/econdev
www.alleghenycountyswmp.com

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COUNTY OF ALLEGHENY

RICH FITZGERALD
COUNTY EXECUTIVE

February 10, 2017

EXAMPLE

Ms. Karen F. Fosbaugh
Township Manager
South Park Twp.
2675 Brownsville Rd.
South Park, PA 15129

Subject: Response to Comments on the
Allegheny County Draft Act 167 Stormwater Management Plan

Dear Ms. Fosbaugh,

Thank you for your comments on the Allegheny County Draft Act 167 Stormwater Management Plan, including the Draft Model Stormwater Management Ordinance. As required by the Act 167 planning process, we have reproduced your comments with the County's responses on the attached form that will be incorporated into an appendix in the next version of the Plan document. The response form is provided for your information and use. There will be a general discussion of all comments received and the revised Model Stormwater Management Ordinance at the February 15, 2017 Watershed Plan Advisory Committee meeting. Additional comments will be received until February 24, 2017 at William's e-mail address or by mail at the office address.

Should you have any questions concerning our responses, or the Stormwater Management Plan, please contact William D. McLain at wmclain@alleghenycounty.us or by phone at 412.350.1361.

Sincerely,

Manager, Planning Division

ROBERT D. HURLEY, DIRECTOR
ALLEGHENY COUNTY ECONOMIC DEVELOPMENT
ONE CHATHAM CENTER • SUITE 900 • 112 WASHINGTON PLACE • PITTSBURGH, PA 15219
PHONE (412) 350-1000 • WWW.ALLEGHENYCOUNTY.US/ECONOMIC/

APPENDIX F-1

Public Comments and Responses on the September 20, 2016 Draft SWM PLAN

Shannon, John

From: Jan Lauer <jlauer@accdpa.org>
Sent: Thursday, September 15, 2016 1:57 PM
To: William.McLain@AlleghenyCounty.US; Kay Pierce; Davis, Chad; Shannon, John
Cc: Danielle Sheppard; Jonathan Burgess
Subject: FW: Allegheny County Act 167 Plan

Please contact Danielle or Jonathan if you have any questions. This represents our total feedback – no other sections.

Jan

From: Danielle Sheppard
Sent: Thursday, September 15, 2016 1:53 PM
To: Jan Lauer <jlauer@accdpa.org>
Cc: Jonathan Burgess <jburgess@accdpa.org>
Subject: RE: Allegheny County Act 167 Plan

Jan – we've put together some comments for the agricultural section of the Act 167 plan.

Paragraph 1- Agricultural Conservation Practices

- After the sentence *Planning a conservation system ensures that the maximum benefits can be obtained from the individual components and that the overall management goals are accomplished.* Add Pennsylvania requires farmers to obtain a written Agricultural Erosion and Sediment Control Plan or Conservation Plan for agricultural plowing or tilling activities or for animal heavy use areas greater than 5,000 square feet.
- Change *local CCD* to local County Conservation District

Paragraph 2 – Streambank Protection

- After the sentence *The practice can be implemented with or without fencing; however, it is much more effective when fencing is installed.* Fencing is highly recommended in areas accessible to livestock. *This BMP* ~~*usually*~~ may *requires installation of an alternate watering source for livestock and* potentially *an animal crossing.*

Paragraph 4 – Barnyard Runoff Control

- Add to the sentence *These principles are* removing manure from the barnyard, *keeping "clean" water away from the barnyard, collecting runoff from the barnyard, and filtering it with an appropriate BMP…*

Paragraph 5 – Nutrient Management

- *Nutrient* and manure *management is planning for, and implementation of, the application of organic and inorganic materials to provide sufficient nutrient for crop production in a manner that limits negative environmental impacts of their use (NRCS, 1999).* Manure management plans are required for all operations producing and utilizing manure. An approved nutrient management plan is required for higher density, concentrated animal operations. *A nutrient management plan accounts for all nutrient sources and details the location, timing, rate, and method of nutrient application to crop fields.* Pennsylvania regulations define maximum application rates and setback distances from environmentally sensitive areas. *Implementing a nutrient management plan provides benefit to the farmer by allocating the available nutrient to where they are needed the most for crop yield. It also limits excess nutrients that would otherwise be susceptible to transport* ~~*eventually*~~ from contributing to NPS pollution.

Paragraph 8 – Conservation Tillage

- Add after the sentence *Minimum tillage farming is another method that involves minor disturbance of the soil, but maintains much of the ground cover on the surface. There is no efficiency associated with this*

practice. Additionally, foregoing fall tillage while maintaining crop residue can also provide a beneficial reduction in soil loss. *The effects of each tillage system…*

Danielle Sheppard
Agriculture Conservationist
Allegheny County Conservation District
33 Terminal Way, Suite 325 B
Pittsburgh, PA 15219
Phone: 412-241-7645 Fax: 412-242-6165

From: Shannon, John [mailto:jshannon@mbakerintl.com]
Sent: Monday, September 12, 2016 12:05 PM
To: Jan Lauer <jlauer@accdpa.org>
Cc: William D. McLain <William.McLain@AlleghenyCounty.US>; Kay Pierce <Kay.pierce@alleghenycounty.us>; Davis, Chad <CDavis@mbakerintl.com>
Subject: Allegheny County Act 167 Plan

Good morning Jan,

We thought the August 29 meeting was very informative and helpful.

Will the Conservation District be submitting any comments on the Draft Act 167 PLAN in advance of the WPAC #5 meeting on Sept. 20?

In particular, we were hoping that you would be able to review and add to the Agricultural Conservation Practices on pages 90-92 of the PLAN.

If you could let us know if you are doing comments, we can plan when to begin production of the CDs for the WPAC meeting.

Thanks, John

John M. Shannon, P.E. | Senior Project Manager
Michael Baker International
[O] 412-375-3076 | [M] 412-304-7230 | [F] 412-375-3995
100 Airside Drive, Airside Business Park | Moon Township, PA 15108
jshannon@mbakerintl.com | www.mbakerintl.com



Plan Review Comments		
Project: Allegheny County Act 167 SWM Plan Subject: Review of Draft County-wide SWM Plan and Model Ordinance County Project Manager: William D. McLain, Allegheny County Economic Development Design Consultant: Michael Baker International, Inc. Reviewer(s): Jan Lauer, Director and Danielle Sheppard, Agricultural Conservationist, Allegheny County Conservation District Date(s): September 2016 ; September 2016		
Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
1	Section 6 - Water Quality: Agricultural Conservation Practices	Comment on Paragraph 1 - Agricultural Conservation Practices Response: The recommended change has been incorporated into the Plan.
2	Section 6 - Water Quality: Agricultural Conservation Practices	Comment on Paragraph 1 - Agricultural Conservation Practices Response: The recommended change has been incorporated into the Plan.
3	Section 6 - Water Quality: Agricultural Conservation Practices	Comment on Paragraph 2 - Streambank Protection Response: The recommended change has been incorporated into the Plan.
4	Section 6 - Water Quality: Agricultural Conservation Practices	Comment on Paragraph 4 - Barnyard Runoff Control Response: The recommended change has been incorporated into the Plan.
5	Section 6 - Water Quality: Agricultural Conservation Practices	Comment on Paragraph 5 - Nutrient Management Response: The recommended change has been incorporated into the Plan.
6	Section 6 - Water Quality: Agricultural Conservation Practices	Comment on Paragraph 6 - Conservation Tillage Response: The recommended change has been incorporated into the Plan.
Comments on the Model Ordinance		
		No formal comments were submitted. Response: NA

alcosan allegheny county sanitary authority ™

January 13, 2017

Members of the Board

John Weinstein
Chairman

Gregory A. Jones
Corey O'Connor
Jack Shea
Brenda L. Smith
Sylvia C. Wilson
Rep. Harry Readshaw

Arletta Scott Williams
Executive Director

David W. Borneman, P.E.
Director
Engineering & Construction

Arthur M. Tamilia, Esq.
Director
Environmental Compliance

William H. Inks, CPA
Director
Finance & Administration

Jan M. Oliver
Director
Regional Conveyance

Douglas A. Jackson, P.E.
Director
Operations & Maintenance

Delivered via email to wmclain@alleghenycounty.us

William D. McLain, Allegheny County Plan Manager
Allegheny County Economic Development
Chatham One, Suite 900, 112 Washington Place
Pittsburgh, PA 15219

Dear Mr. McLain,

The Allegheny County Sanitary Authority welcomes the opportunity to submit comments to the Allegheny County Draft Act 167 Phase 2 County-Wide Stormwater Management Plan.

Our comments, which are attached, offer several suggestions and questions about the plan and its impact on ALCOSAN, our member municipalities, and our Wet Weather Plan mandated by the United States Department of Justice, the U.S. Environmental Protection Agency, the Pennsylvania Department of Environmental Protection and the Allegheny County Health Department. We believe that some of the changes we recommend would make both the Wet Weather Plan and the Stormwater Management Plan more effective. Specifically, our comments involve 11 specific areas:

1. **Implementation Framework**
2. **Implementation and Enforcement**
3. **Special Consideration of GSI Retrofit Projects**
4. **Dewatering Times for Projects in Combined Sewer Areas**
5. **Section 303 - Volume Controls**
6. **Absence of Watershed Studies in Portions of the Combined Sewer Areas**
7. **Section 402 - Plan Submission**
8. **Road Projects**
9. **Sites with Limited Infiltration Capacity**
10. **Coordination with ALCOSAN's GROW Program**
11. **Exemptions Based on Project Size**

We are eager to work with your office to move forward together in finalizing a Plan that meets the needs of all stakeholders, and helps ALCOSAN and its member municipalities enhance and expand our clean water work together.

Sincerely,

ALLEGHENY COUNTY SANITARY AUTHORITY

Arletta Scott Williams
Executive Director

Allegheny County Sanitary Authority Comments on the
Allegheny County Draft Act 167 Phase 2 County-Wide Stormwater Management Plan

1. **Implementation Framework** - While the Draft Plan aims to establish uniform minimum county-wide stormwater management standards, administration across 130 municipalities will present other challenges. Moreover, many municipalities have limited resources to administer the procedural and substantive provisions of this ordinance. Efficient ordinance administration may be achieved by municipalities pooling resources with a common unit of government. Delegation of administrative functions, such as reviews and approvals, to a common unit of government (e.g. the Allegheny County Conservation District) would also promote consistency.

   The Plan includes a table that describes three different models for Municipal Plan implementation including individual municipal, multi-municipal and county-wide models. Is the Plan open to another option of creating a new multi-municipal stormwater authority? Such an authority would have the ability to impose stormwater fees and also borrow capital for projects and could provide more effective and uniform implementation.

2. **Implementation and Enforcement** – The following suggestions could help maximize the effectiveness of municipal implementation and enforcement of their ordinances, if not already contemplated:
   a. require training for reviewers, to be repeated periodically;
   b. provide a guidance manual; and
   c. if possible, require municipalities to report to the County the number of reviews conducted each year, possibly on a staggered schedule to help easily manage the receipt/review of these reports.

3. **Special Consideration of GSI Retrofit Projects** – The ordinance is targeted at new development and redevelopment so it is recommended to provide more clarity on the requirements for voluntary GSI retrofit projects that are solely intended to better manage runoff from existing development. For example, as written it appears such projects must meet the Volume Controls and Rate Controls and would require modeling to demonstrate that those requirements are met, unless a statement is added to make it clear that none of the requirements and modeling apply if a project involves no new impervious area. It would also help simplify the permitting aspects of GSI retrofit projects if they could follow the simplified Small Project Stormwater Management Site Plan requirements instead of the full requirements in Section 401. Another approach to clarifying and simplifying GSI retrofit project provisions would be to identify a

special class of project that would be exempt from the volume and rate controls if the sole purpose of the project is to better manage runoff from existing impervious surfaces. A similar provision is included in the Philadelphia Water Stormwater Management Guidance Manual as quoted below:

> *"Stormwater Retrofit is defined in the Stormwater Regulations as a project that is limited to the voluntary rehabilitation and/or installation of stormwater management practices (SMPs) on a property to better manage stormwater runoff.... In most circumstances, projects classified as Demolition or Stormwater Retrofits will be exempt from PCSM [Post-Construction Stormwater Management] Requirements, regardless of size. However, these types of projects must still comply with the Erosion & Sediment Control (E&S) requirement."*

4. **Dewatering Times for Projects in Combined Sewer Areas** – The State BMP Manual leaves flexibility in the design basis for dewatering projects with storage, but states it should be between 24 to 72 hours. It also states that mosquitos should not be a problem if water drains in 72 hours since mosquitos require a considerably long breeding period with relatively static water levels. To maximize CSO reduction and treatment of these dewatered flows, projects in combined sewer areas could be encouraged or required to design for a 72-hour dewatering time which could send more combined sewage to treatment by delaying more dewatering until after overflows have ended.

5. **Section 303 - Volume Controls** – For the one-inch capture of runoff from new impervious area in the Design Storm Method, the Plan and ordinance could encourage or require municipalities to increase this requirement to the first 1.5 inches of runoff in combined sewer areas in order to achieve greater CSO reduction. The City of Pittsburgh, which encompasses a significant portion of ALCOSAN's combined sewer area, already requires this amount of capture for certain projects.

6. **Absence of Watershed Studies in Portions of the Combined Sewer Area** – Per Section 304, default release rates (which are often less restrictive than watershed-specific rates that result from a study) must be met in areas without an approved Act 167 Storm water Management Plan. It appears portions of the ALCOSAN combined sewer area fall into this category including some areas which experience more frequent flooding such as Negley Run. It is recommended that the future watershed studies be prioritized in unstudied portions of the combined sewer area or at least in those areas with greatest flood risk so that more restrictive watershed-specific release rates can be established where appropriate where they can help reduce both flooding and CSOs.

7. **Section 402 - Plan Submission** – If desired, could ALCOSAN be added as a required recipient of plan submissions and/or record drawings in combined sewer areas? This would enable ALCOSAN to track compliance and effectiveness, and better coordinate its flow reduction efforts with significant redevelopment plans. If this is an option ALCOSAN would appreciate the opportunity to discuss the merits of such a requirement, using electronic submissions, GIS files, etc.

8. **Road Projects** – Since a very significant percentage of impervious area relates to road projects, we recommend providing guidance to clarify which specific types of road resurfacing/replacement construction methods will constitute a "regulated activities". "Regulated activities" under the Model Ordinance broadly encompass all "earth disturbance activit[ies]" including excavations, embankments, road maintenance, and the movement of soil. Because regulated activities are defined broadly, ALCOSAN suggests exemptions be included for roadway resurfacing and maintenance projects (which don't increase impervious area) and underground infrastructure projects which have impacts too trivial to merit consideration.

9. **Sites with Limited Infiltration Capacity** – One of the recommendations in Section 8 is quoted below. Since capture of at least the first inch of runoff with zero discharge is a proposed volume control for every site, we agree that a clear procedure is needed as this may not be achievable at many sites. We could not locate a recommended procedure in Section 9 as mentioned below. We recommend that a more specific procedure be provided in the Plan or in a guidance manual for this situation as it likely will arise frequently. Also, while infiltration should be strongly encouraged, the zero discharge requirements coupled with the difficulty of predicting actual infiltration rates may result in more excessive dewatering times and the corresponding potential for mosquito breeding.

   "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: shallow bedrock, hydric soils, floodplains, and documented problem areas. Section 9 provides a recommended procedure for sites with these limitations."

10. **Coordination with ALCOSAN's GROW Program** – ALCOSAN is still considering how the ordinance will impact its Green Revitalization of Our Waterways (GROW) Program since some GROW projects will be subject to the municipal ordinances to be adopted. As the ordinance is finalized ALCOSAN may want to discuss how to ensure the new ordinance requirements coupled with GROW requirements do not add unnecessary complexity or cost that would deter the implementation of GSI projects.

11. **Exemptions Based on Project Size** – The proposed ordinance allows municipalities to choose a size of one acre or less for exempting some of the more burdensome site plan requirements in Section 401, but it appears that projects would only be exempt from Volume Controls, Rate Controls and Riparian Buffer requirements if cumulative earth disturbances are less than 5,000 square feet. Based on this understanding, the 5,000 square feet threshold may be too burdensome for single home construction and small businesses.

Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Draft County-wide SWM Plan and Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
Design Consultant: Michael Baker International, Inc.
Reviewer(s): Arletta Scott Williams, Executive Director, Allegheny County Sanitary Authority

Date(s): January 13, 2017; February 6, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
		Comments with regard to the Plan
1	Implementation Framework	While the Draft Plan aims to establish uniform minimum county-wide stormwater management standards, administration across 130 municipalities will present other challenges. Moreover, many municipalities have limited resources to administer the procedural and substantive provisions of this ordinance. Efficient ordinance administration may be achieved by municipalities pooling resources with a common unit of government. Delegation of administrative functions, such as reviews and approvals, to a common unit of government (e.g. the Allegheny County Conservation District) would also promote consistency. The Plan includes a table that describes three different models for Municipal Plan implementation including individual municipal, multi-municipal and county-wide models. Is the Plan open to another option of creating a new multi-municipal stormwater authority? Such an authority would have the ability to impose stormwater fees and also borrow capital for projects and could provide more effective and uniform implementation. Response: The recommended change has been incorporated by adding "Multi-municipal Stormwater Authority" to Section 11, Table 11.1 and the associated paragraphs on page 172 of the Draft Plan.
2	Implementation and Enforcement	The following suggestions could help maximize the effectiveness of municipal implementation and enforcement of their ordinances, if not already contemplated: a) require training for reviewers, to be repeated periodically; b) provide a guidance manual; and c) if possible, require municipalities to report to the County the number of reviews conducted each year, possibly on a staggered schedule to help easily manage the receipt/review of these reports. Response: The recommended change has been incorporated by adding these suggestions to Section 10 in the Implementation of the Plan subsection on page 172 of the Draft Plan.
6	Absence of Watershed Studies in Portions of the Combined Sewer Area	Per Section 304, default release rates (which are often less restrictive than watershed-specific rates that result from a study) must be met in areas without an approved Act 167 Storm water Management Plan. It appears portions of the ALCOSAN combined sewer area fall into this category including some areas which experience more frequent flooding such as Negley Run. It is recommended that the future watershed studies be prioritized in unstudied portions of the combined sewer area or at least in those areas with greatest flood risk so that more restrictive watershed-specific release rates can be established where appropriate where they can help reduce both flooding and CSOs. Response: Your comment is appreciated and will be considered by the County when future Act 167 funding is available to further the planning process.
		Comments on the Model Ordinance
3	Special Consideration of GSI Retrofit Projects	The ordinance is targeted at new development and redevelopment so it is recommended to provide more clarity on the requirements for voluntary GSI retrofit projects that are solely intended to better manage runoff from existing development. For example, as written it appears such projects must meet the Volume Controls and Rate Controls and would require modeling to demonstrate that those requirements are met, unless a statement is added to make it clear that none of the requirements and modeling apply if a project involves no new impervious area. It would also help simplify the permitting aspects of GSI retrofit projects if they could follow the simplified Small Project Stormwater Management Site Plan requirements instead of the full requirements in Section 401. Another approach to clarifying and simplifying GSI retrofit project provisions would be to identify a special class of project that would be exempt from the volume and rate controls if the sole purpose of the project is to better manage runoff from existing impervious surfaces. A similar provision is included in the Philadelphia Water Stormwater Management Guidance Manual as quoted below: "Stormwater Retrofit is defined in the Stormwater Regulations as a project that is limited to the voluntary rehabilitation and/or installation of stormwater management practices (SMPs) on a property to better manage stormwater runoff.... In most circumstances, projects classified as Demolition or Stormwater Retrofits will be exempt from PCSM [Post-Construction Stormwater Management] Requirements, regardless of size. However, these types of projects must still comply with the Erosion & Sediment Control (E&S) requirement." Response: The recommended change has been incorporated in Section 302.H Exemptions.

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
4	Dewatering Times for Projects in Combined Sewer Areas	The State BMP Manual leaves flexibility in the design basis for dewatering projects with storage, but states it should be between 24 to 72 hours. It also states that mosquitos should not be a problem if water drains in 72 hours since mosquitos require a considerably long breeding period with relatively static water levels. To maximize CSO reduction and treatment of these dewatered flows, projects in combined sewer areas could be encouraged or required to design for a 72-hour dewatering time which could send more combined sewage to treatment by delaying more dewatering until after overflows have ended. Response: The recommended change has been incorporated in Section 303 Volume Controls.
5	Section 303 - Volume Controls	For the one-inch capture of runoff from new impervious area in the Design Storm Method, the Plan and ordinance could encourage or require municipalities to increase this requirement to the first 1.5 inches of runoff in combined sewer areas in order to achieve greater CSO reduction. The City of Pittsburgh, which encompasses a significant portion of ALCOSAN's combined sewer area, already requires this amount of capture for certain projects. Response: After consideration of your comment, the decision was made that the removal of the first 1 inch of runoff is appropriate for the Allegheny County SWM Plan. Municipalities may choose to adopt stricter standards.
7	Section 402 - Plan Submission	If desired, could ALCOSAN be added as a required recipient of plan submissions and/or record drawings in combined sewer areas? This would enable ALCOSAN to track compliance and effectiveness, and better coordinate its flow reduction efforts with significant redevelopment plans. If this is an option ALCOSAN would appreciate the opportunity to discuss the merits of such a requirement, using electronic submissions, GIS files, etc. Response: The recommended change has been incorporated in Section 402.
8	Road Projects	Since a very significant percentage of impervious area relates to road projects, we recommend providing guidance to clarify which specific types of road resurfacing/replacement construction methods will constitute a "regulated activities". "Regulated activities" under the Model Ordinance broadly encompass all "earth disturbance activit[ies]" including excavations, embankments, road maintenance, and the movement of soil. Because regulated activities are defined broadly, ALCOSAN suggests exemptions be included for roadway resurfacing and maintenance projects (which don't increase impervious area) and underground infrastructure projects which have impacts too trivial to merit consideration. Response: The recommended change has been incorporated in Section 302.E.
9	Sites with Limited Infiltration Capacity	One of the recommendations in Section 8 is quoted below. Since capture of at least the first inch of runoff with zero discharge is a proposed volume control for every site, we agree that a clear procedure is needed as this may not be achievable at many sites. We could not locate a recommended procedure in Section 9 as mentioned below. We recommend that a more specific procedure be provided in the Plan or in a guidance manual for this situation as it likely will arise frequently. Also, while infiltration should be strongly encouraged, the zero discharge requirements coupled with the difficulty of predicting actual infiltration rates may result in more excessive dewatering times and the corresponding potential for mosquito breeding. *"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: shallow bedrock, hydric soils, floodplains, and documented problem areas. Section 9 provides a recommended procedure for sites with these limitations."* Response: The recommended change has been incorporated in Section 303 Volume Controls of the Model Ordinance.
10	Coordination with ALCOSAN's GROW Program	ALCOSAN is still considering how the ordinance will impact its Green Revitalization of Our Waterways (GROW) Program since some GROW projects will be subject to the municipal ordinances to be adopted. As the ordinance is finalized ALCOSAN may want to discuss how to ensure the new ordinance requirements coupled with GROW requirements do not add unnecessary complexity or cost that would deter the implementation of GSI projects. Response: The County will meet with ALCOSAN when requested.
11	Exemptions Based on Project Size	The proposed ordinance allows municipalities to choose a size of one acre or less for exempting some of the more burdensome site plan requirements in Section 401, but it appears that projects would only be exempt from Volume Controls, Rate Controls and Riparian Buffer requirements if cumulative earth disturbances are less than 5,000 square feet. Based on this understanding, the 5,000 square feet threshold may be too burdensome for single home construction and small businesses. Response: The recommended change has been incorporated in Section 302.B

Shannon, John

From: Pierce, Kay <Kay.Pierce@AlleghenyCounty.US>
Sent: Friday, October 14, 2016 7:38 AM
To: Hartwell, Andrew H.; Wilharm, Steve
Cc: McLain, William D.; Shannon, John; Davis, Chad
Subject: RE: Phase II Stormwater Management Plan

Steve,

We really appreciate you taking the time to review and provide comments on the plan.

Thank you,

Kay

Kay Pierce, Manager
ACED - Planning Division
Chatham One, Suite 900
112 Washington Place
Pittsburgh, PA 15219
412-350-1030
www.alleghenyplaces.com

From: Hartwell, Andrew H.
Sent: Thursday, October 13, 2016 2:52 PM
To: Wilharm, Steve <Steve.Wilharm@AlleghenyCounty.US>
Cc: McLain, William D. <William.McLain@AlleghenyCounty.US>; Pierce, Kay <Kay.Pierce@AlleghenyCounty.US>
Subject: RE: Phase II Stormwater Management Plan

Hi Steve,

I am actually not the project manager for the stormwater project, William McLain is. I am glad that you approve of the plan though, I know that Will and his team have worked very hard on it.

Best,
Andrew

Andrew H. Hartwell, AICP
Allegheny County Economic Development | Planning Division
One Chatham Center - Suite 900
112 Washington Place
Pittsburgh, PA 15219
Phone: (412) 350-1360 | Fax: (412) 350-1050

ALLEGHENY COUNTY

From: Wilharm, Steve
Sent: Thursday, October 13, 2016 2:35 PM
To: Hartwell, Andrew H. <Andrew.Hartwell@AlleghenyCounty.US>

Cc: McLain, William D. <William.McLain@AlleghenyCounty.US>
Subject: Phase II Stormwater Management Plan

Good afternoon Andrew,

I finally had a chance to review the Stormwater Plan and found everything to be in good order. The plan is very comprehensive and seems to address the needs of every municipality in the phase two part of the project. Although my input was very little I believe it will benefit emergency services in the long run.

Thank you for the opportunity to be involved in this very important project.

Steve

Steven J. Wilharm
Division Manager
Allegheny County Emergency Services
400 North Lexington Street (Suite 200)
Pittsburgh PA 15208-2521
412-473-2592 –Work
412-473-2623 – Fax
Steve.wilharm@alleghenycounty.us

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Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Draft County-wide SWM Plan and Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
Design Consultant: Michael Baker International, Inc.
Reviewer(s): Steve Wilharm, Division Manager, Allegheny County Emergency Services

Date(s): October 2016 ; February 10, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
1	Section 7 - Stormwater Control Facilities and Floodplains: Flood Hazard Areas and Flood Vulnerabilities	The Plan is very comprehensive and seems to address the needs of every municipality in the phase two part of the project. Although my input was very little I believe it will benefit emergency services in the long run.
		Response: Your comments are appreciated.
Comments on the Model Ordinance		
		No formal comments were submitted.
		Response: NA

Anthony W. Gross, Mayor

Deborah E. Laskey,
Council President

Randall R. Stoddard,
Council Vice President

Council Members:
Scott L. Krause
Kathryn M. Coban
Harry H. Novicki
Michael Pugliese
Meghan Kennedy

Borough of Blawnox
376 Freeport Road
Pittsburgh, PA 15238

Phone: (412) 828-4141
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Cindy L. Bahn,
Borough Manager

Kathy Ulanowicz,
Tax Collector

John F. Cambest, Esq.
Solicitor

RECEIVED
16 NOV 32 PM 1:27
ALLEGHENY COUNTY
DEPARTMENT OF
ECONOMIC DEVELOPMENT

November 8, 2016

William D. McLain, Allegheny County Plan Manager
Allegheny County Economic Development
Chatham One, Suite 900
112 Washington Place
Pittsburgh, PA 15219

Re: Allegheny County Stormwater Management Draft Ordinance

Dear Mr. McLain:

On behalf of the Blawnox Borough Council, I am writing to provide comments regarding the County's proposed Stormwater Management Ordinance. In collaboration with the Borough Engineer, we recommend the following; note that these comments fall into two broad categories – editing, and substantive; the latter appear first.

Substantive Recommendations:

Section 302. A. The Borough suggests that "one acre" be used here. Development less than one acre is not "exempt" from stormwater management because the developer will still need to adhere to the requirements of Section 302.B. covering volume control. Section 302.A., incorporating the suggesting benchmark would simply "exempt" development of less than one acre from rate control.

Section 303. A. 3. b. The Commonwealth of Pennsylvania uses 20%, and the Borough suggests that Allegheny County use the same percentage. A 50% developer's penalty will result in the dissuasion of redevelopment, and stormwater management facilities will be vastly oversized. The oversize of the facilities will cause undue hardship on smaller sites, and the facilities will never function as intended because the County is essentially mandating that the calculations are skewed, resulting in the over-development of ponds, rain gardens, and the like, with little follow through.

Section 305. A. This statement reads that an easement shall be required for a site with an *existing* riparian buffer. Is that the intent of the drafters?

Section 305. B. The 35-foot easement would cause undue hardship on smaller development and redevelopment sites because the total easement width could end up being greater than 70 feet. There is not a "one size fits all" riparian buffer easement. The width of the easement should be based upon the size of the drainage area to the site. For drainage areas greater than 100 acres, Pennsylvania (PA Code 102.14) requires a minimum total easement width of 100 feet in non-special protection watersheds and a minimum total easement width of 150 feet in special protection/high quality watersheds. Pennsylvania does not have riparian buffer requirements for sites with drainage areas less than 100 acres. The center line of the stream should be used for measuring the width of the proposed buffer, not the top of the bank, as the top of the bank is not easily discernable in some locations, and can be easily disputed. The center line is a clearer reference point, particularly as streams naturally migrate, and erosion can change the "top of the bank" reference point.

Section 401. C. The width of easements is not specified in the draft ordinance, and the Borough may not require easements for privately owned facilities. This statement should be revised to address easement width and requirements, if any, for privately owned facilities.

Section 401. E. The Borough recommends adding a requirement for "construction details sufficient to completely express the intended stormwater design components", as well as one for a "grading plan showing existing and proposed contours" to this section.

Section 401.E. 10. The Borough suggests that the applicant should not be forced into using certain LID or "green" methods as long as the requirements of the Ordinance are being met, and recommends eliminating this requirement.

Section 403. A. The Borough plans to insert "municipal engineer" into this provision; most municipalities are likely to do the same.

Section 403. D. Again, the Borough recommends the elimination of this paragraph; applicants should not be forced into using certain LID or "green" methods as long as the requirements of the Ordinance are being met.

Section 407. The Borough recommends requiring the recording of stormwater management BMPs ONLY for sites over one acre. It would be impracticable and cause undue hardship to record stormwater management BMPs on smaller sites, such as homeowner's residential lots. As written, we would need to record every rain garden or rock sump we require residents to install if they put an addition or their home, or add a patio space.

Editing Recommendations:

Section 301. M. A formatting note – the statement is followed by a superscript "4" indicating that a footnote is present, but the footnote is not easily found. Placing footnotes at the bottom of the same page as the subscript denotation makes it easier for the reader to find.

Section 304. The section should reference that release rate maps are found in Appendix A.

Section 401. A. and B. These provisions should be moved under a different section heading. It is confusing to have them under "site plan requirements". Some reformatting in this section would be helpful.

Section 405 – The section provides that applicable review fees are required for a re-submission, however review fees for the initial submission were never discussed. A paragraph establishing a fee schedule should be inserted before this section.

Appendix A – Release Rate Maps. These maps contain no helpful information, such as contours, roads, or parcels, that would aid the viewer in locating a site. ONE comprehensive map for the entire County would be more accessible than several watershed-based maps.

Mr. McLain, thank you for the opportunity to provide feedback on the Draft Ordinance; we are anxious to see the County adopt an Ordinance that provides reasonable regulation with clear guidance for developments without placing undue burden on residents.

Best regards,

Cindy L. Bahn, JD, MBA
Borough Manager, Blawnox Borough

Plan Review Comments		
Project: Allegheny County Act 167 SWM Plan		
Subject: Review of Draft County-wide SWM Plan and Model Ordinance		
County Project Manager: William D. McLain, Allegheny County Economic Development		
Design Consultant: Michael Baker International, Inc.		
Reviewer(s): Cindy L. Bahn, JD, MBA, Borough Manager, Blawnox Borough		
Date(s): November 8, 2016; February 6, 2017		
Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE Response: NA
Comments on the Model Ordinance		
		Substantive Recommendations
1	Section 302. A	The Borough suggests that "one acre" be used here. Development less than one acre is not "exempt" from stormwater management because the developer will still need to adhere to the requirements of Section 302.B. covering volume control. Section 302.A., incorporating the suggesting benchmark would simply "exempt" development of less than one acre from rate control. Response: The recommended change has been incorporated.
2	Section 303. A.3.b	The Commonwealth of Pennsylvania uses 20%, and the Borough suggests that Allegheny County use the same percentage. A 50% developer's penalty will result in the dissuasion of redevelopment, and stormwater management facilities will be vastly oversized. The oversize of the facilities will cause undue hardship on smaller sites, and the facilities will never function as intended because the County is essentially mandating that the calculations are skewed, resulting in the over-development of ponds, rain gardens, and the like, with little follow through. Response: The recommended change has been incorporated.
3	Section 305. A	This statement reads that an easement shall be required for a site with an *existing* riparian buffer. Is that the intent of the drafters? Response: We cannot find your reference to existing riparian buffers.
4	Section 305. B	The 35-foot easement would cause undue hardship on smaller development and redevelopment sites because the total easement width could end up being greater than 70 feet. There is not a "one size fits all" riparian buffer easement. The width of the easement should be based upon the size of the drainage area to the site. For drainage areas greater than 100 acres, Pennsylvania (PA Code 102.14) requires a minimum total easement width of 100 feet in non-special protection watersheds and a minimum total easement width of 150 feet in special protection/high quality watersheds. Pennsylvania does not have riparian buffer requirements for sites with drainage areas less than 100 acres. The center line of the stream should be used for measuring the width of the proposed buffer, not the top of the bank, as the top of the bank is not easily discernable in some locations, and can be easily disputed. The center line is a clearer reference point, particularly as streams naturally migrate, and erosion can change the "top of the bank" reference point. Response: After consideration of your comment, the decision was made that the 35' Riparian Buffer is appropriate for the Allegheny County SWM Plan.
5	Section 401. C	The width of easements is not specified in the draft ordinance, and the Borough may not require easements for privately owned facilities. This statement should be revised to address easement width and requirements, if any, for privately owned facilities. Response: Each municipality may chose the easement requirements suitable for their municipality. The Design Consultant recommends easements be required in private developments to assure future access if the land around the SWM facilities is sold.
6	Section 401. E	The Borough recommends adding a requirement for "construction details sufficient to completely express the intended stormwater design components", as well as one for a "grading plan showing existing and proposed contours" to this section. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Municipalities have the option to make the ordinance provision more stringent.
7	Section 401. E. 10	The Borough suggests that the applicant should not be forced into using certain LID or "green" methods as long as the requirements of the Ordinance are being met, and recommends eliminating this requirement. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. After consideration of your comment and the comments of other commenters, the decision was made that the GI and LID provisions are appropriate for the Allegheny County SWM Plan.
8	Section 403. A	The Borough plans to insert "municipal engineer" into this provision; most municipalities are likely to do the same. Response: Each municipality should determine who their Designated Reviewer should be.

Comment Number	Page or Sheet No	Reviewer's Comment / Question Designer's Response
9	Section 403. D	Again, the Borough recommends the elimination of this paragraph; applicants should not be forced into using certain LID or "green" methods as long as the requirements of the Ordinance are being met.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. After consideration of your comment and the comments of other commenters, the decision was made that the GI and LID provisions are appropriate for the Allegheny County SWM Plan.
10	Section 407	The Borough recommends requiring the recording of stormwater management BMPs ONLY for sites over one acre. It would be impracticable and cause undue hardship to record stormwater management BMPs on smaller sites, such as homeowner's residential lots. As written, we would need to record every rain garden or rock sump we require residents to install if they put an addition or their home, or add a patio space.
		Response: The recommended change has been incorporated, Section 302.B has been revised to be applicable only to earth disturbances over one-quarter (0.25) acre.
		Editing Recommendations
11	Section 301. M	A formatting note- the statement is followed by a superscript "4" indicating that a footnote is present, but the footnote is not easily found. Placing footnotes at the bottom of the same page as the subscript denotation makes it easier for the reader to find.
		Response: The superscripts within the Model Ordinance refer to Article IX - References.
12	Section 304	The section should reference that release rate maps are found in Appendix A.
		Response: The recommended change will be incorporated in the final ordinance.
13	Section 401.A & B	These provisions should be moved under a different sections heading. It is confusing to have them under "site plan requirements". Some reformatting in this section would be helpful.
		Response: The recommended change has been incorporated.
14	Section 405	The section provides that applicable review fees are required for a re-submission, however review fees for the initial submission were never discussed. A paragraph establishing a fee schedule should be inserted before this section.
		Response: Section 601 sets forth the fees. Each municipality will establish their fee structure in this section.
15	Appendix A Release Rate Maps	These maps contain no helpful information, such as contours, roads, or parcels, that would aid the viewer in locating a site. ONE comprehensive map for the entire County would be more accessible than several watershed-based maps.
		Response: The release rate districts are watershed based. Upon adoption by County Council and approval by PADEP, GIS files for the Release Rate Maps will be available for download.

THE BOROUGH OF BRENTWOOD

MUNICIPAL BUILDING – 3624 BROWNSVILLE ROAD
PITTSBURGH, PA 15227-3199
Office 412-884-1500 FAX 412-884-1911
www.brentwoodboro.com

November 29, 2016

Allegheny County Department of Economic Development
One Chatham Center
112 Washington Place, Suite 900
Pittsburgh, PA 15219

ATTN: Kay Pierce, Manager- Planning Division

Re: ***Comment Letter***
Allegheny County Stormwater Management Ordinance

Dear Ms. Pierce:

We have reviewed the Draft Allegheny County Stormwater Management Ordinance related to the ACT 167 Plan. The following are comments and/or issues associated with the Ordinance:

1. Section 110. Waivers.

    a. The waiver process should include a definition of hardship.

    b. The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level.

2. Section 301. General Requirements

    a. 301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.)

3. Section 302. Exemptions

    a. 302.A We recommend using 1 acre as the minimum earth disturbance.

b. 302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District. Conservation District review/approval should not be required in the 5,000 to 1 acre range as indicated in our Memorandum of Understanding for the with the Conservation District. This reference should be removed.

4. Section 303. Volume Controls

   a. Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual. Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface".

   b. Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP.

5. Section 305. Riparian Buffers

   a. The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams.

6. Section 401. Plan Requirements

   a. 401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer.

   b. 401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement.

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1915-2015

7. Section 402. Plan Submission

   a. We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits.

If you have any questions, please contact me at 412/884-1500 etc. 110.

Very truly yours,
BRENTWOOD BOROUGH

George Zboyovsky, PE
Borough Manager

Cc: Brentwood Council
Ruthann L. Omer, P.E., Borough Liaison, Gateway Engineers
Jennifer J. Slagle, P.E., Borough Engineer, Gateway Engineers
William McLain, Allegheny County Economic Development
John Shannon, Michael Baker International, Inc. ✓
B:\Stormwater Phase II\Correspondence

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CELEBRATING 100 YEARS!
1915-2015

Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Draft County-wide SWM Plan and Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
SWM Plan Consultant: Michael Baker International, Inc.
Reviewer(s): George Zbovovsky, PE, Borough Manager, Borough of Brentwood

Date(s): November 29, 2016; February 10, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE Response: NA
Comments on the Model Ordinance		
1a	Section 110. Waivers	**The waiver process should include a definition of hardship.** Response: The recommended change has been incorporated.
1b	Section 110. Waivers	The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. **This process must be further defined.** Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Clarifying language has been added in response to your comment.
2a	Section 301. General Requirements	301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.) Response: The recommended change has been incorporated.
3a	Section 302. Exemptions	302.A We recommend using 1 acre as the minimum earth disturbance. Response: The recommended change has been incorporated.
3b	Section 302. Exemptions	302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District. Conservation District review/approval should not be required in the 5,000 to 1 acre range as indicated in our Memorandum of Understanding for the with the Conservation District. This reference should be removed. Response: The recommended change has been incorporated.
4a	Section 303. Volume Controls	Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual. Response: In response to your comment, the language has been clarified to say that CG-1 is only the method.
4a	Section 303. Volume Controls	Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface". Response: The recommended change has been incorporated.
4b	Section 303. Volume Controls	Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP. Response: The recommended change has been incorporated.
5a	Section 305. Riparian Buffers	The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams. Response: After consideration of your comment, the decision was made that the 35' Riparian Buffer is appropriate for the Allegheny County SWM Plan.
6a	Section 401. Plan Requirements	401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. The requirement has been revised to include the Designated Reviewer as signatory. A seal is not required, but the plans must be certified as meeting the requirements of the municipal ordinance.

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
6b	Section 401. Plan Requirements	401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement.
		Response: The recommended change has been incorporated in Section 401 and an alternative approach to infiltration has been provided in Section 303 in response to your comment.
7a	Section 402. Plan Submission	We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits.
		Response: The recommended change has been incorporated.

BOROUGH OF CRAFTON

OFFICE OF THE BOROUGH MANAGER

100 STOTZ AVE. • PITTSBURGH, PENNSYLVANIA 15205 • PHONE: 412-921-0752 Ext. 26 • FAX: 412-921-4158

RECEIVED
16 NOV 21 PM 1:47
ALLEGHENY COUNTY
DEPARTMENT OF
ECONOMIC DEVELOPMENT

November 17, 2016

Allegheny County Department of Economic Development
One Chatham Center
112 Washington Place, Suite 900
Pittsburgh, PA 15219

ATTN: Kay Pierce, Manager- Planning Division

Re: Allegheny County Stormwater Management Ordinance

Dear Ms. Pierce:

We have reviewed the Draft Allegheny County Stormwater Management Ordinance related to the ACT 167 Plan. The following are comments and/or issues associated with the Ordinance:

1. Section 110. Waivers.

    a. The waiver process should include a definition of hardship.
    b. The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level.

2. Section 301. General Requirements

    a. 301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.)

3. Section 302. Exemptions

    a. 302.A We recommend using 1 acre as the minimum earth disturbance.
    b. 302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District.

4. Section 303. Volume Controls

    a. Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual. Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface".

b. Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP.

5. Section 305. Riparian Buffers

   a. The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams.

6. Section 401. Plan Requirements

   a. 401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer.
   b. 401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement.

7. Section 402. Plan Submission

   a. We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits.

If you have any questions, please contact me.

Sincerely,

BOROUGH OF CRAFTON

Ann C. Scott
Borough Manager

Cc: Ruthann L. Omer, P.E., Borough Engineer, Gateway Engineers
Philip Strunk, P.E., Project Manager, Gateway Engineers
William McLain, Allegheny County Economic Development

Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Draft County-wide SWM Plan and Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
SWM Plan Consultant: Michael Baker International, Inc.
Reviewer(s): Ann C. Scott, Borough Manager, Borough of Crafton

Date(s): November 17, 2016; February 10, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE
		Response: NA
Comments on the Model Ordinance		
1a	Section 110. Waivers	The waiver process should include a definition of hardship.
		Response: The recommended change has been incorporated.
1b	Section 110. Waivers	The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Clarifying language has been added in response to your comment.
2a	Section 301. General Requirements	301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.)
		Response: The recommended change has been incorporated.
3a	Section 302. Exemptions	302.A We recommend using 1 acre as the minimum earth disturbance.
		Response: The recommended change has been incorporated.
3b	Section 302. Exemptions	302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District.
		Response: A change has been incorporated in Section 302.
4a	Section 303. Volume Controls	Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual.
		Response: In response to your comment, the language has been clarified to say that CG-1 is only the method.
4a	Section 303. Volume Controls	Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface".
		Response: The recommended change has been incorporated.
4b	Section 303. Volume Controls	Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP.
		Response: The recommended change has been incorporated.
5a	Section 305. Riparian Buffers	The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams.
		Response: After consideration of your comment, the decision was made that the 35' Riparian Buffer is appropriate for the Allegheny County SWM Plan.
6a	Section 401. Plan Requirements	401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. The requirement has been revised to include the Designated Reviewer as signatory. A seal is not required, but the plans must be certified as meeting the requirements of the municipal ordinance.

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
6b	Section 401. Plan Requirements	401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement.
		Response: The recommended change has been incorporated in Section 401 and an alternative approach to infiltration has been provided in Section 303 in response to your comment.
7a	Section 402. Plan Submission	We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits.
		Response: The recommended change has been incorporated.

THE BOROUGH OF ETNA

437 BUTLER STREET
ETNA, PGH., PA 15223
MARY ELLEN RAMAGE, *Secretary/Manager*
PHONE: (412) 781-0569 FAX: (412) 782-5302
www.etnaborough.org

THOMAS RENGERS
Mayor

PETER F. RAMAGE
Chairman of Council

DEPARTMENT CO-CHAIRMEN
DAVID BECKI
Council Vice Chairman
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Zoning, Planning & Flood Plain Management

RONALD TRADER
Zoning, Planning & Flood Plain Management
Borough Property

WILLIAM O'DELL
Refuse & Engineering
Borough Property

KAREN TOMASZEWSKI
Police
Administrative & Finance

RUDY MILCIC, Jr.
Streets - Sewers, Fire

GREG PORTER
Refuse & Engineering
Fire

EDWARD V. BURKE, III
Storm Water Management
Police

DAVID FARMERIE
Administrative & Finance
Storm Water Managment

SUSAN BROWN
Treasurer

RONALD HECK
& ASSOCIATES
Borough Solicitors

November 16, 2016

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16 NOV 17 PM12: 21
ALLEGHENY COUNTY
DEPARTMENT OF
ECONOMIC DEVELOPMENT

Mr. William McLain, Planning Division
Allegheny County Economic Development
Chatham One, Suite 900
112 Washington Place
Pittsburgh, PA 15219

RE: Stormwater Plan for Allegheny County

Dear Mr. McLain:

I am writing on behalf of the Borough of Etna regarding the Draft Phase II Allegheny County Stormwater Management Plan. I am attaching a copy of the letter, dated November 10, 2016 from the North Hills Council of Governments.

I am sending this letter at the direction of Etna Borough Council to voice their support for the North Hills letter as indicating Etna's comments and questions regarding the County's Proposed Plan and Model Ordinance.

If you have any questions, please do not hesitate to contact me.

Sincerely yours,

Mary Ellen Ramage

Mary Ellen Ramage,
Secretary-Manager

Cc: Council, Etna Borough
Mayor Rengers

AGENDA

Al Atkinson
President

John Marshall
Vice President

William Staiter
Secretary/Treasurer

Wayne E. Roller
Executive Director

RECEIVED
16 NOV 17 PM12:21
ALLEGHENY COUNTY
DEPARTMENT OF
ECONOMIC DEVELOPMENT

NORTH HILLS COUNCIL OF GOVERNMENTS

300 Wetzel Road
Suite 201
Glenshaw, PA 15116

Phone: 412/487-5230
Fax: 412/487-5240

November 10, 2016

Mr. William McLain, Planning Division
Allegheny County Economic Development
Chatham One, Suite 900
112 Washington Place
Pittsburgh, PA 15219

RE: Stormwater Plan for Allegheny County - Questions and Comments

Dear Mr. McClain:

After a thorough review by our Municipal Managers stormwater committee and our NHCOG stormwater engineer, PVE Sheffler, the North Hills Council of Governments wishes to present a list of comments and questions regarding the Draft Phase II Allegheny County Stormwater Management Plan (PLAN). We respectfully submit these comments in no particular order of importance, for your consideration, as follows:

- How will the riparian buffer easements be handled in communities that have limited developable or re-developable land that are adjacent to streams? The 100 year floodplain limits or a minimum of 35 feet from the top of stream bank could render many areas in communities such as Etna, Millvale, and Shaler un-developable. Will any further details be provided on suggested permitted uses within a Riparian Buffer Easement?

- As stated in the Executive Summary, Deer Creek, Girty's Run, Pine Creek, and Squaw Run already have completed Act 167 studies and these watersheds are "updated" with this PLAN. We would like clarification as to what updated entails. For example, the updated Pine Creek hydrologic model and ordinance does not contain a conditional direct discharge option for any storm frequency or location. Would the existing study and ordinances adopted by the NHCOG have to be amended to accommodate conditional direct discharge districts being proposed in the PLAN?

- Is the Low Impact Development portion of the model ordinance more a Zoning issue than a Stormwater Issue? Or, should this definition be clarified to refer to stormwater only. Low Impact Development is commonly associated with clustering of developments, shorter front yard requirements leading to smaller driveways, and other design practices.

- In the waivers section of the Model Ordinance, it states that no waiver or modification of any regulated stormwater activity may be granted by a Municipality unless approved in advance by the PADEP or the Conservation District. What is the reason for this added layer of review that could result in extra time delays in plan reviews? This would seem to be placing an additional burden on the two reviewing agencies

who will already be doing more stormwater work than in the past. Would there be a time frame for their response that would guarantee that the Municipality would be able to render its decision in the timeframe established in the Municipalities Planning Code?

- What is the purpose of having the municipality create a signature block and signing the stormwater plan?

- As a point of clarification, are the standards in Section 303 (A)(3) required for only the 2 year storm relating to the PADEP BMP Manual CG-1?

- What was the rationale behind including the 1 year storm in the list of storm frequencies to be analyzed for peak rate control? Our concern is that this lower frequency storm will result in a large increase in the size of stormwater management facilities as the more frequent storms require smaller outlet controls with a large, shallow low level volume in the facility.

- Would an Impervious Area Flash (IAF) analysis as included in the NHCOG ordinance be an acceptable replacement for the 1 year storm analysis? Also, the IAF provides an assurance that the green space on a proposed site, or the offsite flow onto a development site does not mask the effects of the quick runoff from the site's new impervious area.

- Why was the NRCS lag equation included in the acceptable methods of computing time of concentration? If the models studied were based on TR55 methodology using the equations for sheet, shallow concentrated, and open channel flow would provide the appropriate timing values.

- Please clarify the Term of Validity referred to in Section 406 of the Model Ordinance and what its purpose is in regulating the site stormwater management.

- In the list of authorized discharges in Section 701 of the Model Ordinance, we noted that there is not an item for dechlorinated swimming pool discharges. The municipalities would request that this be added to the list of authorized discharges as long as the PADEP guidelines for swimming pool water discharge are followed. If this cannot be added, could an explanation be provided for excluding this previously permitted discharge?

- In Section 702 for Roof Drains and Sump Pumps could the definition of "wherever feasible" be expanded upon to set a measurable standard?

The NHCOG Stormwater engineer, PVE Sheffler, was also asked to develop a list of items from the Draft Phase II County report and model ordinance that the NHCOG will be suggesting that our member communities amend or add to their existing ordinances, to comply with the new County Regulations. Responses to the aforementioned items will serve to complete the list of modifications for their ordinances. If a further discussion is needed with regard to any of the comments listed above, we would appreciate the opportunity.

Thank you for your time and consideration in reviewing this information.

Very Truly Yours,
North Hills Council of Governments

Wayne Roller, Executive Director

Cc: All NHCOG Municipal Managers

Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Draft County-wide SWM Plan and Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
Design Consultant: Michael Baker International, Inc.
Reviewer(s): Mary Ellen Ramage, Secretary-Manager, Borough of Etna

Date(s): November 16, 2016; February 10, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
		Comments with regard to the Plan
2		As stated in the Executive Summary, Deer Creek, Girty's Run, Pine Creek, and Squaw Run already have completed Act 167 studies and these watersheds are "updated" with this PLAN. We would like clarification as to what updated entails. For example, the updated Pine Creek hydrologic model and ordinance does not contain a conditional direct discharge option for any storm frequency or location. Would the existing study and ordinances adopted by the NHCOG have to be amended to accommodate conditional direct discharge districts being proposed in the PLAN? Response: Municipalities that have an existing Stormwater Management Ordinance must update their ordinance to at least meet the requirements of the Allegheny County Plan and Model Ordinance. The existing hydrologic study by the NHCOG is not updated and the existing Release Rate Maps from that study are incorporated into the Plan in Appendix A of the Model Ordinance. You do not have to establish Conditional Direct Discharge Districts.
9		Why was the NRCS lag equation included in the acceptable methods of computing time of concentration? If the models studied were based on TR55 methodology using the equations for sheet, shallow concentrated, and open channel flow would provide the appropriate timing values. Response: The portion of Section 8 describing acceptable time of concentration methods will be modified to remove the requirement that the maximum of the two methods be used, in order to allow for the use of the method that is most applicable to the hydrologic method being used.
		Comments on the Model Ordinance
1		How will the riparian buffer easements be handled in communities that have limited developable or redevelopable land that are adjacent to streams? The 100 year floodplain limits or a minimum of 35 feet from the top of stream bank could render many areas in communities such as Etna, Millvale, and Shaler un-developable. Will any further details be provided on suggested permitted uses within a Riparian Buffer Easement? Response: After consideration of your comment, the decision was made that the 35' Riparian Buffer is appropriate for the Allegheny County SWM Plan. If applicable to the particular development, Section 110 - Waivers covers development where "... there is no possibility that the property can be developed in strict conformity with the provisions of the Stormwater Management Ordinance."
3		Is the Low Impact Development portion of the model ordinance more a Zoning issue than a Stormwater Issue? Or, should this definition be clarified to refer to stormwater only. Low Impact Development is commonly associated with clustering of developments, shorter front yard requirements reading to smaller driveways, and other design practices. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. LID is a non-structural stormwater management option. LID concepts can be applied to nearly any type of development or redevelopment project. The optional text from the 2016 PADEP Stormwater Management BMP Manual (which was included in the Model Ordinance), is intended to strongly encourage the incorporation of LID practices in development and redevelopment projects. Municipalities may also consider LID practices during the development of zoning plans and ordinances.
4a		In the waivers section of the Model Ordinance, it states that no waiver or modification of any regulated stormwater activity may be granted by a Municipality unless approved in advance by the PADEP or the Conservation District. What is the reason for this added layer of review that could result in extra time delays in plan reviews? This would seem to be placing an additional burden on the two reviewing agencies who will already be doing more stormwater work than in the past. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance.
4b		Would there be a time frame for their response that would guarantee that the Municipality would be able to render its decision in the time frame established in the Municipalities Planning Code? Response: A timeframe has been incorporated.
5		What is the purpose of having the municipality create a signature block and signing the stormwater plan? Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance.
6		As a point of clarification, are the standards in Section 303 (A)(3) required for only the 2 year storm relating to the PADEP BMP Manual CG-1? Response: Yes, Section 303.A applies to the 2 year storm and below.

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
7		What was the rationale behind including the 1 year storm in the list of storm frequencies to be analyzed for peak rate control? Our concern is that this lower frequency storm will result in a large increase in the size of stormwater management facilities as the more frequent storms require smaller outlet controls with a large, shallow low level volume in the facility.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Inclusion of the 1 year storm provides benefits in helping to prevent streambank erosion.
8		Would an Impervious Area Flash (IAF) analysis as included in the NHCOG ordinance be an acceptable replacement for the 1 year storm analysis? Also, the IAF provides an assurance that the green space on a proposed site, or the offsite flow onto a development site does not mask the effects of the quick runoff from the site's new impervious area.
		Response: Section 4.2.4 of the Hampton Township SWM Ordinance (IAF provision) is vague in that it doesn't specify if it refers to only post-development or existing conditions. Also, it doesn't specify storm frequencies. Therefore, it doesn't appear to be a replacement for the 1-year storm, but could be adopted for all events after modification.
10		Please clarity the Term of Validity referred to in Section 406 of the Model Ordinance and what its purpose is in regulating the site stormwater management.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Its purpose is to prevent implementation of plans long after approval when regulations may have changed. Note the use of "may" in the following portion of Section 406: "... then the municipality may consider the SWM Plan disapproved ..."
11		In the list of authorized discharges in Section 701 of the Model Ordinance, we noted that there is not an item for dechlorinated swimming pool discharges. The municipalities would request that this be added to the list of authorized discharges as long as the PADEP guidelines for swimming pool water discharge are followed. If this cannot be added, could an explanation be provided for excluding this previously permitted discharge?
		Response: The recommended change has been incorporated.
12		In Section 702 for Roof Drains and Sump Pumps could the definition of "wherever feasible" be expanded upon to set a measurable standard.
		Response: The language of Section 702 may in the next ordinance version be revised to include: wherever feasible "*in the judgement of the Designated Reviewer*."

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THE GATEWAY ENGINEERS, INC.
400 HOLIDAY DRIVE, SUITE 300
PITTSBURGH, PA 15220-2727
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ALLEGHENY COUNTY
DEPARTMENT OF

November 21, 2016
C-96158-0002

Allegheny County Department of Economic Development
One Chatham Center
112 Washington Place, Suite 900
Pittsburgh, PA 15219

Attn: Kay Pierce, Manager- Planning Division

Re: Allegheny County Stormwater Management Ordinance

Dear Ms. Pierce:

On behalf of our municipal clients, we have reviewed the Draft Allegheny County Stormwater Management Ordinance related to the ACT 167 Plan. The following are comments and/or issues associated with the Ordinance:

1. Section 110. Waivers.

    a. The waiver process should include a definition of hardship.
    b. The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level.

2. Section 301. General Requirements

    a. 301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.)

3. Section 302. Exemptions

    a. 302.A We recommend using 1 acre as the minimum earth disturbance.
    b. 302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District. Conservation District review/approval should not be required in the 5,000 to 1 acre range unless it is designated in the Memorandum of Understanding for the municipality. This

reference should be removed to allow the each municipal ordinance to address the requirement.

4. Section 303. Volume Controls

    a. Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual. Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface".
    b. Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP.

5. Section 305. Riparian Buffers

    a. The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams.

6. Section 401. Plan Requirements

    a. 401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer.
    b. 401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement.

7. Section 402. Plan Submission

    a. We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits.

We would like to request a meeting to sit down with your office and discuss our comments and concerns. If you have any questions, please contact me.

Sincerely,

Richard D. Minsterman
Municipal Team Leader

cc: Ruthann L. Omer, P.E., Borough Engineer, Gateway Engineers
Jennifer J. Slagle, P.E., Project Manager, Gateway Engineers
William McLain, Allegheny County Economic Development
John Shannon, Michael Baker International, Inc.

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Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Draft County-wide SWM Plan and Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
SWM Plan Consultant: Michael Baker International, Inc.
Reviewer(s): Richard D. Minstermann, Municipal Team Leader, The Gateway Engineers, Inc.

Date(s): November 21, 2016; February 6, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE Response: NA
Comments on the Model Ordinance		
1a	Section 110. Waivers	The waiver process should include a definition of hardship. Response: The recommended change has been incorporated.
1b	Section 110. Waivers	The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Clarifying language has been added in response to your comment.
2a	Section 301. General Requirements	301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.) Response: The recommended change has been incorporated.
3a	Section 302. Exemptions	302.A We recommend using 1 acre as the minimum earth disturbance. Response: The recommended change has been incorporated.
3b	Section 302. Exemptions	302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District. Conservation District review/approval should not be required in the 5,000 to 1 acre range unless it is designated in the Memorandum of Understanding for the municipality. This reference should be removed to allow the each municipal ordinance to address Response: The recommended change has been incorporated.
4a	Section 303. Volume Controls	Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual. Response: In response to your comment, the language has been clarified to say that CG-1 is only the method.
4a	Section 303. Volume Controls	Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface". Response: The recommended change has been incorporated.
4b	Section 303. Volume Controls	Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP. Response: The recommended change has been incorporated.
5a	Section 305. Riparian Buffers	The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams. Response: After consideration of your comment, the decision was made that the 35' Riparian Buffer is appropriate for the Allegheny County SWM Plan.
6a	Section 401. Plan Requirements.	401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. The requirement has been revised to include the Designated Reviewer as signatory. A seal is not required, but the plans must be certified as meeting the requirements of the municipal ordinance.

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
6b	Section 401. Plan Requirements	401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement.
		Response: The recommended change has been incorporated in Section 401 and an alternative approach to infiltration has been provided in Section 303 in response to your comment.
7a	Section 402. Plan Submission	We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits.
		Response: The recommended change has been incorporated.
Closing		We would like to request a meeting to sit down with your office and discuss our comments and concerns.
		Response: A meeting was held at the ACED offices on January 18, 2017.

BOROUGH OF JEFFERSON HILLS

PRESIDENT
Christopher W. King

VICE PRESIDENT
James A. Weber

COUNCIL MEMBERS
Vickie Ielase
Tracey P. Khalil
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ALLEGHENY COUNTY
DEPARTMENT OF
ECONOMIC DEVELOPMENT

MAYOR
Janice R. Cmar

BOROUGH MANAGER/
SECRETARY
Tricia Levander

FINANCE OFFICER
Charles Bennett

SOLICITOR
William F. Shimko

November 18, 2016

Allegheny County Department of Economic Development
One Chatham Center
112 Washington Place, Suite 900
Pittsburgh, PA 15219

ATTN: Kay Pierce, Manager- Planning Division

Re: Allegheny County Stormwater Management Ordinance

Dear Ms. Pierce:

We have reviewed the Draft Allegheny County Stormwater Management Ordinance related to the ACT 167 Plan. The following are comments and/or issues associated with the Ordinance:

1. Section 110. Waivers.

    a. The waiver process should include a definition of hardship.
    b. The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level.

2. Section 301. General Requirements

    a. 301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.)

3. Section 302. Exemptions

    a. 302.A We recommend using 1 acre as the minimum earth disturbance.
    b. 302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District. Conservation District review/approval should not be required in the 5,000 to 1 acre range as indicated in our Memorandum of Understanding for the with the Conservation District. This reference should be removed.

4. Section 303. Volume Controls

a. Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual. Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface".
b. Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP.

5. Section 305. Riparian Buffers

a. The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams.

6. Section 401. Plan Requirements

a. 401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer.
b. 401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement.

7. Section 402. Plan Submission

a. We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits.

If you have any questions, please contact me.

Sincerely,

Tricia Levander
Borough Manager

cc: Ruthann L. Omer, P.E., Borough Engineer, Gateway Engineers
William McLain, Allegheny County Economic Development
John Shannon, Michael Baker International, Inc.

Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Draft County-wide SWM Plan and Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
SWM Plan Consultant: Michael Baker International, Inc.
Reviewer(s): Tricia Levander, Borough Manager, Borough of Jefferson Hills

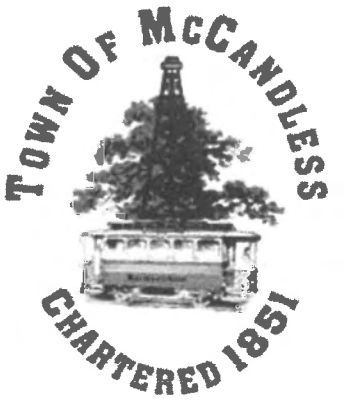
Date(s): November 18, 2016; February 10, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE Response: NA
Comments on the Model Ordinance		
1a	Section 110. Waivers	The waiver process should include a definition of hardship. Response: The recommended change has been incorporated.
1b	Section 110. Waivers	The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Clarifying language has been added in response to your comment.
2a	Section 301. General Requirements	301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.) Response: The recommended change has been incorporated.
3a	Section 302. Exemptions	302.A We recommend using 1 acre as the minimum earth disturbance. Response: The recommended change has been incorporated.
3b	Section 302. Exemptions	302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District. Conservation District review/approval should not be required in the 5,000 to 1 acre range as indicated in our Memorandum of Understanding for the with the Conservation District. This reference should be removed. Response: The recommended change has been incorporated.
4a	Section 303. Volume Controls	Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual. Response: In response to your comment, the language has been clarified to say that CG-1 is only the method.
4a	Section 303. Volume Controls	Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface". Response: The recommended change has been incorporated.
4b	Section 303. Volume Controls	Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP. Response: The recommended change has been incorporated.
5a	Section 305. Riparian Buffers	The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams. Response: After consideration of your comment, the decision was made that the 35' Riparian Buffer is appropriate for the Allegheny County SWM Plan.
6a	Section 401. Plan Requirements	401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. The requirement has been revised to include the Designated Reviewer as signatory. A seal is not required, but the plans must be certified as meeting the requirements of the municipal ordinance.

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
6b	Section 401. Plan Requirements	401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement. Response: The recommended change has been incorporated in Section 401 and an alternative approach to infiltration has been provided in Section 303 in response to your comment.
7a	Section 402. Plan Submission	We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits. Response: The recommended change has been incorporated.

Town Council
President
Gerard J. Aufman, Jr. *Second Ward*
Vice President
William J. McKim *Seventh Ward*

Kim Zachary *First Ward*
Steven E. Mertz *Third Ward*
Joan D. Powers *Fourth Ward*
Gregory W. Walkauskas *Fifth Ward*
Ralph J. LeDonne *Sixth Ward*



Town Manager
Tobias M. Cordek
Assistant Town Manager
Regis J. Ebner Jr.
Town Attorney
William C. Ries

Zoning Office	412-364-0616
Building Inspection	412-364-0616
Tax Department	412-364-0616
Public Works	412-364-0616
Police	412-364-7992

9955 Grubbs Road, Wexford, PA 15090-9644
Phone: 412-364-0616 * Fax: 412-364-5066

November 16, 2016

Mr. William McClain, Planning Division
Allegheny County Economic Development
Chatham One, Suite 900
112 Washington Place
Pittsburgh, PA 15219

RECEIVED
16 NOV 21 PM 1:48
ALLEGHENY COUNTY
DEPARTMENT OF

RE: Stormwater Plan for Allegheny County

Dear Mr. McClain:

The Town of McCandless along with the North Hills Council of Governments (NHCOG) has participated in the review of the proposed Allegheny County Act 167 Ordinance. The Town concurs with the review of PVE Sheffler and the NHCOG.

In addition, at the Three Rivers Wet Weather Conference on Thursday, October 12, 2016, John Shannon from Michael Baker International and William McClain from Allegheny County Economic Development proposed an option to extend the riparian buffer to the edge of the 100 year flood plain or 35 feet, whichever is greater.

Due to the development we have had within the 100 year flood plain, mostly prior to the establishment of flood plain maps, it would be difficult to enforce this provision without a series of rules for existing "non-conforming" properties. Presently our flood plain ordinance addresses those issues. Putting a provision in the Act 167 Ordinance would create a conflict with our flood plain ordinance which was approved by Federal Emergency Management Agency and the Department of Community and Economic Development.

Thank you for your consideration of our comments.

Respectfully,

Bruce G. Betty, AICP
Land Use Administrator

BGB/ml

Enc.

Cc: NHCOG
Town Council
Town Manager
Town Attorney

Al Atkinson
President

John Marshall
Vice President

William Stalter
Secretary/Treasurer

Wayne E. Roller
Executive Director

NORTH HILLS COUNCIL OF GOVERNMENTS

300 Wetzel Road
Suite 201
Glenshaw, PA 15116

Phone: 412/487-5230
Fax: 412/487-5240

November 10, 2016

Mr. William McLain, Planning Division
Allegheny County Economic Development
Chatham One, Suite 900
112 Washington Place
Pittsburgh, PA 15219

RE: Stormwater Plan for Allegheny County - Questions and Comments

Dear Mr. McClain:

After a thorough review by our Municipal Managers stormwater committee and our NHCOG stormwater engineer, PVE Sheffler, the North Hills Council of Governments wishes to present a list of comments and questions regarding the Draft Phase II Allegheny County Stormwater Management Plan (PLAN). We respectfully submit these comments in no particular order of importance, for your consideration, as follows:

- How will the riparian buffer easements be handled in communities that have limited developable or re-developable land that are adjacent to streams? The 100 year floodplain limits or a minimum of 35 feet from the top of stream bank could render many areas in communities such as Etna, Millvale, and Shaler un-developable. Will any further details be provided on suggested permitted uses within a Riparian Buffer Easement?

- As stated in the Executive Summary, Deer Creek, Girty's Run, Pine Creek, and Squaw Run already have completed Act 167 studies and these watersheds are "updated" with this PLAN. We would like clarification as to what updated entails. For example, the updated Pine Creek hydrologic model and ordinance does not contain a conditional direct discharge option for any storm frequency or location. Would the existing study and ordinances adopted by the NHCOG have to be amended to accommodate conditional direct discharge districts being proposed in the PLAN?

- Is the Low Impact Development portion of the model ordinance more a Zoning issue than a Stormwater issue? Or, should this definition be clarified to refer to stormwater only. Low Impact Development is commonly associated with clustering of developments, shorter front yard requirements leading to smaller driveways, and other design practices.

- In the waivers section of the Model Ordinance, it states that no waiver or modification of any regulated stormwater activity may be granted by a Municipality unless approved in advance by the PADEP or the Conservation District. What is the reason for this added layer of review that could result in extra time delays in plan reviews? This would seem to be placing an additional burden on the two reviewing agencies

who will already be doing more stormwater work than in the past. Would there be a time frame for their response that would guarantee that the Municipality would be able to render its decision in the timeframe established in the Municipalities Planning Code?

- What is the purpose of having the municipality create a signature block and signing the stormwater plan?

- As a point of clarification, are the standards in Section 303 (A)(3) required for only the 2 year storm relating to the PADEP BMP Manual CG-1?

- What was the rationale behind including the 1 year storm in the list of storm frequencies to be analyzed for peak rate control? Our concern is that this lower frequency storm will result in a large increase in the size of stormwater management facilities as the more frequent storms require smaller outlet controls with a large, shallow low level volume in the facility.

- Would an Impervious Area Flash (IAF) analysis as included in the NHCOG ordinance be an acceptable replacement for the 1 year storm analysis? Also, the IAF provides an assurance that the green space on a proposed site, or the offsite flow onto a development site does not mask the effects of the quick runoff from the site's new impervious area.

- Why was the NRCS lag equation included in the acceptable methods of computing time of concentration? If the models studied were based on TR55 methodology using the equations for sheet, shallow concentrated, and open channel flow would provide the appropriate timing values.

- Please clarify the Term of Validity referred to in Section 406 of the Model Ordinance and what its purpose is in regulating the site stormwater management.

- In the list of authorized discharges in Section 701 of the Model Ordinance, we noted that there is not an item for dechlorinated swimming pool discharges. The municipalities would request that this be added to the list of authorized discharges as long as the PADEP guidelines for swimming pool water discharge are followed. If this cannot be added, could an explanation be provided for excluding this previously permitted discharge?

- In Section 702 for Roof Drains and Sump Pumps could the definition of "wherever feasible" be expanded upon to set a measurable standard?

The NHCOG Stormwater engineer, PVE Sheffler, was also asked to develop a list of items from the Draft Phase II County report and model ordinance that the NHCOG will be suggesting that our member communities amend or add to their existing ordinances, to comply with the new County Regulations. Responses to the aforementioned items will serve to complete the list of modifications for their ordinances. If a further discussion is needed with regard to any of the comments listed above, we would appreciate the opportunity.

Thank you for your time and consideration in reviewing this information.

Very Truly Yours,
North Hills Council of Governments

Wayne Roller, Executive Director

Cc: All NHCOG Municipal Managers

Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Draft County-wide SWM Plan and Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
Design Consultant: Michael Baker International, Inc.
Reviewer(s): Bruce G. Betty, AICP, Land Use Administrator, Town of McCandless

Date(s): November 16, 2016; February 10, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
		Comments with regard to the Plan
2		As stated in the Executive Summary, Deer Creek, Girty's Run, Pine Creek, and Squaw Run already have completed Act 167 studies and these watersheds are "updated" with this PLAN. We would like clarification as to what updated entails. For example, the updated Pine Creek hydrologic model and ordinance does not contain a conditional direct discharge option for any storm frequency or location. Would the existing study and ordinances adopted by the NHCOG have to be amended to accommodate conditional direct discharge districts being proposed in the PLAN?
		Response: Municipalities that have an existing Stormwater Management Ordinance must update their ordinance to at least meet the requirements of the Allegheny County Plan and Model Ordinance. The existing hydrologic study by the NHCOG is not updated and the existing Release Rate Maps from that study are incorporated into the Plan in Appendix A of the Model Ordinance. You do not have to establish Conditional Direct Discharge Districts.
9		Why was the NRCS lag equation included in the acceptable methods of computing time of concentration? If the models studied were based on TR55 methodology using the equations for sheet, shallow concentrated, and open channel flow would provide the appropriate timing values.
		Response: The portion of Section 8 describing acceptable time of concentration methods will be modified to remove the requirement that the maximum of the two methods be used, in order to allow for the use of the method that is most applicable to the hydrologic method being used.
		Comments on the Model Ordinance
1		How will the riparian buffer easements be handled in communities that have limited developable or redevelopable land that are adjacent to streams? The 100 year floodplain limits or a minimum of 35 feet from the top of stream bank could render many areas in communities such as Etna, Millvale, and Shaler un-developable. Will any further details be provided on suggested permitted uses within a Riparian Buffer Easement?
		Response: After consideration of your comment, the decision was made that the 35' Riparian Buffer is appropriate for the Allegheny County SWM Plan. If applicable to the particular development, Section 110 - Waivers covers development where "... there is no possibility that the property can be developed in strict conformity with the provisions of the Stormwater Management Ordinance."
3		Is the Low Impact Development portion of the model ordinance more a Zoning issue than a Stormwater Issue? Or, should this definition be clarified to refer to stormwater only. Low Impact Development is commonly associated with clustering of developments, shorter front yard requirements reading to smaller driveways, and other design practices.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. LID is a non-structural stormwater management option. LID concepts can be applied to nearly any type of development or redevelopment project. The optional text from the 2016 PADEP Stormwater Management BMP Manual (which was included in the Model Ordinance), is intended to strongly encourage the incorporation of LID practices in development and redevelopment projects. Municipalities may also consider LID practices during the development of zoning plans and ordinances.
4a		In the waivers section of the Model Ordinance, it states that no waiver or modification of any regulated stormwater activity may be granted by a Municipality unless approved in advance by the PADEP or the Conservation District. What is the reason for this added layer of review that could result in extra time delays in plan reviews? This would seem to be placing an additional burden on the two reviewing agencies who will already be doing more stormwater work than in the past.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance.
4b		Would there be a time frame for their response that would guarantee that the Municipality would be able to render its decision in the time frame established in the Municipalities Planning Code?
		Response: A timeframe has been incorporated.
5		What is the purpose of having the municipality create a signature block and signing the stormwater plan?
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance.
6		As a point of clarification, are the standards in Section 303 (A)(3) required for only the 2 year storm relating to the PADEP BMP Manual CG-1?
		Response: Yes, Section 303.A applies to the 2 year storm and below.

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
7		What was the rationale behind including the 1 year storm in the list of storm frequencies to be analyzed for peak rate control? Our concern is that this lower frequency storm will result in a large increase in the size of stormwater management facilities as the more frequent storms require smaller outlet controls with a large, shallow low level volume in the facility.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Inclusion of the 1 year storm provides benefits in helping to prevent streambank erosion.
8		Would an Impervious Area Flash (IAF) analysis as included in the NHCOG ordinance be an acceptable replacement for the 1 year storm analysis? Also, the IAF provides an assurance that the green space on a proposed site, or the offsite flow onto a development site does not mask the effects of the quick runoff from the site's new impervious area.
		Response: Section 4.2.4 of the Hampton Township SWM Ordinance (IAF provision) is vague in that it doesn't specify if it refers to only post-development or existing conditions. Also, it doesn't specify storm frequencies. Therefore, it doesn't appear to be a replacement for the 1-year storm, but could be adopted for all events after modification.
10		Please clarity the Term of Validity referred to in Section 406 of the Model Ordinance and what its purpose is in regulating the site stormwater management.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Its purpose is to prevent implementation of plans long after approval when regulations may have changed. Note the use of "may" in the following portion of Section 406: "... then the municipality may consider the SWM Plan disapproved ..."
11		In the list of authorized discharges in Section 701 of the Model Ordinance, we noted that there is not an item for dechlorinated swimming pool discharges. The municipalities would request that this be added to the list of authorized discharges as long as the PADEP guidelines for swimming pool water discharge are followed. If this cannot be added, could an explanation be provided for excluding this previously permitted discharge?
		Response: The recommended change has been incorporated.
12		In Section 702 for Roof Drains and Sump Pumps could the definition of "wherever feasible" be expanded upon to set a measurable standard.
		Response: The language of Section 702 may in the next ordinance version be revised to include: wherever feasible "*in the judgement of the Designated Reviewer*."

Shannon, John

From: Shannon, John
Sent: Monday, February 13, 2017 1:49 PM
To: Shannon, John
Subject: Act 167 Report comments
Attachments: 4 Model SWM Ordinance (MS4) 160916.pdf; 2 Allegheny Co Act 167 Executive Summary 160916.pdf; 2016-01-04 Moon SWM Ordinance TJB rev 03-12-2014.docx

From: Mal Petroccia [mailto:mpetroccia@moontwp.us]
Sent: Wednesday, November 16, 2016 10:43 AM
To: McLain, William D. <William.McLain@AlleghenyCounty.US>
Cc: Scott Brilhart <sbrilhart@moontwp.us>; Lora Dombrowski <ldombrowski@moontwp.us>; 'Heather Dodson' <HDodson@mbakerintl.com>; Dawn Lane <dlane@moontwp.us>
Subject: RE: Act 167 Report comments

Will,
Moon Township has reviewed the Draft Allegheny County Phase II Stormwater Management Plan. Since the plan was received in pdf format, the easiest way to comment was to add comment balloons at the appropriate locations. Only the Executive Summary and Ordinance Sections were reviewed. There are a number of highlights throughout the attached sections, which were made for internal use and are not intended as comments. Moon Township has two serious concerns about the methodology used to create the plan. First, the stated goal of providing uniform stormwater management standards throughout the county is not consistent with a plan that has some watersheds that are modeled and other watersheds that are not modeled. Inherently the standards should be different for different watersheds. At the highest level, watersheds that are not modeled may have one set of consistent standards and watersheds that are modeled will have different standards depending on the modeling results.

The second concern is specific to Moon Township. The Flaugherty Run Release Rate Map shows two areas with a 50% release rate. One area is near Spring Run Ext. west and northwest of the Boggs School Fire Station. This area includes part of Bon Meade development and some developable land. The second area is along Flaugherty Run Road from just upstream of the intersection at Stoops Ferry Road to the intersection with Foxwood Road. This area includes a significant area of developable C-1 property near the intersection with Brodhead Road. Achieving a 50% release rate is extremely difficult and a substantial burden on private property.

We are asking Baker to rerun its models with a 70% release rate at these locations and 70% release rate at adjacent subsheds to make the basin subshed development more equitable. The remainder of the basin is in the 70% to 100% release rate range.

If you have questions or concerns, please call or email.
Thank you for the opportunity to comment,
Mal

Malcolm W. Petroccia, P.E. | Moon Township Engineer
1000 Beaver Grade Road | Moon Township, PA 15108 | (412) 265-1006

Confidentiality Notice: This e-mail message, including any attachments, is for the sole use of the intended recipient(s) and may contain confidential and privileged information. Any unauthorized review, use, disclosure, forwarding, or distribution is prohibited. If you are not the intended recipient, please contact the sender by reply

Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Draft County-wide SWM Plan and Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
Design Consultant: Michael Baker International, Inc.
Reviewer(s): Malcolm Petroccia, PE, Township Engineer, Township of Moon

Date(s): December 2016 ; February 10, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
1		Moon Township has reviewed the Draft Allegheny County Phase II Stormwater Management Plan. Since the plan was received in pdf format, the easiest way to comment was to add comment balloons at the appropriate locations. Only the Executive Summary and Ordinance Sections were reviewed. There are a number of highlights throughout the attached sections, which were made for internal use and are not intended as comments. Moon Township has two serious concerns about the methodology used to create the plan. First, the stated goal of providing uniform stormwater management standards throughout the county is not consistent with a plan that has some watersheds that are modeled and other watersheds that are not modeled. Inherently the standards should be different for different watersheds. At the highest level, watersheds that are not modeled may have one set of consistent standards and watersheds that are modeled will have different standards depending on the modeling results. Response: Your comments are appreciated. It is acknowledged that Section 304 - Rate Controls includes: Section 304.A "For areas not covered by a release rate map from an approved Act 167 Stormwater Management Plan", and Section 304.B ""For areas covered by a release rate map from an approved Act 167 Stormwater Management Plan" with corresponding criteria that will differ depending on whether a Plan is has been completed or not. However, all other provisions of the Ordinance are the same for either condition.
2	Section 102.D Statement of Findings	The second concern is specific to Moon Township. The Flaugherty Run Release Rate Map shows two areas with a 50% release rate. One area is near Spring Run Ext. west and northwest of the Boggs School Fire Station. This area includes part of Bon Meade development and some developable land. The second area is along Flaugherty Run Road from just upstream of the intersection at Stoops Ferry Road to the intersection with Foxwood Road. This area includes a significant area of developable C-1 property near the intersection with Brodhead Road. Achieving a 50% release rate is extremely difficult and a substantial burden on private property. We are asking Baker to rerun its models with a 70% release rate at these locations and 70% release rate at adjacent subsheds to make the basin subshed development more equitable. The remainder of the basin is in the 70% to 100% release rate range. Response: The requested analysis was performed and the recommended change has been incorporated by increasing the release rate in the 50% and 60% districts and decreasing the release rate in other districts.
Comments on the Model Ordinance		
		No formal comments were submitted. Response: NA

Police and Fire Depts.
Emergency – 911
Non-Emergency – 412-431-2254
Fax: 412-431-5267

Administrative Office
412-431-8107
Fax: 412-431-0184

BOROUGH OF MOUNT OLIVER

(INCORPORATED NOVEMBER 9, 1892)
County of Allegheny — State of Pennsylvania

MUNICIPAL BUILDING — 150 BROWNSVILLE ROAD
MT. OLIVER, PENNSYLVANIA 15210

Council Meets Third Monday of Each Month

RECEIVED
16 NOV 21 PM 1:47
ALLEGHENY COUNTY
DEPARTMENT OF
ECONOMIC DEVELOPMENT

November 17, 2016

Allegheny County Department of Economic Development
One Chatham Center
112 Washington Place, Suite 900
Pittsburgh, PA 15219

ATTN: Kay Pierce, Manager- Planning Division

Re: Allegheny County Stormwater Management Ordinance

Dear Ms. Pierce:

We have reviewed the Draft Allegheny County Stormwater Management Ordinance related to the ACT 167 Plan. The following are comments and/or issues associated with the Ordinance:

1. Section 110. Waivers.

    a. The waiver process should include a definition of hardship.
    b. The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level.

2. Section 301. General Requirements

    a. 301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.)

3. Section 302. Exemptions

    a. 302.A We recommend using 1 acre as the minimum earth disturbance.
    b. 302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District. Conservation District review/approval should not be required in the 5,000 to 1 acre range as indicated in our Memorandum of Understanding for the with the Conservation District. This reference should be removed.

4. Section 303. Volume Controls

    a. Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual. Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface".
    b. Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP.

5. Section 305. Riparian Buffers

    a. The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams.

6. Section 401. Plan Requirements

    a. 401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer.
    b. 401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement.

7. Section 402. Plan Submission

    a. We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits.

If you have any questions, please contact me.

Sincerely,

Rick Hopkinson
Borough Manager

Cc: Ruthann L. Omer, P.E., Municipal Liaison Gateway Engineers
Jennifer J. Slagle, P.E., Project Manager, Gateway Engineers
William McLain, Allegheny County Economic Development
John Shannon, Michael Baker International, Inc

Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Draft County-wide SWM Plan and Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
SWM Plan Consultant: Michael Baker International, Inc.
Reviewer(s): Rick Hopkinson, Borough Manager, Borough of Mount Oliver

Date(s): November 17, 2016; February 10, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE Response: NA
Comments on the Model Ordinance		
1a	Section 110. Waivers	The waiver process should include a definition of hardship. Response: The recommended change has been incorporated.
1b	Section 110. Waivers	The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Clarifying language has been added in response to your comment.
2a	Section 301. General Requirements	301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.) Response: The recommended change has been incorporated.
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4a	Section 303. Volume Controls	Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface". Response: The recommended change has been incorporated.
4b	Section 303. Volume Controls	Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP. Response: The recommended change has been incorporated.
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6a	Section 401. Plan Requirements	401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. The requirement has been revised to include the Designated Reviewer as signatory. A seal is not required, but the plans must be certified as meeting the requirements of the municipal ordinance.

Comment Number	Page or Sheet No	Reviewer's Comment / Question Designer's Response
6b	Section 401. Plan Requirements	401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement. Response: The recommended change has been incorporated in Section 401 and an alternative approach to infiltration has been provided in Section 303 in response to your comment.
7a	Section 402. Plan Submission	We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits. Response: The recommended change has been incorporated.

MT. LEBANON
PENNSYLVANIA

RECEIVED
16 NOV 22 AM 10: 32
ALLEGHENY COUNTY
DEPARTMENT OF
ECONOMIC DEVELOPMENT

MUNICIPAL BUILDING
710 WASHINGTON ROAD
PITTSBURGH, PA 15228
PHONE: (412) 343-3400
www.mtlebanon.org

November 17, 2016

Allegheny County Department of Economic Development
One Chatham Center
112 Washington Place, Suite 900
Pittsburgh, PA 15219

ATTN: Kay Pierce, Manager- Planning Division

Re: Allegheny County Stormwater Management Ordinance

Dear Ms. Pierce:

We have reviewed the Draft Allegheny County Stormwater Management Ordinance related to the ACT 167 Plan. The following are comments and/or issues associated with the Ordinance:

1. Section 110. Waivers.

    a. The waiver process should include a definition of hardship.
    b. The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level.

2. Section 301. General Requirements

    a. 301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.)

3. Section 302. Exemptions

    a. 302.A We recommend using 1 acre as the minimum earth disturbance.
    b. 302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District. Conservation District review/approval should not be required in the 5,000 to 1 acre range as indicated in our Memorandum of Understanding for the with the Conservation District. This reference should be removed.

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4. Section 303. Volume Controls

    a. Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual. Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface".
    b. Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP.

5. Section 305. Riparian Buffers

    a. The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams.

6. Section 401. Plan Requirements

    a. 401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer.
    b. 401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement.

7. Section 402. Plan Submission

    a. We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, and General Permits.

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PITTSBURGH, PA 15228
PHONE: (412) 343-3400
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If you have any questions, please contact me.

Sincerely,

Keith McGill
Municipal Manager

cc: Ian McMeans, Assistant Municipal Manager
Daniel S. Deiseroth, P.E., Municipal Engineer, Gateway Engineers
Stacey L. Graf, P.E., Project Manager, Gateway Engineers
William McLain, Allegheny County Economic Development

Plan Review Comments		
Project: Allegheny County Act 167 SWM Plan		
Subject: Review of Draft County-wide SWM Plan and Model Ordinance		
County Project Manager: William D. McLain, Allegheny County Economic Development		
SWM Plan Consultant: Michael Baker International, Inc.		
Reviewer(s): Keith McGill, Municipal Manager, Mt. Lebanon Pennsylvania		
Date(s): November 17, 2016; February 10, 2017		
Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE Response: NA
Comments on the Model Ordinance		
1a	Section 110. Waivers	The waiver process should include a definition of hardship. Response: The recommended change has been incorporated.
1b	Section 110. Waivers	The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Clarifying language has been added in response to your comment.
2a	Section 301. General Requirements	301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.) Response: The recommended change has been incorporated.
3a	Section 302. Exemptions	302.A We recommend using 1 acre as the minimum earth disturbance. Response: The recommended change has been incorporated.
3b	Section 302. Exemptions	302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District. Conservation District review/approval should not be required in the 5,000 to 1 acre range as indicated in our Memorandum of Understanding for the with the Conservation District. This reference should be removed. Response: The recommended change has been incorporated.
4a	Section 303. Volume Controls	Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual. Response: In response to your comment, the language has been clarified to say that CG-1 is only the method.
4a	Section 303. Volume Controls	Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface". Response: The recommended change has been incorporated.
4b	Section 303. Volume Controls	Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP. Response: The recommended change has been incorporated.
5a	Section 305. Riparian Buffers	The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams. Response: After consideration of your comment, the decision was made that the 35' Riparian Buffer is appropriate for the Allegheny County SWM Plan.
6a	Section 401. Plan Requirements	401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. The requirement has been revised to include the Designated Reviewer as signatory. A seal is not required, but the plans must be certified as meeting the requirements of the municipal ordinance.

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
6b	Section 401. Plan Requirements	401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement. Response: The recommended change has been incorporated in Section 401 and an alternative approach to infiltration has been provided in Section 303 in response to your comment.
7a	Section 402. Plan Submission	We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits. Response: The recommended change has been incorporated.

NINE MILE RUN
WATERSHED ASSOCIATION

Act 167 Draft Allegheny County Stormwater Management Ordinance
Comments from Nine Mile Run Watershed Association
12.22.16

Please accept the following comments as the official submissions from the Nine Mile Run Watershed Association on the Act 167 Draft Allegheny County Stormwater Management Ordinance dated September 16, 2016. If you have any questions, feel free to contact Michael Hiller, Director of Policy & Outreach at mike@ninemilerun.org or 412-371-8779 x121.

Section 102. Statement of Findings

D. This statement is critical to the advancement of green infrastructure (GI) and low impact development (LID). Please keep this section in the statement of findings.

Section 103. Purpose

C. This language is important in establishing the purpose of the GI and LID. Managing rainwater at the source and reducing overall runoff is critical to reducing overflows.

Section 301. General Requirements

G. 2.e. This statement is critical to the advancement of GI and LID. Please keep language as is.

G. 3. This language is strong. Perhaps establish a list of detailed justifications, so explanation is objective and translates easily across different projects.

I. This language is important to the advancement of GI and LID. Please keep language as is.

Section 302. Exemptions

A. Regulated activities that result in cumulative earth disturbances less than half-acre are exempt from the requirements in Section 401 of this ordinance except as provided in paragraph B below.

Section 303. Volume Controls

- The language in paragraph 1 is critical to the advancement of GI and LID. Please keep language as is.

A. 2. Retaining the first one inch of runoff is critical to the reduction of overflows. Please keep language as is.

A. 3.b. *100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions.*

B. 1. Retaining the first two inches of runoff from all new impervious surfaces is critical to the reduction of CSOs. Please keep language as is.

B. 2. Retaining the first one inch of runoff is critical to the reduction of overflows. Please keep language as is.

B. 3. Please keep language as is.

Section 305. Riparian Buffers

B. This language is important in retaining existing riparian buffers and controlling development from impeding into floodplains. Please keep language as is.

321 Pennwood Ave., Ste 202, Pittsburgh, PA 15221
www.ninemilerun.org
412 371-8779 / Fax: 412 371-1115

Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Draft County-wide SWM Plan and Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
Design Consultant: Michael Baker International, Inc.
Reviewer(s): Michael Hiller, Director of Policy and Outreach, Nine Mile Run Watershed Association

Date(s): December 22, 2016 ; February 6, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		None Response: NA
Comments on the Model Ordinance		
1	Section 102.D Statement of Findings	This statement is critical to the advancement of green infrastructure (GI) and low impact development (LID). Please keep this section in the statement of findings. Response: Your supportive comment is acknowledged and incorporated.
2	Section 103.C Purpose	This language is important in establishing the purpose of the GI and LID. Managing rainwater at the source and reducing overall runoff is critical to reducing overflows. Response: Your supportive comment is acknowledged and incorporated.
3	Section 301.G.2.e General Requirements	This statement is critical to the advancement of GI and LID. Please keep language as is. Response: Your supportive comment is acknowledged and incorporated.
4	Section 301.G.3 General Requirements	This language is strong. Perhaps establish a list of detailed justifications, so explanation is objective and translates easily across different projects. Response: The recommended change has been incorporated.
5	Section 301.I General Requirements	This language is important to the advancement of GI and LID. Please keep language as is. Response: Your supportive comment is acknowledged and incorporated.
6	Section 302.A Exemptions	Regulated activities that result in cumulative earth disturbances less than half-acre are exempt from the requirements in Section 401 of this ordinance except as provided in paragraph B below. Response: After consideration of your comment, the decision was made that one (1) acre is appropriate for the Allegheny County SWM Plan.
7	Section 303 Volume Controls	The language in paragraph 1 is critical to the advancement of GI and LID. Please keep language as is. Response: After consideration of your comment and the comments of other commenters, the decision was made to revise the wording for clarity..
8	Section 303.A.2 Volume Controls	Retaining the first one inch of runoff is critical to the reduction of overflows. Please keep language as is. Response: Your supportive comment is acknowledged and incorporated.
9	Section 303.A.3.b Volume Controls	100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions. Response: After consideration of your comment and the comments of other commenters, the decision was made that 20% is appropriate for the Allegheny County SWM Plan.
10	Section 303.B.1 Volume Controls	Retaining the first two inches of runoff from all new impervious surfaces is critical to the reduction of CSOs. Please keep language as is. Response: Your supportive comment is acknowledged and incorporated.
11	Section 303.B.2 Volume Controls	Retaining the first one inch of runoff is critical to the reduction of overflows. Please keep language as is. Response: Your supportive comment is acknowledged and incorporated.
12	Section 303 .B.3Volume	Please keep language as is. Response: Your supportive comment is acknowledged and incorporated.
13	Section 305.B Riparian Buffers	This language is important in retaining existing riparian buffers and controlling development from impeding into floodplains. Please keep language as is. Response: After consideration of your comment, the decision was made that the 35' Riparian Buffer is appropriate for the Allegheny County SWM Plan.

Al Atkinson
President

John Marshall
Vice President

William Stalter
Secretary/Treasurer

Wayne E. Roller
Executive Director

NORTH HILLS COUNCIL OF GOVERNMENTS

300 Wetzel Road
Suite 201
Glenshaw, PA 15116

Phone: 412/487-5230
Fax: 412/487-5240

November 10, 2016

Mr. William McLain, Planning Division
Allegheny County Economic Development
Chatham One, Suite 900
112 Washington Place
Pittsburgh, PA 15219

RECEIVED
16 NOV 14 PM 12:58
ALLEGHENY COUNTY
DEPARTMENT OF

RE: Stormwater Plan for Allegheny County - Questions and Comments

Dear Mr. McClain:

After a thorough review by our Municipal Managers stormwater committee and our NHCOG stormwater engineer, PVE Sheffler, the North Hills Council of Governments wishes to present a list of comments and questions regarding the Draft Phase II Allegheny County Stormwater Management Plan (PLAN). We respectfully submit these comments in no particular order of importance, for your consideration, as follows:

- How will the riparian buffer easements be handled in communities that have limited developable or re-developable land that are adjacent to streams? The 100 year floodplain limits or a minimum of 35 feet from the top of stream bank could render many areas in communities such as Etna, Millvale, and Shaler un-developable. Will any further details be provided on suggested permitted uses within a Riparian Buffer Easement?

- As stated in the Executive Summary, Deer Creek, Girty's Run, Pine Creek, and Squaw Run already have completed Act 167 studies and these watersheds are "updated" with this PLAN. We would like clarification as to what updated entails. For example, the updated Pine Creek hydrologic model and ordinance does not contain a conditional direct discharge option for any storm frequency or location. Would the existing study and ordinances adopted by the NHCOG have to be amended to accommodate conditional direct discharge districts being proposed in the PLAN?

- Is the Low Impact Development portion of the model ordinance more a Zoning issue than a Stormwater Issue? Or, should this definition be clarified to refer to stormwater only. Low Impact Development is commonly associated with clustering of developments, shorter front yard requirements leading to smaller driveways, and other design practices.

- In the waivers section of the Model Ordinance, it states that no waiver or modification of any regulated stormwater activity may be granted by a Municipality unless approved in advance by the PADEP or the Conservation District. What is the reason for this added layer of review that could result in extra time delays in plan reviews? This would seem to be placing an additional burden on the two reviewing agencies

who will already be doing more stormwater work than in the past. Would there be a time frame for their response that would guarantee that the Municipality would be able to render its decision in the timeframe established in the Municipalities Planning Code?

- What is the purpose of having the municipality create a signature block and signing the stormwater plan?

- As a point of clarification, are the standards in Section 303 (A)(3) required for only the 2 year storm relating to the PADEP BMP Manual CG-1?

- What was the rationale behind including the 1 year storm in the list of storm frequencies to be analyzed for peak rate control? Our concern is that this lower frequency storm will result in a large increase in the size of stormwater management facilities as the more frequent storms require smaller outlet controls with a large, shallow low level volume in the facility.

- Would an Impervious Area Flash (IAF) analysis as included in the NHCOG ordinance be an acceptable replacement for the 1 year storm analysis? Also, the IAF provides an assurance that the green space on a proposed site, or the offsite flow onto a development site does not mask the effects of the quick runoff from the site's new impervious area.

- Why was the NRCS lag equation included in the acceptable methods of computing time of concentration? If the models studied were based on TR55 methodology using the equations for sheet, shallow concentrated, and open channel flow would provide the appropriate timing values.

- Please clarify the Term of Validity referred to in Section 406 of the Model Ordinance and what its purpose is in regulating the site stormwater management.

- In the list of authorized discharges in Section 701 of the Model Ordinance, we noted that there is not an item for dechlorinated swimming pool discharges. The municipalities would request that this be added to the list of authorized discharges as long as the PADEP guidelines for swimming pool water discharge are followed. If this cannot be added, could an explanation be provided for excluding this previously permitted discharge?

- In Section 702 for Roof Drains and Sump Pumps could the definition of "wherever feasible" be expanded upon to set a measurable standard?

The NHCOG Stormwater engineer, PVE Sheffler, was also asked to develop a list of items from the Draft Phase II County report and model ordinance that the NHCOG will be suggesting that our member communities amend or add to their existing ordinances, to comply with the new County Regulations. Responses to the aforementioned items will serve to complete the list of modifications for their ordinances. If a further discussion is needed with regard to any of the comments listed above, we would appreciate the opportunity.

Thank you for your time and consideration in reviewing this information.

Very Truly Yours,
North Hills Council of Governments

Wayne Roller

Wayne Roller, Executive Director

Cc: All NHCOG Municipal Managers

Plan Review Comments		
Project: Allegheny County Act 167 SWM Plan Subject: Review of Draft County-wide SWM Plan and Model Ordinance County Project Manager: William D. McLain, Allegheny County Economic Development Design Consultant: Michael Baker International, Inc. Reviewer(s): Wayne Roller, Executive Director, North Hills Council of Governments Date(s): November 10, 2016; February 6, 2017		
Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
		Comments with regard to the Plan
2		As stated in the Executive Summary, Deer Creek, Girty's Run, Pine Creek, and Squaw Run already have completed Act 167 studies and these watersheds are "updated" with this PLAN. We would like clarification as to what updated entails. For example, the updated Pine Creek hydrologic model and ordinance does not contain a conditional direct discharge option for any storm frequency or location. Would the existing study and ordinances adopted by the NHCOG have to be amended to accommodate conditional direct discharge districts being proposed in the PLAN? Response: Municipalities that have an existing Stormwater Management Ordinance must update their ordinance to at least meet the requirements of the Allegheny County Plan and Model Ordinance. The existing hydrologic study by the NHCOG is not updated and the existing Release Rate Maps from that study are incorporated into the Plan in Appendix A of the Model Ordinance. You do not have to establish Conditional Direct Discharge Districts.
9		Why was the NRCS lag equation included in the acceptable methods of computing time of concentration? If the models studied were based on TR55 methodology using the equations for sheet, shallow concentrated, and open channel flow would provide the appropriate timing values. Response: The portion of Section 8 describing acceptable time of concentration methods will be modified to remove the requirement that the maximum of the two methods be used, in order to allow for the use of the method that is most applicable to the hydrologic method being used.
		Comments on the Model Ordinance
1		How will the riparian buffer easements be handled in communities that have limited developable or redevelopable land that are adjacent to streams? The 100 year floodplain limits or a minimum of 35 feet from the top of stream bank could render many areas in communities such as Etna, Millvale, and Shaler un-developable. Will any further details be provided on suggested permitted uses within a Riparian Buffer Easement? Response: After consideration of your comment, the decision was made that the 35' Riparian Buffer is appropriate for the Allegheny County SWM Plan. If applicable to the particular development, Section 110 - Waivers covers development where "... there is no possibility that the property can be developed in strict conformity with the provisions of the Stormwater Management Ordinance."
3		Is the Low Impact Development portion of the model ordinance more a Zoning issue than a Stormwater Issue? Or, should this definition be clarified to refer to stormwater only. Low Impact Development is commonly associated with clustering of developments, shorter front yard requirements reading to smaller driveways, and other design practices. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. LID is a non-structural stormwater management option. LID concepts can be applied to nearly any type of development or redevelopment project. The optional text from the 2016 PADEP Stormwater Management BMP Manual (which was included in the Model Ordinance), is intended to strongly encourage the incorporation of LID practices in development and redevelopment projects. Municipalities may also consider LID practices during the development of zoning plans and ordinances.
4a		In the waivers section of the Model Ordinance, it states that no waiver or modification of any regulated stormwater activity may be granted by a Municipality unless approved in advance by the PADEP or the Conservation District. What is the reason for this added layer of review that could result in extra time delays in plan reviews? This would seem to be placing an additional burden on the two reviewing agencies who will already be doing more stormwater work than in the past. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance.
4b		Would there be a time frame for their response that would guarantee that the Municipality would be able to render its decision in the time frame established in the Municipalities Planning Code? Response: A timeframe has been incorporated.
5		What is the purpose of having the municipality create a signature block and signing the stormwater plan? Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance.
6		As a point of clarification, are the standards in Section 303 (A)(3) required for only the 2 year storm relating to the PADEP BMP Manual CG-1? Response: Yes, Section 303.A applies to the 2 year storm and below.

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
7		What was the rationale behind including the 1 year storm in the list of storm frequencies to be analyzed for peak rate control? Our concern is that this lower frequency storm will result in a large increase in the size of stormwater management facilities as the more frequent storms require smaller outlet controls with a large, shallow low level volume in the facility.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Inclusion of the 1 year storm provides benefits in helping to prevent streambank erosion.
8		Would an Impervious Area Flash (IAF) analysis as included in the NHCOG ordinance be an acceptable replacement for the 1 year storm analysis? Also, the IAF provides an assurance that the green space on a proposed site, or the offsite flow onto a development site does not mask the effects of the quick runoff from the site's new impervious area.
		Response: Section 4.2.4 of the Hampton Township SWM Ordinance (IAF provision) is vague in that it doesn't specify if it refers to only post-development or existing conditions. Also, it doesn't specify storm frequencies. Therefore, it doesn't appear to be a replacement for the 1-year storm, but could be adopted for all events after modification.
10		Please clarity the Term of Validity referred to in Section 406 of the Model Ordinance and what its purpose is in regulating the site stormwater management.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Its purpose is to prevent implementation of plans long after approval when regulations may have changed. Note the use of "may" in the following portion of Section 406: "... then the municipality may consider the SWM Plan disapproved ..."
11		In the list of authorized discharges in Section 701 of the Model Ordinance, we noted that there is not an item for dechlorinated swimming pool discharges. The municipalities would request that this be added to the list of authorized discharges as long as the PADEP guidelines for swimming pool water discharge are followed. If this cannot be added, could an explanation be provided for excluding this previously permitted discharge?
		Response: The recommended change has been incorporated.
12		In Section 702 for Roof Drains and Sump Pumps could the definition of "wherever feasible" be expanded upon to set a measurable standard.
		Response: The language of Section 702 may in the next ordinance version be revised to include: wherever feasible "*in the judgement of the Designated Reviewer*."

MUNICIPALITY OF PENN HILLS
A HOME RULE COMMUNITY
MUNICIPAL BUILDING
12245 FRANKSTOWN ROAD • PENN HILLS, PA 15235-3494
www.pennhills.org

C-96158-0002

November 18, 2016

Allegheny County Department of Economic Development
One Chatham Center
112 Washington Place, Suite 900
Pittsburgh, PA 15219

ATTN: Kay Pierce, Manager- Planning Division

RECEIVED
16 NOV 22 AM 10 26
ALLEGHENY COUNTY
DEPARTMENT OF
ECONOMIC DEVELOPMENT

Re: Allegheny County Stormwater Management Ordinance

Dear Ms. Pierce:

We have reviewed the Draft Allegheny County Stormwater Management Ordinance related to the ACT 167 Plan. The following are comments and/or issues associated with the Ordinance:

1. Section 110. Waivers.

    a. The waiver process should include a definition of hardship.
    b. The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level.

2. Section 301. General Requirements

    a. 301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.)

3. Section 302. Exemptions

    a. 302.A We recommend using 1 acre as the minimum earth disturbance.
    b. 302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District. **Conservation District review/approval should not be required in the 5,000 to 1 acre rangeas indicated in our Memorandum of Understanding for the with the Conservation District. This reference should be removed.**

4. Section 303. Volume Controls

    a. Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual. Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface".

b. Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP.

5. Section 305. Riparian Buffers

   a. The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams.

6. Section 401. Plan Requirements

   a. 401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer.
   b. 401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement.

7. Section 402. Plan Submission

   a. We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits.

If you have any questions, please contact me.

Sincerely,

Mohammed F. Rayan
Municipal Manager

Cc: Ruthann L. Omer, P.E., Borough Engineer, Gateway Engineers
Jennifer J. Slagle, P.E., Project Manager, Gateway Engineers
William McLain, Allegheny County Economic Development
John Shannon, Michael Baker International, Inc.

Plan Review Comments		
Project: Allegheny County Act 167 SWM Plan		
Subject: Review of Draft County-wide SWM Plan and Model Ordinance		
County Project Manager: William D. McLain, Allegheny County Economic Development		
SWM Plan Consultant: Michael Baker International, Inc.		
Reviewer(s): Mohammed F. Rayan, Municipal Manager, Municipality of Penn Hills		
Date(s): November 18, 2016; February 10, 2017		
Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE Response: NA
Comments on the Model Ordinance		
1a	Section 110. Waivers	The waiver process should include a definition of hardship. Response: The recommended change has been incorporated.
1b	Section 110. Waivers	The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Clarifying language has been added in response to your comment.
2a	Section 301. General Requirements	301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.) Response: The recommended change has been incorporated.
3a	Section 302. Exemptions	302.A We recommend using 1 acre as the minimum earth disturbance. Response: The recommended change has been incorporated.
3b	Section 302. Exemptions	302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District. Conservation District review/approval should not be required in the 5,000 to 1 acre range as indicated in our Memorandum of Understanding for the with the Conservation District. This reference should be removed. Response: The recommended change has been incorporated.
4a	Section 303. Volume Controls	Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual. Response: In response to your comment, the language has been clarified to say that CG-1 is only the method.
4a	Section 303. Volume Controls	Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface". Response: The recommended change has been incorporated.
4b	Section 303. Volume Controls	Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP. Response: The recommended change has been incorporated.
5a	Section 305. Riparian Buffers	The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams. Response: After consideration of your comment, the decision was made that the 35' Riparian Buffer is appropriate for the Allegheny County SWM Plan.
6a	Section 401. Plan Requirements	401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. The requirement has been revised to include the Designated Reviewer as signatory. A seal is not required, but the plans must be certified as meeting the requirements of the municipal ordinance.

Comment Number	Page or Sheet No	Reviewer's Comment / Question Designer's Response
6b	Section 401. Plan Requirements	401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement. Response: The recommended change has been incorporated in Section 401 and an alternative approach to infiltration has been provided in Section 303 in response to your comment.
7a	Section 402. Plan Submission	We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits. Response: The recommended change has been incorporated.

PGH2O Pittsburgh Water & Sewer Authority

December 30, 2016

William McLain
Allegheny County Economic Development
Chatham One
112 Washington Place, Suite 900
Pittsburgh, PA 15219

Dear Mr. McLain:

This letter offers comments regarding Allegheny County's Draft Stormwater Management Ordinance prepared for the Act 167 Plan process.

General comments:

-Check endnote reference numbers.

Article I – General Provisions

Section 102. B.

-The word "reasonable" is not necessary. Remove it or better define what constitutes "reasonable."

Section 110. B.

-Define "undue hardship." A standard of technical infeasibility, as determined by a qualified professional, would be more clear and less open to interpretation of what constitutes "undue hardship."

-Note that the City of Pittsburgh allows developers to pay a fee in lieu of compliance when the required stormwater management is deemed technically infeasible.

Section 110. C.

-Clarify: "No waiver or modification of any regulated stormwater activity involving earth disturbance greater than or equal to one acre may be granted by the Municipality unless that action is approved in advance by the Department of Environmental Protection (DEP) or the Allegheny County Conservation District."

Consider adding the following language:
"Prior DEP or ACCD approval of Local Ordinances will constitute approval for use of specified ordinances or modifications to the Act 167 requirements for any subsequent projects approved by the Municipality."

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Article II – Definitions

-Add definitions for "Native vegetation" and "Invasive vegetation" as referenced in Section 305 C. Consider establishing an authoritative resource to be recognized in this Act 167 definition.

-Consider adding a definition of "environmentally sensitive areas" as referenced in Section 401.2. Application of existing federal or specific state definitions would be appropriate.

-Impervious Surface/Area: Change "Decks, parking areas, and driveway areas are not counted as impervious areas if they do not prevent infiltration." to "Decks, parking areas, and driveway areas are counted as impervious areas only if they directly prevent infiltration."

-Stormwater Management Site Plan: Change "the developer or his representative" to "the developer or the developer's representative".

Article III – General Requirements

Section 301 F.
-Clarify the process for notification of affected adjacent property owners. "Stormwater flows onto adjacent or downstream property shall not be created, increased, decreased, relocated, or otherwise altered without written notification to, and acceptance by, the affected property owner(s). Such stormwater flows shall be subject to the requirements of this Ordinance." Also consider changing "without written notification" to "without written consent".

Section 301 I.
-Clarify "spread out." Consider establishing a geometric or flow condition to define this term.

Section 301 K.
-Consider allowing a more recent climate-adjusted design storm source, such as from NOAA's National Centers for Environmental Information. NOAA's Atlas 14 is dated 2004 (revised 2006) and Appendix A3 notes it does not find significant climate trends. However, more recent data may be available. Language as follows could clarify the situation: "Climate information provided from federal or state resources can be considered in lieu of the specified source."

Section 302 B.

-Change "which need consist only of" to "which must include".

Section 303. Volume Controls

-Keep the sentence "The green infrastructure and low impact development practices provided in the BMP Manual shall be utilized for all regulated activities wherever possible." This will encourage use of best practices.

-"For regulated activity areas equal to or less than"

-To: "Water volume controls shall be implemented using the Design Storm Method in Subsection A or the Simplified Method in Subsection B below," add: "or alternative design criteria as allowed by PA Code Title 25, Chapter 102."

Section 303. A. 2.

-Change: "At least the first one inch of runoff from new 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."

To: "At least the first 1.5 inches of runoff from new 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, infiltration, and discharge to local stormwater systems after detention. If infiltration is not feasible due to site conditions, runoff shall be detained for 24-72 hours before discharge to local stormwater systems, or the environment."

Justification: current precipitation trends will make 1.5" the 95th percentile storm in approximately 40 years, which is within the design lifespan of many stormwater BMPs being built today.

Also, some areas should not have additional infiltration, such as landslide prone areas, areas of known contamination with toxic chemicals, and sites where infiltration would contribute to acid mine drainage.

Section 303. A. 3. b. Additional information may be needed to determine the appropriate percentage of existing impervious area to be considered meadow in good condition, for sizing of BMPs. It would be helpful to know the sensitivity of the sizing to this parameter, for small, medium, and large BMPs.

Section 303. B. 2. As noted above, change "the first one inch" to "the first one and a half inches".

Section 303. B. 3.

To: "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." add: "If infiltration is not feasible due to site conditions, runoff shall be detained for 24-72 hours before discharge to local streams or stormwater systems."

Section 304. Rate Controls

-Clarify what size project is required to follow these rate controls. Would this apply to all stormwater management (SWM) Site Plans, except those using the Simplified Method?

Section 305. Riparian Buffers

Section 305. B.

For clarity, add: "Except as required by 25 Pa. Code Chapter 102,"

Keep the protection of native vegetation and the need to 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. It is reasonable to use the 100-year floodplain or 35 feet from the top of the streambank, if greater, as a minimum for activities covered by this section. Additional study may be required to determine the economic impact of this policy as well as the environmental impact.

Section 305. C.

Add a comma: "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."

Section 401. A.

-Change "municipal's" to "municipality's"

Section 403. Plan Review

-Add a sentence about review fees, referencing Article VI. Justification: review fees are mentioned in reference to resubmission in Section 404.

Section 403. C.

-Change 45 days to 30 days. Justification: 30 days is a standard review period.

Section 404. Modification of Plans.

-Clarify: "A modification to a submitted SWM Site Plan that involves a change in SWM BMPs or techniques, or that involves the relocation or redesign of SWM BMPs, or that is necessary because soil or other conditions are not as stated on the SWM Site Plan, ~~as determined by the Municipality~~ shall require a resubmission of the modified SWM Site Plan in accordance with this Article."

C. "After receipt of the completion certification by the Municipality, the Municipality may conduct a final inspection." Clarify that the municipality may inspect during construction as well, as appears to be outlined in Section 801.

PGH2O

Section 701. C. "...contributors to pollution of a regulated..."

Section 802. Inspection

-Change to: 1. Annually for the lifespan of the BMP. 2. During or immediately after the cessation of a 2.5" or greater storm.

Justification: this is not a significant time commitment (once every two or more years, on average) and may be significant to ensure proper functioning of BMPs. Recommendation: Develop an (online) inspection form that owners can easily submit to municipalities. Municipalities can also send out reminders to inspect BMPs.

Please contact Katherine Camp of PWSA or me if you have any questions or comments.

Sincerely,

Robert A. Weimar -KC

Robert A. Weimar, PE, BCEE
Interim Director of Engineering and Construction

CC: Katherine Camp
George Robinson
Joshua Lippert, City Planning
Tom Batroney, Mott MacDonald

Plan Review Comments		
Project: Allegheny County Act 167 SWM Plan Subject: Review of Draft County-wide SWM Plan and Model Ordinance County Project Manager: William D. McLain, Allegheny County Economic Development Design Consultant: Michael Baker International, Inc. Reviewer(s): Robert A. Weimer, PE, BCEE, Interim Director of Engineering and Construction, Pittsburgh Water & Sewer Authority Date(s): December 30, 2016; February 6, 2017		
Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE Response: NA
Comments on the Model Ordinance		
1	Section 102.B	The word "reasonable" is not necessary. Remove it or better define what constitutes "reasonable." Response: The recommended change has been incorporated.
2	Section 110.B	Define "undue hardship." A standard of technical infeasibility, as determined by a qualified professional, would be more clear and less open to interpretation of what constitutes "undue hardship." Note that the City of Pittsburgh allows developers to pay a fee in lieu of compliance when the required stormwater management is deemed technically infeasible. Response: The recommended change has been incorporated by incorporating language clarifying "hardship."
3	Section 110.C	Clarify: "No waiver or modification of any regulated stormwater activity involving earth disturbance greater than or equal to one acre may be granted by the Municipality unless that action is approved in advance by the Department of Environmental Protection (DEP) or the Allegheny County Conservation District." Consider adding the following language: "Prior DEP or ACCD approval of Local Ordinances will constitute approval for use of specified ordinances or modifications to the Act 167 requirements for any subsequent projects approved by the Municipality." Response: The recommended change has been incorporated.
4	Article II Definitions	Add definitions for "Native vegetation" and "Invasive vegetation" as referenced in Section 305 C. Consider establishing an authoritative resource to be recognized in this Act 167 definition. Response: The recommended change has been incorporated.
5	Article II Definitions	Consider adding a definition of "environmentally sensitive areas" as referenced in Section 401.2. Application of existing federal or specific state definitions would be appropriate. Response: This change will be considered in the next version of the ordinance.
6	Article II Definitions	Impervious Surface/Area: Change "Decks, parking areas, and driveway areas are not counted as impervious areas if they do not prevent infiltration." to "Decks, parking areas, and driveway areas are counted as impervious areas only if they directly prevent infiltration." Response: The recommended change has been incorporated.
7	Article II Definitions	Stormwater Management Site Plan: Change "the developer or his representative" to "the developer or the developer's representative". Response: The recommended change has been incorporated.
8	Section 301.F	Clarify the process for notification of affected adjacent property owners. "Stormwater flows onto adjacent or downstream property shall not be created, increased, decreased, relocated, or otherwise altered without written notification to, and acceptance by, the affected property owner(s). Such stormwater flows shall be subject to the requirements of this Ordinance." Also consider changing "without written notification" to "without written consent". Response: The recommended change has been incorporated.
9	Section 301.I	Clarify "spread out." Consider establishing a geometric or flow condition to define this term. Response: The recommended change has been incorporated.
10	Section 301.K	Consider allowing a more recent climate-adjusted design storm source, such as from NOAA's National Centers for Environmental Information. NOAA's Atlas 14 is dated 2004 (revised 2006) and Appendix A3 notes it does not find significant climate trends. However, more recent data may be available. Language as follows could clarify the situation: "Climate information provided from federal or state resources can be considered in lieu of the specified source." Response: After consideration of your comment, the decision was made that the citing of the PADOT Drainage Manual and NOAA's Atlas 14 provides consistency and is appropriate for the Allegheny County SWM Plan.
11	Section 302.B	Change "which need consist only of" to "which must include". Response: The recommended change has been incorporated.

Comment Number	Page or Sheet No	Reviewer's Comment / Question Designer's Response
12	Section 303 Volume Controls	Keep the sentence "The green infrastructure and low impact development practices provided in the BMP Manual shall be utilized for all regulated activities wherever possible." This will encourage use of best practices. - "For regulated activity areas equal *to* or less than" - To: "Water volume controls shall be implemented using the Design Storm Method in Subsection A or the Simplified Method in Subsection B below," add: "or alternative design criteria as allowed by PA Code Title 25, Chapter 102." Response: The recommended change has been incorporated.
13	Section 303.A.2	Change: "At least the first one inch of runoff from new 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." To: "At least the first 1.5 inches of runoff from new 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, infiltration, and discharge to local stormwater systems after detention. If infiltration is not feasible due to site conditions, runoff shall be detained for 24-72 hours before discharge to local stormwater systems, or the environment." Justification: current precipitation trends will make 1.5" the 95th percentile storm in approximately 40 years, which is within the design lifespan of many stormwater BMPs being built today. Also, some areas should not have additional infiltration, such as landslide prone areas, areas of known contamination with toxic chemicals, and sites where infiltration would contribute to acid mine drainage. Response: The recommended change regarding detention has been incorporated. After consideration of your comment regarding 1.5" and comments from other commenters, the decision was made that 1" is appropriate for the Allegheny County SWM Plan; municipalities have the option of making their ordinance more stringent and using 1.5".
14	Section 303.A.3b	Additional information may be needed to determine the appropriate percentage of existing impervious area to be considered meadow in good condition, for sizing of BMPs. It would be helpful to know the sensitivity of the sizing to this parameter, for small, medium, and large BMPs. Response: After consideration of the comments received, the decision was made that 20% is appropriate for the Allegheny County SWM Plan.
15	Section 303.B.2	As noted above, change "the first one inch" to "the first one and a half inches". After consideration of your comment regarding 1.5" and comments from other commenters, the decision was made that 1" is appropriate for the Allegheny County SWM Plan; municipalities have the option of making their ordinance more stringent and using 1.5".
16	Section 303.B.3	To: "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." add: "If infiltration is not feasible due to site conditions, runoff shall be detained for 24-72 hours before discharge to local streams or stormwater systems." Response: The recommended change has been incorporated in Sections 303.a.2 and B.2.
17	Section 304 Rate Controls	Clarify what size project is required to follow these rate controls. Would this apply to all stormwater management (SWM) Site Plans, except those using the Simplified Method? Response: Section 302.A & B state that Section 305 applies to all regulated activities larger than 0.25 acre, except as exempted by Section 303.B.4.
18	Section 305.B Riparian Buffers	For clarity, add: "Except as required by 25 Pa. Code Chapter 102." Response: The recommended change has been incorporated.
19	Section 305.B Riparian Buffers	Keep the protection of native vegetation and the need to 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. It is reasonable to use the 100-year floodplain or 35 feet from the top of the streambank, if greater, as a minimum for activities covered by this section. Additional study may be required to determine the economic impact of this policy as well as the environmental impact. Response: After consideration of your comment, the decision was made that the 35' Riparian Buffer is appropriate for the Allegheny County SWM Plan.
20	Section 305.C Riparian Buffers	Add a comma: "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." Response: The recommended change has been incorporated.
21	Section 401.A	Change "municipal's" to "municipality's" Response: The recommended change has been incorporated.
22	Section 403 Plan Review	Add a sentence about review fees, referencing Article VI. Justification: review fees are mentioned in reference to resubmission in Section 404. Response: The recommended change has been incorporated.
23	Section 403 C	Change 45 days to 30 days. Justification: 30 days is a standard review period. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Municipalities have the option to make the ordinance provision more stringent

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
24	Section 404 Modification of Plans	Clarify: "A modification to a submitted SWM Site Plan that involves a change in SWM BMPs or techniques, or that involves the relocation or redesign of SWM BMPs, or that is necessary because soil or other conditions are not as stated on the SWM Site Plan, ~~as determined by the Municipality~~ shall require a resubmission of the modified SWM Site Plan in accordance with this Article."
		Response: The recommended change has been incorporated.
25	Section 407.C	"After receipt of the completion certification by the Municipality, the Municipality may conduct a final inspection." Clarify that the municipality may inspect during construction as well, as appears to be outlined in Section 801.
		Response: The recommended change has been incorporated.
26	Section 701.C	"…contributors to pollution *of* a regulated…"
		Response: The recommended change has been incorporated.
27	Section 802 Inspection	Change to: 1. Annually for the lifespan of the BMP. 2. During or immediately after the cessation of a 2.5" or greater storm.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Municipalities have the option to make the ordinance provision more stringent.

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Jeremy Shaffer
Jack Betkowski

November 30, 2016

Allegheny County Department of Economic Development
One Chatham Center
112 Washington Place, Suite 900
Pittsburgh, PA 15219

ATTN:Kay Pierce, Manager- Planning Division

Re: Allegheny County Stormwater Management Ordinance

Dear Ms. Pierce:

We have reviewed the Draft Allegheny County Stormwater Management Ordinance related to the ACT 167 Plan. The following are comments and/or issues associated with the Ordinance:

1. Section 110. Waivers.

    a. The waiver process should include a definition of hardship.
    b. The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level.

2. Section 301. General Requirements

    a. 301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.)

3. Section 302. Exemptions

    a. 302.A We recommend using 1 acre as the minimum earth disturbance.
    b. 302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District. Conservation District review/approval should not be required in the 5,000 to 1 acre

range as indicated in our Memorandum of Understanding for the with the Conservation District. This reference should be removed.

4. Section 303. Volume Controls

    a. Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual. Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface".
    b. Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP.

5. Section 305. Riparian Buffers

    a. The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams.

6. Section 401. Plan Requirements

    a. 401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer.
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    a. We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County

Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits.

If you have any questions, please contact me.

Sincerely,

Douglas Sample
Township Manager

Cc: Richard D. Minsterman, P.E., Township Engineer, Gateway Engineers

William McLain, Allegheny County Economic Development
John Shannon, Michael Baker International, Inc.

Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Draft County-wide SWM Plan and Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
SWM Plan Consultant: Michael Baker International, Inc.
Reviewer(s): Douglas Sample, Township Manager, Ross Township

Date(s): November 30, 2016; February 10, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE Response: NA
Comments on the Model Ordinance		
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2a	Section 301. General Requirements	301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.) Response: The recommended change has been incorporated.
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4a	Section 303. Volume Controls	Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual. Response: In response to your comment, the language has been clarified to say that CG-1 is only the method.
4a	Section 303. Volume Controls	Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface". Response: The recommended change has been incorporated.
4b	Section 303. Volume Controls	Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP. Response: The recommended change has been incorporated.
5a	Section 305. Riparian Buffers	The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams. Response: After consideration of your comment, the decision was made that the 35' Riparian Buffer is appropriate for the Allegheny County SWM Plan.
6a	Section 401. Plan Requirements	401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. The requirement has been revised to include the Designated Reviewer as signatory. A seal is not required, but the plans must be certified as meeting the requirements of the municipal ordinance.

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
6b	Section 401. Plan Requirements	401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement.
		Response: The recommended change has been incorporated in Section 401 and an alternative approach to infiltration has been provided in Section 303 in response to your comment.
7a	Section 402. Plan Submission	We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits.
		Response: The recommended change has been incorporated.

SENATE ENGINEERING COMPANY

U-PARC, 420 William Pitt Way
Pittsburgh, PA 15238-1330
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ALLEGHENY COUNTY
DEPARTMENT OF
ECONOMIC DEVELOPMENT

November 18, 2016

Mr. William McLain
ALLEGHENY COUNTY ECONOMIC DEVELOPMENT
One Chatham Center, Suite 900
112 Washington Place
Pittsburgh, PA 15219

RE: Watershed Plan Advisory Committee
Draft Allegheny County Phase II Stormwater Management Plan

Dear Mr. McLain:

Please find our comments regarding the Draft Allegheny County Phase II Stormwater Management Plan below. We offer these comments on behalf of all of our municipal clients that reside in Allegheny County.

Section 301. M. – A formatting note: the statement is followed by a superscript "4" indicating that a footnote is present. The footnote is not easily found. The footnote should be on the same page as the subscript denotation.

Section 302. A. – We recommend inserting "one acre" here. It is important to understand that development less than one acre is not "exempt" from stormwater management because the developer will still have to follow paragraph B. We are only "exempting" development less than 1 acre from rate control. They will still need to implement a plan with volume control as outlined in paragraph B.

Section 303. A. 3. b. – The instructions say to insert a percentage no less than 50%. Fifty percent is overkill. We recommend using 20% as a minimum. The state of Pennsylvania uses 20%. A fifty percent developer's penalty will result in the dissuasion of redevelopment, and stormwater management facilities will be vastly oversized. The oversize of the facilities will cause undue hardship on smaller sites, and the facilities will never function as intended, because we are essentially mandating that the calculations are skewed.

Section 304. – The section should reference that release rate maps are found in Appendix A.

Section 305. A. – This statement reads that an easement shall be required for a site with an *existing* riparian buffer. We should clarify that this is the intent of this statement.

Section 305. B. – The 35 foot easement would cause undue hardship on smaller development and redevelopment sites because the total easement width could end up being greater than 70 feet. There is not a "one size fits all" riparian buffer easement. The width of the easement should be based upon the size of the drainage area to the site. For drainage areas greater than 100 acres, the state of Pennsylvania (PA Code 102.14) requires a minimum total easement width of 100 feet in non-special protection watersheds and a minimum total easement width of 150 feet in special protection / high quality watersheds. The state of Pennsylvania does not have riparian buffer requirements for sites with drainage areas less than 100 acres. Also, we recommend using the center line of the stream instead of the top of bank as the draft ordinance states in order to measure the width of the proposed buffer. Top of bank is not discernable in some locations and can be easily disputed. The center line of the stream is a clearer reference point. Also, streams naturally migrate, and due to erosion, a "top of bank" may change in geographical location and become even more obscure.

Section 401. A. and B. – These are statements that should be moved under a different section heading. It is confusing to have them under "site plan requirements". Some reformatting in this section is necessary.

Section 401. C. – The width of easements is not specified in the draft ordinance, and the municipality may not require easements for privately owned facilities. This statement should be revised to address easement width and requirements, if any, for privately owned facilities.

Section 401. E. – We recommend adding a requirement for "construction details sufficient to completely express the intended stormwater design components" to this section. We also recommend adding a requirement for a "grading plan showing existing and proposed contours" to this section.

Section 401.E. 10. – We do not believe the applicant should be forced into using certain LID or "green" methods as long as the requirements of the Ordinance are being met. We recommend eliminating this statement.

Section 403. A. – Insert "municipal engineer".

Section 403. D. – We recommend eliminating this paragraph. We do not believe the applicant should be forced into using certain LID or "green" methods as long as the requirements of the Ordinance are being met.

Section 405 – This paragraph states that applicable review fees are required for a re-submission. Review fees for the initial submission were never discussed. A paragraph establishing a fee schedule should be inserted before this section.

Section 407 – We recommend requiring the recording of stormwater management BMPs ONLY for sites over one acre. It would be impracticable and cause undue hardship to record stormwater management BMPs on smaller sites, such as homeowner's residential lots. (Are we going to record every little rain garden or rock sump we require our residents to install if they put an addition on their home or add a patio space?)

Appendix A – Release Rate Maps – These maps contain no helpful information (contours, roads, parcels) that would aid the viewer in locating a site. ONE comprehensive map should be provided for the entire County instead of several watershed based maps.

Sincerely,

SENATE ENGINEERING COMPANY

Amber Yon, P.E.
Project Engineer

G:\Sen\ADMIN\2016\Allegheny County Proposed Stormwater Management Ordiance\111216L.Doc

Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Draft County-wide SWM Plan and Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
Design Consultant: Michael Baker International, Inc.
Reviewer(s): Amber Yon, P.E., Project Engineer, Senate Engineering Company

Date(s): November 18, 2016; February 10, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE Response: NA
Comments on the Model Ordinance		
1	Section 301. M	**A formatting note- the statement is followed by a superscript "4" indicating that a footnote is present, but the footnote is** not easily found. Placing footnotes at the bottom of the same page as the subscript denotation makes it easier for the reader to find. Response: The superscripts within the Model Ordinance refer to Article IX - References.
2	Section 302. A	We recommend inserting "one acre" be used here. It is important to understand that development less than one acre is not "exempt" from stormwater management because the developer will still have to follow Paragraph B. We are only "exempting" development less than 1 acre from rate control. They will still need to implement a plan with volume control as outlined in paragraph B. Response: The recommended change has been incorporated.
3	Section 303. A.3.b	The instructions say to insert a percentage no less than 50%. Fifty percent is overkill. We recommend using 20% as a minimum. The state of Pennsylvania uses 20%. A fifty percent developer's penalty will result in the dissuasion of redevelopment, and stormwater management facilities will be vastly oversized. The oversize of the facilities will cause undue hardship on smaller sites, and the facilities will never function as intended because we are essentially mandating that the calculations are skewed. Response: The recommended change has been incorporated.
4	Section 304	The section should reference that release rate maps are found in Appendix A. Response: The recommended change will be incorporated in the final ordinance.
5	Section 305. A	This statement reads that an easement shall be required for a site with an *existing* riparian buffer. We should clarify that this is the intent of this statement? Response: We cannot find your reference to existing riparian buffers.
6	Section 305. B	The 35-foot easement would cause undue hardship on smaller development and redevelopment sites because the total easement width could end up being greater than 70 feet. There is not a "one size fits all" riparian buffer easement. The width of the easement should be based upon the size of the drainage area to the site. For drainage areas greater than 100 acres, the state of Pennsylvania (PA Code 102.14) requires a minimum total easement width of 100 feet in non-special protection watersheds and a minimum total easement width of 150 feet in special protection/high quality watersheds. The state of Pennsylvania does not have riparian buffer requirements for sites with drainage areas less than 100 acres. Also, we recommend using the center line of the stream instead of the top of the bank as the draft ordinance states in order to measure the width of the proposed buffer. Top of bank is not discernable in some locations and can be easily disputed. The center line of the stream is a clearer reference point. Also, streams naturally migrate, and due to erosion, a "top of the bank" may change in geographical location and become even more obscure. Response: After consideration of your comment, the decision was made that the 35' Riparian Buffer is appropriate for the Allegheny County SWM Plan.
7	Section 401.A & B	These provisions should be moved under a different section heading. It is confusing to have them under "site plan requirements". Some reformatting in this section is necessary. Response: The recommended change has been incorporated.
8	Section 401. C	The width of easements is not specified in the draft ordinance, and the municipality may not require easements for privately owned facilities. This statement should be revised to address easement width and requirements, if any, for privately owned facilities. Response: Each municipality may chose the easement requirements suitable for their municipality. The Design Consultant recommends easements be required in private developments to assure future access if the land around the SWM facilities is sold.

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
9	Section 401. E	We recommend adding a requirement for "construction details sufficient to completely express the intended stormwater design components" to this section. We also recommend adding a requirement for a "grading plan showing existing and proposed contours" to this section.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Municipalities have the option to make the ordinance provision more stringent.
10	Section 401.E.10	We do not believe the applicant should be forced into using certain LID or "green" methods as long as the requirements of the Ordinance are being met. We recommend eliminating this statement.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. After consideration of your comment and the comments of other commenters, the decision was made that the GI and LID provisions are appropriate for the Allegheny County SWM Plan.
11	Section 403. A	Insert "municipal engineer".
		Response: Each municipality should determine who the Designated Reviewer should be.
12	Section 403. D	We recommend eliminating this paragraph. We do not believe the applicant should not be forced into using certain LID or "green" methods as long as the requirements of the Ordinance are being met.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. After consideration of your comment and the comments of other commenters, the decision was made that the GI and LID provisions are appropriate for the Allegheny County SWM Plan.
13	Section 405	This paragraph states that applicable review fees are required for a re-submission. Review fees for the initial submission were never discussed. A paragraph establishing a fee schedule should be inserted before this section.
		Response: Section 601 sets forth the fees. Each municipality will establish their fee structure in this section.
14	Section 407	We recommend requiring the recording of stormwater management BMPs ONLY for sites over one acre. It would be impracticable and cause undue hardship to record stormwater management BMPs on smaller sites, such as homeowner's residential lots. (Are we going to record every little rain garden or rock sump we require residents to install if they put an addition or their home, or add a patio space?)
		Response: The recommended change has been incorporated, as Section 302.B has been revised to be applicable only to earth disturbances over one-quarter (0.25) acre.
15	Appendix A Release Rate Maps	These maps contain no helpful information, (contours, roads, parcels) that would aid the viewer in locating a site. ONE comprehensive map should be provided for the entire County instead of several watershed based maps.
		Response: The release rate districts are watershed based. Upon adoption by County Council and approval by PADEP, GIS files for the Release Rate Maps will be available for download.

Township of South Park
2675 Brownsville Road, South Park, Pennsylvania 15129
Phone (412) 831-7000 Fax: (412) 831-0425 www.southparktwp.com

Board of Supervisors:
David J. Buchewicz
Walter C. Sackinsky
Edward T. Snee

Township Manager:
Karen F. Fosbaugh

November 21, 2016

Jan Lauer
Allegheny County Conservation District
33 Terminal Way
Suite 325 B
Pittsburgh, PA 15219

Re: Comments to Stormwater Management Ordinance

Dear Ms. Lauer:

Please be advised that the Stormwater Management Ordinance was distributed to the Township Solicitor and the Township Engineer for comment. A workshop session was also held and included Municipal officials. The following points were raised:

Township Engineer:

1. Section 302 of the Draft Ordinance, "Exemptions", is similar to the current Township Ordinance Section 112.20, but requires additional details to be submitted for a project between 5,000 square feet and an acre. Currently the Township allows projects creating less than 10,000 square feet of impervious area to be classified as a small development. There are supposed to be "Small Project" provisions available in the new draft Ordinance but the current version does not include the "Appendix C" necessary to review those provisions. We are asking the County for clarification on this, and/or how much flexibility the municipality can allow on the limits, would be appropriate.

2. Section 303 of the Draft Ordinance, "Volume Controls", includes provisions that are not directly addressed in the current Township Ordinance, but which are part of any project that requires an NPDES Permit for stormwater. The difference between this draft and current practice lies in 303.A.3.b, which appears to require a minimum of 50% of existing impervious area to be considered meadow when calculating for the volume required to be treated, compared with the current 20%. This increase will result in additional and/or larger facilities required to control the runoff volume. This could become onerous on the Applicants.

3. Section 701 of the Draft Ordinance contains a more restrictive list of prohibited discharges than used previously. Items eliminated from this list, that now would be inferred to be prohibited, include air conditioning condensate, individual residential car washing (it now stipulates that cleaning agents cannot be used), dechlorinated swimming pool discharges (however, other potable water sources are included as long as there is no detectable residual chlorine, so pools may or may not be inferred to be included).

4. Under Section 304, there may or may not be more stringent runoff rate controls required in the Township. It depends upon whether the final Plan includes "release rates" for the Township watersheds. They did not include a Release Rate Map with the draft.

5. All communities must be advised of the release rates once Allegheny County makes the determination as to what these rates will be.

Township Solicitor:

1. Definition of Qualified Professional should not be as broad to include "...or otherwise qualified by law" but should be narrowed to read as otherwise qualified under Pennsylvania law to eliminate professionals not qualified under the laws of the Commonwealth.

2. It is suggested the inclusion of language that all plans and drawings contain the seal and signature of a Qualified Professional, licensed in the Commonwealth of Pennsylvania only.

3. The inclusion of an Indemnification, Defend, Hold Harmless and Release paragraph such as the following:

Indemnification, Defend, Hold Harmless and Release. The Applicant shall fully defend, release, protect, indemnify, and hold harmless the Township, its departments, officials, officers, agents, employees and contractors from and against each and every claim, demand, or cause of action and any and all liability, damages, obligations, judgments, losses, fines, penalties, costs, legal and expert fees and expenses incurred in defense, enforcement of and/or handling of by the Township including, without limitation, personal injuries and death in connection therewith which may be made or asserted by any third parties on account of, arising out of, or in any way incidental to or in connection with the performance by the Applicant, as well as this does not constitute a waiver of the Township's immunity under any applicable law.

4. Appendix B captioned "Operation and Maintenance (O&M) Agreement Stormwater Management Best Management Practices (SWM BMP's) needs to be significantly enhanced. See the attached proposed draft of Appendix B for your immediate reference. The Township of South Park's current Storm Water Facilities Maintenance and Monitoring Agreement appears to be more comprehensive in certain areas. (See attached for your immediate reference.)

5. Has there been any discussion as to what amount, if any, can be placed in an escrow account under a SWM O&M Agreement?

6. The proposed draft does not appear to be descriptive enough with regard to agricultural activity compared to 25 Pa. Code Chapter 102.4. We are not certain that everyone will have access to and read 25 Pa. Code Chapter 102.4 carefully.

7. Section 501 of the Draft states "The municipality reserves the right to accept or reject ownership and operating responsibility..." We would reserve the words to reject or accept, since generally the Township of South Park does not accept a SWM facility.

8. Under Section 601, it is imperative to include all costs and expenses in this Ordinance in Chapter A 141, "Fees", of the Code of the Township of South Park.

9. This Draft is missing the standard legal miscellaneous sections at the conclusion of this ordinance.

Township Officials:

1. The ordinance heavily focuses on the release of stormwater emanating from residential downspouts onto lawn areas. South Park Township is concerned that this action is exacerbating sanitary sewer infiltration issues.

2. Article III – Stormwater Management Standards – Section 301. General Requirements – Item F. Clarification needs to be provided as to who is to notify adjacent property owners and does "adjacent" mean immediately adjacent or all those possibly affected.

3. Article VII – Prohibitions – Section 701. Prohibited Discharges and Connections – Add new Item C - No. 9 to include swimming pools and hot tubs.

4. Article VII – Prohibitions – Section 701. Prohibited Discharges and Connections – Item 7. It is the Township's opinion that It would be impossible for the Township to monitor whether or not residents are using cleaning agents when their vehicles with cleaning agents.

5. Article VIII – Enforcement and Penalties – Section 805. Penalties – The fees should be established by Allegheny County and would, therefore, be consistent to all.

Thank you for providing our community with the opportunity to offer comment relative to the proposed Ordinance. Do not hesitate to contact me should additional information or clarification be required.

Sincerely,

Karen F. Fosbaugh,
Township Manager

/kff

Enclosures

Cc: Board of Supervisors (w/o enclosures)
Gary Wargo, Code Enforcement Officer (w/o enclosures)
Bruce Beaver, Director of Public Works (w/o enclosures)
Paul J. Gitnik, Esq., Township Solicitor (w/o enclosures)
Rob Arnold, Township Engineer (w/o enclosures)

Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Draft County-wide SWM Plan and Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
Design Consultant: Michael Baker International, Inc.
Reviewer(s): Karen F. Fosbaugh, Township Manager, Township of South Park

Date(s): November 21, 2016; February 6, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE Response: NA
Comments on the Model Ordinance		
		Township Engineer:
1	Section 302	Section 302 of the Draft Ordinance, "Exemptions", is similar to the current Township Ordinance Section 112.20, but requires additional details to be submitted for a project between 5,000 square feet and an acre. Currently the Township allows projects creating less than 10,000 square feet of impervious area to be classified as a small development. There are supposed to be "Small Project" provisions available in the new draft Ordinance but the current version does not include the "Appendix C" necessary to review those provisions. We are asking the County for clarification on this, and/or how much flexibility the municipality can allow on the limits, would be appropriate. Response: The recommended change has been incorporated, Section 302.B has been revised to one-quarter (0.25) acre. Municipalities have the option to make the ordinance provision more stringent. Appendix C was included on the CD distributed to all municipalities and on the SWM Plan website for download.
2	Section 303.A.3	Section 303 of the Draft Ordinance, "Volume Controls", includes provisions that are not directly addressed in the current Township Ordinance, but which are part of any project that requires an NPDES Permit for Stormwater. The difference between this draft and current practice lies in 303.A.3.b, which appears to require a minimum of 50% of existing impervious area to be considered meadow when calculating for the volume required to be treated, compared with the current 20%. This increase will result in additional and/or larger facilities required to control the runoff volume. This could become onerous on the Applicants. Response: The recommended change has been incorporated, Section 303.A.3 has been revised to 20%.
3	Section 701	Section 701 of the Draft Ordinance contains a more restrictive list of prohibited discharges than used previously. Items eliminated from this list, that now would be inferred to be prohibited, include air conditioning condensate, individual residential car washing (it now stipulates that cleaning agents cannot be used), dechlorinated swimming pool discharges (however, other potable water sources are included as long as there is no detectable residual chlorine, so pools may or may not be inferred to be included). Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Section 701.C includes HVAC condensate, and dechlorinated swimming pool water has been added.
4	Section 304	Under Section 304, there may or may not be more stringent runoff rate controls required in the Township. It depends upon whether the final Plan includes "release rates" for the Township watersheds. They did not include a Release Rate Map with the draft. Response: The Township watersheds were not studied as part of this Plan and an existing Act 167 is not known to exist for the Township's watersheds, therefore the provisions of Section 304.A would apply to the Township of South Park.
5	Section 304	All communities must be advised of the release rates once Allegheny County makes the determination as to what these rates will be. Response: The provisions of Section 304.A would apply to the Township of South Park upon adoption by County Council and approval by PADEP.
		Township Solicitor:
TS 1	Article II	Definition of Qualified Professional should not be as broad to include "...or otherwise qualified by law" but should be narrowed to read as otherwise qualified under Pennsylvania law to eliminate professionals not qualified under the laws of the Commonwealth. Response: The recommended change has been incorporated.
TS 2	Article IV	It is suggested the inclusion of language that all plans and drawings contain the seal and signature of a Qualified Professional, licensed in the Commonwealth of Pennsylvania only. Response: Section 407.B requires a certification from a Qualified Professional that the SWM BMPs have been constructed according to the approved plans and specifications.

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
TS 3	Article IV	The inclusion of an Indemnification, Defend, Hold Harmless and Release paragraph such as the following: Indemnification, Defend, Hold Harmless and Release. The Applicant shall fully defend, release, protect, indemnify, and hold harmless the Township, its departments, officials, officers, agents, employees and contractors from and against each and every claim, demand, or cause of action and any and all liability, damages, obligations, judgments, losses, fines, penalties, costs, legal and expert fees and expenses incurred in defense, enforcement of and/or handling of by the Township including, without limitation, personal injuries and death in connection therewith which may be made or asserted by any third parties on account of, arising out of, or in any way incidental to or in connection with the performance by the Applicant, as well as this does not constitute a waiver of the Township's immunity under any applicable law.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Municipalities have the option to make the ordinance provisions more stringent.
TS 4	Appendix B	Appendix B captioned "Operation and Maintenance (O&M) Agreement Stormwater Management Best Management Practices (SWM BMP's) needs to be significantly enhanced. See the attached proposed draft of Appendix B for your immediate reference. The Township of South Park's current Storm Water Facilities Maintenance and Monitoring Agreement appears to be more comprehensive in certain areas. (See attached for your immediate reference.)
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Municipalities have the option to make the ordinance provisions more stringent.
TS 5	Appendix B	Has there been any discussion as to what amount, if any, can be placed in an escrow account under a SWM O&M
		Response: Each municipality has the option to make the ordinance more stringent and to add other provisions, such as an escrow account, as they deem appropriate.
TS 6	Article II	The proposed draft does not appear to be descriptive enough with regard to agricultural activity compared to 25 Pa. Code Chapter 102.4. We are not certain that everyone will have access to and read 25 Pa. Code Chapter 102.4 carefully.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Municipalities have the option to make the ordinance provisions more stringent and to add clarifying language to the definition of Agricultural Activity in Article II - Definitions.
TS 7	Section 501	Section 501 of the Draft states "The municipality reserves the right to accept or reject ownership and operating responsibility..." We would reserve the words to reject or accept, since generally the Township of South Park does not accept a SWM facility.
		Response: The recommended change has been incorporated.
TS 8	Section 601	Under Section 601, it is imperative to include all costs and expenses in this Ordinance in Chapter A 141, "Fees", of the Code of the Township of South Park.
		Response: Each municipality must modify the model ordinance to incorporate other relevant ordinances from their municipality.
TS 9		This Draft is missing the standard legal miscellaneous sections at the conclusion of this ordinance.
		Response: Each municipality must modify the model ordinance with provisions applicable to their municipality.
		Township Officials:
TO 1	Section 702 & Appendix C	The ordinance heavily focuses on the release of stormwater emanating from residential downspouts onto lawn areas. South Park Township is concerned that this action is exacerbating sanitary sewer infiltration issues.
		Response: The language in Section 702 is from PADEP's 2016 Model Stormwater Management Ordinance, and states "wherever feasible." Appendix C is optional and is offered to assist small developments.
TO 2	Section 301.F	Article III - Stormwater Management Standards - Section 301. General Requirements - Item F. Clarification needs to be provided as to who is to notify adjacent property owners and does "adjacent" mean immediately adjacent or all those possibly affected.
		Response: The recommended change has been incorporated.
TO 3	Section 701.C	Article VII - Prohibitions - Section 701. Prohibited Discharges and Connections - Add new Item C - No. 9 to include swimming pools and hot tubs.
		Response: The recommended change has been incorporated.
TO 4	Section 701.C	Article VII - Prohibitions - Section 701. Prohibited Discharges and Connections - Item 7. It is the Township's opinion that It would be impossible for the Township to monitor whether or not residents are using cleaning agents when their vehicles with cleaning agents.
		Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance.
TO 5	Section 805	Article VIII - Enforcement & Penalties - Section 805. Penalties - The fees should be established by Allegheny County and would, therefore, be consistent to all.
		Response: After consideration of your comment, the decision was made that fees established by each municipality is appropriate for the Allegheny County SWM Plan.

Shannon, John

From: Pierce, Kay <Kay.Pierce@AlleghenyCounty.US>
Sent: Thursday, February 02, 2017 8:05 AM
To: Shannon, John
Cc: McLain, William D.
Subject: FW: State Actions if a Muniicpality doesn't adopt 167 ordinance

John,

Did you ever receive this comment from SPC? If not my apologies. I am going through e-mails and finding a few that may have slipped through the cracks, so to speak.

Kay

Kay Pierce, Manager
ACED - Planning Division
Chatham One, Suite 900
112 Washington Place
Pittsburgh, PA 15219
412-350-1030
www.alleghenyplaces.com

From: Erin M. Kepple [mailto:ekepple@spcregion.org]
Sent: Wednesday, January 04, 2017 2:38 PM
To: Pierce, Kay <Kay.Pierce@AlleghenyCounty.US>; McLain, William D. <William.McLain@AlleghenyCounty.US>
Cc: Fliss, Jeffrey <jfliss@pa.gov>; Abigail Stark <astark@spcregion.org>
Subject: FW: State Actions if a Muniicpality doesn't adopt 167 ordinance

Hi Kay and William,

It was great seeing and discussing things with you last week. As promised, I went back through things that I have stashed away in regards to ACT 167 Ordinance Adoption. Tim Bruno was the DEP watershed manager in the NW region of DEP that I spoke to you about that achieved almost 100% municipal adoption in the NW region of DEP.

The language below may be helpful to include in correspondence with the municipalities when you notify them of their obligations to adopt ordinances (if you choose to do so). I have cc'd Jeff Fliss on this message so he is in the loop on this suggestion.

I will continue to look for additional information that may be helpful for you as you move forward.

Erin

Erin Kepple- Adams
Water Resource Manager
Southwestern Pennsylvania Commission
Two Chatham Center – Suite 400
112 Washington Place
Pittsburgh, PA 15219
(412) 391-5590 x 374 (P)
(412) 391-9160 (F)

Please consider the environment before printing this email

From: Sarah Koenig
Sent: Friday, June 13, 2014 3:56 PM
To: Erin M. Kepple
Subject: State Actions if a Muniicpality doesn't adopt 167 ordinance

I mentioned this the other day but just came across is again, so I wanted to share. I'm sure the state isn't/wouldn't actually do this, but it's still in the law. Tim Bruno mentioned actually taking action against the ~10 municipalities that hadn't adopted in his region – this must've been his basis.

Section 12. Failure of municipalities to adopt implementing ordinances.
(a) If the Department finds that a municipality has failed to adopt or amend, and implement such ordinances and regulations as required by section 11, the Department shall provide written notice of violation to the municipality.
(b) Within 60 days of receipt of the notice of violation, the municipality shall report to the Department the action which it is taking to comply with the requirement or regulation.
(c) If within 180 days of receipt of the notice of violation, the municipality has failed to comply with such requirement or regulation, as determined by the department, the Department shall notify the State Treasurer to withhold payment of all funds payable to the municipality from the General Fund. Provided, that prior to any withholding of funds, the Department shall give both notice to the municipality of its intention to notify the State Treasurer to withhold payment of funds and the right to appeal the decision of the Department within the 180-day period following notification. The hearing shall be conducted before the Environmental Hearing Board in accordance with the provisions of the act of April 9, 1929 (P.L. 177, No. 175), known as "The Administrative Code of 1929," and Chapters 5 and 7 of Title 2 (Administrative Law and Procedure), of the Pennsylvania Consolidated Statutes. If an appeal is filed within the 180-day period, funds shall not be withheld from the municipality until the appeal is decided.
(d) Any person, other than a municipality, aggrieved by an action of the Department shall have the right within 30 days of receipt of notice of such action to appeal such action to the Environmental Hearing Board, pursuant to section 1921-A, act of April 9, 1929 (P.L. 177, No. 175), known as "The Administrative Code of 1929," and the provisions of Chapters 5 and 7 of Title 2 (Administrative Law and Procedure) of the Pennsylvania Consolidated Statutes.

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Plan Review Comments		
Project: Allegheny County Act 167 SWM Plan		
Subject: Review of Draft County-wide SWM Plan and Model Ordinance		
County Project Manager: William D. McLain, Allegheny County Economic Development		
Design Consultant: Michael Baker International, Inc.		
Reviewer(s): Erin Kepple-Adams, Water Resource Manager, Southwestern Pennsylvania Commission		
Date(s): January 2017 ; February 10, 2017		
Comment Number	Page or Sheet No.	Reviewer's Comment / Question
		Designer's Response
Comments with regard to the Plan		
1	Section 11 - Provisions for Plan Implementation, Review, and Update: Implementation of the Plan	The attached language from Section 12 of Act 167 regarding Failure of municipalities to adopt implementing ordinances, may be helpful to include in correspondence with the municipalities when you notify them of their obligations to adopt ordinances.
		Response: Your comments are appreciated.
Comments on the Model Ordinance		
		No formal comments were submitted.
		Response: NA

Mayor
James J. Fleckenstein

BOROUGH *of* VERSAILLES

5100 Walnut Street
McKeesport, PA 15132
PHONE: 412-751-3922 / FAX: 412-751-4430
E-mail: boversa@aol.com

Council President
Lisa Fleckenstein

Borough Solicitor
Krisha DiMascio

Council Vice President
Cynthia Richards

RECEIVED
16 NOV 23 PM 12: 49
ALLEGHENY COUNTY
DEPARTMENT OF
ECONOMIC DEVELOPMENT

November 18, 2016

Allegheny County Department of Economic Development
One Chatham Center
112 Washington Place, Suite 900
Pittsburgh, PA 15219

ATTN: Kay Pierce, Manager- Planning Division

Re: Allegheny County Stormwater Management Ordinance

Dear Ms. Pierce:

We have reviewed the Draft Allegheny County Stormwater Management Ordinance related to the ACT 167 Plan. The following are comments and/or issues associated with the Ordinance:

1. Section 110. Waivers.

    a. The waiver process should include a definition of hardship.
    b. The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level.

2. Section 301. General Requirements

    a. 301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.)

3. Section 302. Exemptions

    a. 302.A We recommend using 1 acre as the minimum earth disturbance.
    b. 302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District. Conservation District review/approval should not be required in the 5,000 to 1 acre range as indicated in our Memorandum of Understanding for the with the Conservation District. This reference should be removed.

4. Section 303. Volume Controls

    a. Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP

manual. Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface".

b. Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP.

5. Section 305. Riparian Buffers

   a. The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams.

6. Section 401. Plan Requirements

   a. 401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer.
   b. 401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement.

7. Section 402. Plan Submission

   a. We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits.

If you have any questions, please contact me.

Sincerely,

Lisa Fleckenstein

Lisa Fleckenstein
Council President

cc: Michael S. Glister, P.E., Borough Engineer, Gateway Engineers
William McLain, Allegheny County Economic Development
John Shannon, Michael Baker International, Inc.

Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Draft County-wide SWM Plan and Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
SWM Plan Consultant: Michael Baker International, Inc.
Reviewer(s): Lisa Fleckenstein, Council President, Borough of Versailles

Date(s): November 18, 2016; February 10, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE Response: NA
Comments on the Model Ordinance		
1a	Section 110. Waivers	The waiver process should include a definition of hardship. Response: The recommended change has been incorporated.
1b	Section 110. Waivers	The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Clarifying language has been added in response to your comment.
2a	Section 301. General Requirements	301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.) Response: The recommended change has been incorporated.
3a	Section 302. Exemptions	302.A We recommend using 1 acre as the minimum earth disturbance. Response: The recommended change has been incorporated.
3b	Section 302. Exemptions	302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District. Conservation District review/approval should not be required in the 5,000 to 1 acre range as indicated in our Memorandum of Understanding for the with the Conservation District. This reference should be removed. Response: The recommended change has been incorporated.
4a	Section 303. Volume Controls	Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual. Response: In response to your comment, the language has been clarified to say that CG-1 is only the method.
4a	Section 303. Volume Controls	Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface". Response: The recommended change has been incorporated.
4b	Section 303. Volume Controls	Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP. Response: The recommended change has been incorporated.
5a	Section 305. Riparian Buffers	The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams. Response: After consideration of your comment, the decision was made that the 35' Riparian Buffer is appropriate for the Allegheny County SWM Plan.
6a	Section 401. Plan Requirements	401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. The requirement has been revised to include the Designated Reviewer as signatory. A seal is not required, but the plans must be certified as meeting the requirements of the municipal ordinance.

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
6b	Section 401. Plan Requirements	401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement. Response: The recommended change has been incorporated in Section 401 and an alternative approach to infiltration has been provided in Section 303 in response to your comment.
7a	Section 402. Plan Submission	We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits. Response: The recommended change has been incorporated.

Borough of Whitehall
A HOME RULE COMMUNITY
FOUNDED 1948

November 17, 2016

Allegheny County Department of Economic Development
One Chatham Center
112 Washington Place, Suite 900
Pittsburgh, PA 15219

ATTN: Kay Pierce, Manager- Planning Division

Re: Allegheny County Stormwater Management Ordinance

Dear Ms. Pierce:

We have reviewed the Draft Allegheny County Stormwater Management Ordinance related to the ACT 167 Plan. The following are comments and/or issues associated with the Ordinance:

1. Section 110. Waivers.

    a. The waiver process should include a definition of hardship.
    b. The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level.

2. Section 301. General Requirements

    a. 301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.)

3. Section 302. Exemptions

    a. 302.A We recommend using 1 acre as the minimum earth disturbance.
    b. 302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District. Conservation District review/approval should not be required in the 5,000 to 1 acre range as indicated in our Memorandum of Understanding with the Conservation District. This reference should be removed.

4. Section 303. Volume Controls

a. Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual. Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface".
b. Section 303.3.b Percentage of disturbance "no less than 50% to 100% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions." We disagree with this range and recommend 20% as required by the DEP BMP manual. There was no study or basis to identify a minimum of 50% and therefore is an imposed reduction in the release rate for areas that were not studied. We would recommend further study of each watershed to increase this number beyond the 20% as required by the DEP.

5. Section 305. Riparian Buffers

a. The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams.

6. Section 401. Plan Requirements

a. 401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer.
b. 401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement.

7. Section 402. Plan Submission

a. We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits.

If you have any questions, please contact me.

Sincerely,

James Leventry
Borough Manager

Cc: Ruthann L. Omer, P.E., Borough Engineer, Gateway Engineers
Jennifer J. Slagle, P.E., Project Manager, Gateway Engineers
William McLain, Allegheny County Economic Development
John Shannon, Michael Baker International, Inc.

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Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Draft County-wide SWM Plan and Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
SWM Plan Consultant: Michael Baker International, Inc.
Reviewer(s): James Leventry, Borough Manager, Borough of Whitehall

Date(s): November 17, 2016; February 10, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE Response: NA
Comments on the Model Ordinance		
1a	Section 110. Waivers	The waiver process should include a definition of hardship. Response: The recommended change has been incorporated.
1b	Section 110. Waivers	The model ordinance indicates that waivers on disturbance of over 1 acre must be granted by the DEP or Allegheny County Conservation District. This process must be further defined. Typically a stormwater consistency letter is required by the municipality for review of the NPDES permit by the DEP and/or Allegheny County Conservation District. This item confuses the review process at the municipal level. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. Clarifying language has been added in response to your comment.
2a	Section 301. General Requirements	301.G.3 indicates "SWM Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable." This requirement is vague and should be clarified, unless the intention is to leave it up to the municipality at the time of adoption to state what is required to address this justification. (i.e. Calculations, cost analysis, or a simple statement as to why these methods were not feasible on the site.) Response: The recommended change has been incorporated.
3a	Section 302. Exemptions	302.A We recommend using 1 acre as the minimum earth disturbance. Response: The recommended change has been incorporated.
3b	Section 302. Exemptions	302.B.b Requires letters of adequacy from the Conservation District. Municipalities have a Memorandum of Understanding for erosion and sediment control plans with the Conservation District. Conservation District review/approval should not be required in the 5,000 to 1 acre range as indicated in our Memorandum of Understanding with the Conservation District. This reference should be removed. Response: The recommended change has been incorporated.
4a	Section 303. Volume Controls	Section 303.2 and 3. These sections are not part of CG-1 in the BMP Manual as stated in this section. The section should be revised to correctly reflect the requirements of the BMP manual. Response: In response to your comment, the language has been clarified to say that CG-1 is only the method.
4a	Section 303. Volume Controls	Additionally, "new impervious surface" can be clarified to state "net increase in impervious surface". Response: The recommended change has been incorporated.
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5a	Section 305. Riparian Buffers	The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development in this area. DEP has a process for development in this area. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. We recommend deferring this section to the DEP Chapter 102 requirements for disturbance along streams. Response: After consideration of your comment, the decision was made that the 35' Riparian Buffer is appropriate for the Allegheny County SWM Plan.
6a	Section 401. Plan Requirements	401.D requires a signature block on the plan for recording indicating that the municipal official seal the plans and certifies that the SWM plan meets all design standards of the ordinance. We recommend that the site preparer sign the plans under this clause and the municipal engineer will seal the plan as required for recording. We don't agree that the reviewer should have professional liability for the design of another engineer. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance. The requirement has been revised to include the Designated Reviewer as signatory. A seal is not required, but the plans must be certified as meeting the requirements of the municipal ordinance.

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
6b	Section 401. Plan Requirements	401.E.10 requires a justification if BMP's other than green infrastructure methods and LID practices are proposed to achieve the volume, rate and water quality controls. The justification should be further defined unless the intent is to allow the individual municipalities to clarify this requirement.
		Response: The recommended change has been incorporated in Section 401 and an alternative approach to infiltration has been provided in Section 303 in response to your comment.
7a	Section 402. Plan Submission	We disagree that all plans shall be submitted to Allegheny County Conservation District and Allegheny County Economic Development as stated in this section. This process should be discussed and clarified as to who is responsible for reviews and comments. This section should reference permits that are required from other agencies, i.e. NPDES, Joint Permits, General Permits.
		Response: The recommended change has been incorporated.

Michael Baker
INTERNATIONAL

Michael Baker International

APPENDIX F-2

Public Comments and Responses on the February 3, 2017 Revised Draft SWM PLAN and Model Ordinance

THE BOROUGH OF ETNA

437 BUTLER STREET
ETNA, PGH., PA 15223
MARY ELLEN RAMAGE, *Secretary/Manager*
PHONE: (412) 781-0569 FAX: (412) 782-5302
www.etnaborough.org

THOMAS RENGERS
Mayor

PETER F. RAMAGE
Chairman of Council

DEPARTMENT CO-CHAIRMEN
DAVID BECKI
Council Vice Chairman
Streets - Sewer
Zoning, Planning & Flood Plain Management

RONALD TRADER
Zoning, Planning & Flood Plain Management
Borough Property

WILLIAM O'DELL
Refuse & Engineering
Borough Property

KAREN TOMASZEWSKI
Police
Administrative & Finance

RUDY MILCIC, Jr.
Streets - Sewers, Fire

GREG PORTER
Refuse & Engineering
Fire

EDWARD V. BURKE, III
Storm Water Management
Police

DAVID FARMERIE
Administrative & Finance
Storm Water Managment

SUSAN BROWN
Treasurer

RONALD HECK
& ASSOCIATES
Borough Solicitors

February 24, 2017

Kay Pierce, Manager, Planning Division
County of Allegheny
One Chatham Center, Suite 900
112 Washington Place
Pittsburgh, PA 15219

ATTENTION: Will McLain

Dear Ms. Pierce:

I am writing on behalf of the Borough of Etna regarding the Allegheny County Draft Act 167 Stormwater Management Plan, and in particular, the Model Stormwater Management Ordinance.

As discussed at the meeting of February 15, 2017, the Borough of Etna has concerns that the Model Ordinance has elements that are not as strict as the North Hills C.O.G. Stormwater Ordinance. Our concern is that when communities are provided the opportunity to lessen standards for stormwater management based on a model provided by the County, they will choose to do so. While we understand that the North Hills C.O.G. is only representative of a smaller portion of the County, we feel that the watershed approach that we have taken should be the standard across our County. We recognize the difficulty of negotiating upstream and downstream interests, but this is a watershed/regional issue, and as the County has the ability to look at this issue from a broader perspective, we feel that the County should take the lead on this approach.

We appreciate the County's efforts to bring our communities up-to-date on this serious, regional issues. If you have any questions, please feel free to contact me at your convenience.

Sincerely yours,

Mary Ellen Ramage

Mary Ellen Ramage,
Secretary-Manager

Cc: Council, Borough of Etna
Mayor Rengers

Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Revised Draft County-wide SWM Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
SWM Plan Consultant: Michael Baker International, Inc.
Reviewer(s): Mary Ellen Ramage, Secretary Manager - Borough of Etna

Date(s): February 24, 2017; March 6, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE Response: NA
Comments on the Model Ordinance		
1		As discussed at the meeting of February 15, 2017, the Borough of Etna has concerns that the Model Ordinance has elements that are not as strict as the North Hills C.O.G. Stormwater Ordinance. Our concern is that when communities are provided the opportunity to lessen standards for storm water management based on a model provided by the County, they will choose to do so. While we understand that the North Hills C.O.G. is only representative of a smaller portion of the County, we feel that the watershed approach that we have taken should be the standard across our County. We recognize the difficulty of negotiating upstream and downstream interests, but this is a watershed/regional issue, and as the County has the ability to look at this issue from a broader perspective, we feel that the County should take the lead on this approach. Response: The recommended change has been incorporated into the Plan and Model Ordinance. The Plan has been revised to include: "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." Other wording has been added for other watersheds without an approved Act 167 Plan.

GATEWAY
On Call On Time On Target

GATEWAY ENGINEERS
100 MCMORRIS ROAD
PITTSBURGH, PA 15205-9401
412.921.4030 PHONE
855.634.9284 TOLL-FREE
412.921.9960 FAX
GatewayEngineers.com

February 24, 2017

Allegheny County Department of Economic Development
One Chatham Center
112 Washington Place, Suite 900
Pittsburgh, PA 15219

Attn: Kay Pierce, Manager- Planning Division

Re: Allegheny County Stormwater Management Ordinance

Dear Ms. Pierce:

On behalf of our municipal clients, we have reviewed the revised Draft Allegheny County Stormwater Management Ordinance, dated February 1, 2017, related to the ACT 167 Plan. The following are comments and/or issues associated with the Ordinance:

1. It is recommended that the Allegheny County Economic Development adopt a final model ordinance that is not more restrictive than the DEP regulations for impacts along streams and in floodways. The Act 167 Ordinance would then defer to the DEP for required permitting in environmentally sensitive areas.

2. All references to other publications reference the "latest" or "most current" documents such that municipalities do not have to update their ordinance with revisions to publications.

3. Section 110.C Waivers – The ACED should work with the agencies (DEP and ACCD) regarding review for waivers from the proposed minimum requirements. There was discussion at the WPAC meeting that the reviewing agencies have not determined if they will be involved in this process. Timeframe provided should allow them to properly review the requests without impacting the plan review process for the municipality. We believe this item may need more discussion prior to final model ordinance adoption.

4. Article II – Definitions

    a. The watercourse definition needs clarification. The definition indicates "A watercourse can be a man made bed and banks with permanent or intermittent flow." For example, would this include a ditch - i.e. from an outfall?

5. Section 301.F – The WPAC meeting discussion indicated that this section would be revised to indicate the "written notification of affected property owners" and remove the "consent" requirement. Additional consideration should be made to determine who will be required to be notified or if it will be up to the reviewer to determine the affected properties. This could be interpreted several different ways.

6. Section 305. Riparian Buffers

    a. The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. It is recommended to defer this section to the DEP Chapter 102 requirements for disturbance along streams.

    b. What streams will require riparian buffers?

    c. Please provide clarification of permitted activity in riparian buffers.

    d. Paragraph F of the model ordinance provides conditions for construction of trails in riparian buffer areas. Would paved trails be prohibited by the proposed model ordinance?

    e. What is the intent of the riparian buffer with respect to new and/or maintenance of existing sanitary sewer lines? The DEP's general permit process allows maintenance of existing lines as well as construction of new sanitary lines.

7. Section 403 Plan Review

    a. 401.B states that the "Municipal official or Designated Plan Reviewer on this date has reviewed and herby certifies that the SWM Site Plan meets all design standards and criteria of the Municipal Ordinance No. __."

    We recommend the following language be incorporated into this section:

        1. "...has reviewed and hereby certifies that the SWM Site plan meets all design standards and criteria of the Municipal Ordinance, except where waivers have been granted as noted on the plan. The review is based on a survey and plan prepared by others and assumes that all information is correct and valid as submitted."

If you have any questions, please contact me.

Sincerely,

Jennifer J. Slagle, P.E.
Project Manager

cc: Ruthann L. Omer, P.E., Borough Liaison, Gateway Engineers
Richard D. Minsterman, P.E., Gateway Engineers
William McLain, Allegheny County Economic Development
John Shannon, Michael Baker International, Inc.
Ann Scott, Crafton Borough Manager
Matthew Serakowski, Township of Upper St. Clair Manager
Debbie Stecko, Ingram Borough Secretary
Tricia Levander, Borough of Jefferson Hills Manager
Douglas Sample, Ross Township Manager
Mohammed Rayan, Municipality of Penn Hills Manager
Keith McGill, Municipality of Mt. Lebanon Manager
James Leventry, Whitehall Borough Manager
George Zboyovsky, Brentwood Borough Manager
Lori Collins, Bridgeville Borough Manager
Cathy Jones, Emsworth Borough Secretary
Donna Perry, Churchill Borough Manager
William Rohe, Sewickley Heights Borough Manager
Richard Hopkinson, Mt. Oliver Borough Manager
Matthew Sebastian, P.E., Shaler Township Engineer
John Palyo, White Oak Borough Manager
Christopher Lochner, Hampton Township Municipal Manager

Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Revised Draft County-wide SWM Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
SWM Plan Consultant: Michael Baker International, Inc.
Reviewer(s): Jennifer J. Slagle, P.E., Project Manager - Gateway Engineers

Date(s): February 24, 2017; March 6, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
		Comments with regard to the Plan
		NONE Response: NA
		Comments on the Model Ordinance
1		It is recommended that the Allegheny County Economic Development adopt a final model ordinance that is not more restrictive than the DEP regulations for impacts along streams and in floodways. The Act 167 Ordinance would then defer to the DEP for required permitting in environmentally sensitive areas. Response: After consideration of your comment, Allegheny County has decided that Section 305 of the ordinance regarding Riparian Buffers is appropriate in order to protect and improve water quality
2		All references to other publications reference the "latest" or "most current" documents such that municipalities do not have to update their ordinance with revisions to publications. Response: The recommended change has been incorporated.
3	Section 110.C Waivers	The ACED should work with the agencies (DEP and ACCD) regarding review for waivers from the proposed minimum requirements. There was discussion at the WPAC meeting that the reviewing agencies have not determined if they will be involved in this process. Timeframe provided should allow them to properly review the requests without impacting the plan review process for the municipality. We believe this item may need more discussion prior to final model ordinance adoption. Response: After consideration of your comment, Allegheny County has decided to proceed with the wording in the PADEP model ordinance.
4	Article II Definitions	The watercourse definition needs clarification. The definition indicates "A watercourse can be a man made bed and banks with permanent or intermittent flow." For example, would this include a ditch- i.e. from an outfall? Response: After consideration of your comment, Allegheny County has decided that the definition of stream or watercourse as "having a defined bed and banks" is consistent with the PADEP Chapter 105 definitions.
5	Section 301.F	The WPAC meeting discussion indicated that this section would be revised to indicate the "written notification of affected property owners" and remove the "consent" requirement. Additional consideration should be made to determine who will be required to be notified or if it will be up to the reviewer to determine the affected properties. This could be interpreted several different ways. Response: The recommended change has been incorporated.
6a	Section 305. Riparian Buffers	The Commonwealth regulates all stream and riparian buffer areas and requirements for disturbance and/or development. The proposed 35' riparian buffer easement is more restrictive than the DEP requirements. It is recommended to defer this section to the DEP Chapter 102 requirements for disturbance along streams. Response: After consideration of your comment, Allegheny County has decided that Section 305 of the ordinance regarding Riparian Buffers is appropriate in order to protect and improve water quality
6b	Section 305. Riparian Buffers	What streams will require riparian buffers? Response: As per Section 305.B: "... 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."
6c	Section 305. Riparian Buffers	Please provide clarification of permitted activity in riparian buffers. Response: The recommended change has been incorporated.
6d	Section 305. Riparian Buffers	Paragraph F of the model ordinance provides conditions for construction of trails in riparian buffer areas. Would paved trails be prohibited by the proposed model ordinance? Response: In response to your comment, Section 305.G.1 has been revised to provide clarification: "Trails shall be designed to be permeable and for non-motorized use only."

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
6e	Section 305. Riparian Buffers	What is the intent of the riparian buffer with respect to new and/or maintenance of existing sanitary sewer lines? The DEP's general permit process allows maintenance of existing lines as well as construction of new sanitary lines.
		Response: In response to your comment, Section 305.I has been revised to provide clarification as: "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."
7	Section 403. Plan Review	401.B states that the "Municipal official or Designated Plan Reviewer on this date has reviewed and herby certifies that the SWM Site Plan meets all design standards and criteria of the Municipal Ordinance No. _." We recommend the following language be incorporated into this section: "... has reviewed and hereby certifies that the SWM Site plan meets all design standards and criteria of the Municipal Ordinance, except where waivers have been granted as noted on the plan. The review is based on a survey and plan prepared by others and assumes that all information is correct and valid as submitted."
		Response: The recommended change has been incorporated.

GROUNDWORK / CIVIL
ENGINEERING + DESIGN

William McLain
Allegheny County Economic Development, Planning Division
Chatham One, Suite 900
112 Washington Place
Pittsburgh, PA 15219

February 24, 2017

Re: Review of Phase 2 of Allegheny County Wide Act 167 SWM Plan & Ordinance

Dear Mr. McLain:

We are pleased to provide this review of the above referenced ACT 167 SWM Plan.

As you are aware, I was the author of the last approved Act 167 Update completed in Allegheny County. That Update was for the Girty's Run, Pine Creek, Squaw Run and Pine Creek Watersheds. I am pleased to provide this review based upon our past experience in the preparation of Act 167 Plans and from the practical experience obtained as a SWM Plan designer and Municipal Engineer in Allegheny County.

In our experience the most valuable aspect of the Act 167 planning process is the development of the Act 167 Stormwater Management (SWM) Ordinance. Therefore, although we have provided some general comments on the Update Report, most of our comments will be focused on the Draft Model 167 SWM Ordinance as revised on February 1, 2017.

General Comments

1. The overall plan was well organized and presented in a professional manor. It is our opinion that this plan will be an important step to insure clear consistent County wide stormwater management standards.

2. It is recommended that after the plan has been approved that all reports, map products and modeling be made available in native format so that this work may be used by designers and in future planning efforts. In particular the Geographic Information System (GIS) information should be made available.

3. We recommend that the GIS products include the Hydric Soil Ground mapping for the entire County. These maps were created by the North Hills Council of Governments (NHCOG) for the North Hills Act 167 Update and are very convenient for designers. The impervious cover GIS

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412-297-6401

layers were also developed by 3 Rivers Wet Weather for the NHCOG project and it is our recommendation that these be updated and made available on the project website.

4. The North Hills Council of Governments may also be able to provide additional mapping of SWM facilities in the North Hills. As a consultant to the NHCOG we collected detailed information on 179 SWM basins in the Pine Creek, Girty's Run, Squaw Run and Deer Creek Watersheds.

5. The problem area lists were compiled based upon the responses received from each Municipality. In our opinion the list should be expanded based upon regional knowledge. For example, we note that no areas of flooding were listed in Millvale Borough or Ross Township. Based upon our experience working in the North Hills significant flooding exists along Girty's Run in those municipalities. First floor flooding has also occurred along Spruce Run (Union Avenue) in Ross Township.

6. The Cemetery Lane project in the Girty's Run watershed should be listed in the Regional Detention Basin Analysis. A summary of the Cemetery Lane Project is provided below.

    a. All property and rights of ways needed to construct the project were acquired and are owned by Ross Township.

    b. The project was designed, permitted, bid, awarded, notice to proceed issued and construction was started in 2012.

    c. The project received a State Safe Water Fund Grant of $1,000,000.00 and a CITF Grant of $200,000.00.

    d. The project was stopped after the work was started by the Ross Township Commissioners. The project was never completed and the remaining grant funding was forfeited.



Figure 1 - Cemetery Lane Regional Stormwater Project Location Map

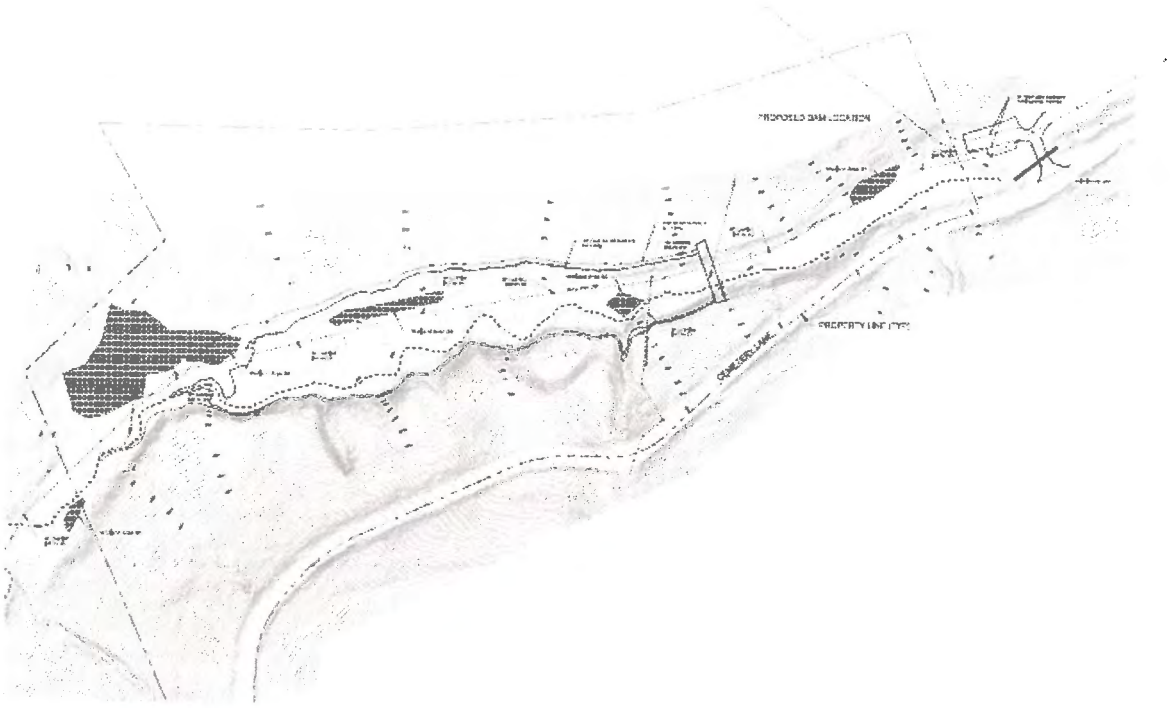


Figure 2 - Cemetery Lane Regional SWM Project General Area

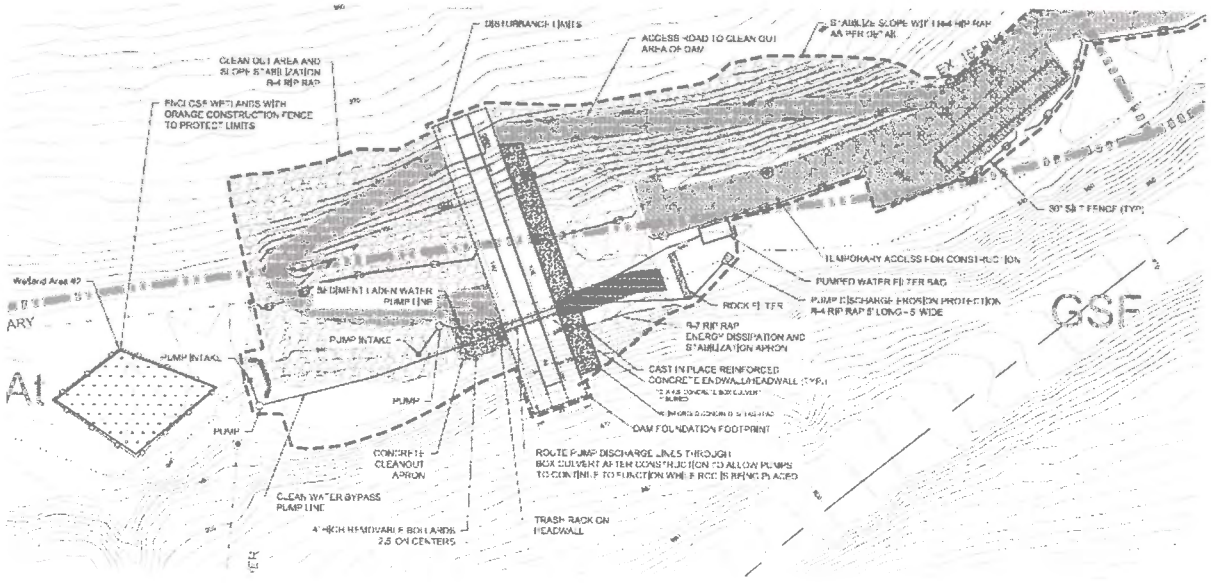


Figure 3 - Cemetery Lane Regional Stormwater Project Plan View

Ordinance Related Comments

7. The proposed County Act 167 Ordinance is far less protective than the current Ordinance effect in the North Hills. For example, currently all projects having a disturbance of between 400 SF and 5000 SF are to have a Small Project SWM Plans completed. The Small Project SWM plans are prepared using a simplified approach contained in the Small Project Manual attached to this letter. Projects having greater than 5000 SF of disturbance now require a comprehensive SWM Plan be prepared. We noted that the draft County Act 167 Ordinance Section 302 (provided below) will exempt areas of less than 10,890 SF (0.25 Acre) from the requirement that a SWM Plan be prepared. Although, it is understood that this is a minimum standard and municipalities may adopt more protective standards, it is my concern that this recommendation may result in many more exemptions than currently are allowed under current the SWM Ordinances currently in place. The County should review the exemption standards in all of the existing municipal SWM Ordinances before making a change that may result in easing the requirement for SWM Planning. Note that if this recommendation was adopted in the North Hills the minimum disturbance requiring SWM planning would increase from 400 SF (small project plan requirement) to 10,890 SF.

Section 302. Exemptions

A. Regulated activities that result in cumulative earth disturbances less than ~~(Enter no more than one acre. A more restrictive area may be entered.)~~ 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 ~~five thousand (5,000) square feet~~ one-quarter (0.25) acre and one (1) acre of earth disturbance must submit a SWM Site Plan to the Municipality which ~~need~~ shall consist ~~only~~ 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.

Figure 4 - Section 302 from County Draft Ordinance - 2-1-17

8. It is recommended that the Design Storms provided in Table 6.2 in the August Draft Act 167 Update Report be included in the Draft Act 167 SWM Ordinance (Ordinance). The current draft Ordinance references a PennDOT Manual, or allows use of NOAA Atlas 14, to determine Design Storm Total Precipitation. In our opinion it would be reasonable to state the Design Storm values directly in the Ordinance.

Table 6.2. Rainfall Values for Allegheny County

Design Storm (years)	24-hour Rainfall Depth (inches)
1	2.04
2	2.44
5	2.99
10	3.44
25	4.09
50	4.65
100	5.24

9. Section 4.4 of the Adopted Act 167 Ordinance that is currently used by the Municipalities in the North Hills has the following stream buffer requirements. It should be noted that the steam buffer requirements only apply to areas being newly developed and do not apply to existing disturbed sites that are redeveloped. It is recommended that the more detailed stream buffer requirements contained in the North Hills Ordinance be considered for the proposed County Wide Model Ordinance. The current Draft County Wide Ordinance mentions stream buffers in Section 305 but is not very detailed and does not base the requirements on watershed area, or allow for "stream buffer averaging".

4.4 Stream Buffer Requirements
2

Stream buffers shall be provided for new development sites as per the following requirements:

4.4.1 A minimum stream buffer width of 50 feet landward in each direction from the top of stream banks is required for all waterways having both a defined bank and a contributing watershed area of greater than 100 acres.

4.4.2 A minimum stream buffer width of 15 feet landward in each direction from the centerline of the waterway is required for smaller waterways having a contributing watershed area of less than 100 acres and greater than 10 acres.

4.4.3 The stream buffer area should be maintained in a natural state.

4.4.4 When wetland(s) extend beyond the edge of the required buffer width, the buffer shall be adjusted so that the buffer consists of the extent of the wetland plus a 25-foot zone extending beyond the wetland edge.

4.4.5 Stream buffer averaging may be applied to account for encroachments such as road crossings. The following criteria must be met in order to utilize buffer averaging on a development site:

1. *Buffer averaging is required for water quality buffers that have stream crossings.*

2. *An overall average buffer width of at least 50 feet must be achieved within the boundaries of the property to be developed. Stream buffer corridors on adjoining properties cannot be included with buffer averaging on a separate property, even if owned by the same property owner.*

3. *The average width must be calculated based upon the entire length of stream bank that is located within the boundaries of the property to be developed. When calculating the buffer length, the natural stream channel should be followed.*

4. *Stream buffer averaging shall be applied to each side of a stream independently. If the property being developed encompasses both sides of a stream, buffer averaging can be applied to both sides of the stream, but must be applied to both sides of the stream independently.*

5. *On each stream bank, the total width of the buffer shall not be less than 25 feet at any location, except at approved stream crossings. Those areas of the buffer having a minimum width of 25 feet (or less at approved stream crossings) can comprise no more than 50 percent of the buffer length.*

4.4.6 Stream buffer locations and widths should be illustrated on all subdivision plans with notations requiring that they be maintained in a natural state.

4.4.7 Stream buffers should be illustrated on all grading and erosion and sedimentation control plans. The defined stream buffer location should be properly recorded. The recording should provide a plan illustrating the stream buffer location, width and the requirement that it be maintained in a natural state.

10. The County Wide Ordinance should define how ordinance waiver requests are addressed. Waivers were address in Section 2.3.2. (Provided below) of the North Hills Ordinance and require that the County or it's designee review and grant waivers. This was done to protect the interest of downstream communities. It was contemplated that the County's Designee for the North Hills would be a Committee of the North Hills Council of Governments (NHCOG) and that in future the NHCOG would review and work on SWM compliance in a more regional manor. It is my understanding that this approach has not been implemented.

2.3.2 Waivers

A. The provisions of this Ordinance are the minimum standards for the protection of the public health, safety, property, and welfare.

B. If an Applicant demonstrates to the satisfaction of the County or its designee that any mandatory provision of this Ordinance is unreasonable or causes unique or undue unreasonableness or hardship as it applies to the proposed Project, or that an alternate design may result in a superior result within the context of Section 1.0, 4.1.1 and 4.1.2 of this Ordinance, the County or its designee upon obtaining the comments and recommendations of the Municipality and the Allegheny County Conservation District may grant a waiver or relief so that substantial justice may be done and the public interest is secured; provided that such waiver will not have the effect of nullifying the intent and purpose of this Ordinance.

11. Some of the detail we developed for the North Hills Small Project Manual (see attached) that should incorporated into the County Wide Model Ordinance Small Project Guidance.

12. We have attached the Model Act 167 Ordinance that was prepared for the North Hills. It is recommended that the County consider using some of the standards and approaches that are included in the approved North Hills Act 167 Ordinance (as amended). A point by point comparison of approved North Hills Ordinance and the draft County Ordinance should be prepared as a tool to improve the draft Ordinance.

Please contact the undersigned if we may be of further assistance.

Respectfully yours,

Art Gazdik, P.E., Principal
Groundwork Civil

Encl: North Hills Small Projects Manual
North Hills COG Model Ordinance

Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Phase 2 of Allegheny County Wide Act 167 SWM Plan & Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
SWM Plan Consultant: Michael Baker International, Inc.
Reviewer(s): Art Gazdik, P.E., Principal, Groundwork/Civil

Date(s): February 24, 2017; March 6, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE Response: NA
Comments on the Model Ordinance		
1	General Comments	The overall plan was well organized and presented in a professional manor. It is our opinion that this plan will be an important step to insure clear consistent County wide stormwater management standards. Response: Thank you.
2	General Comments	It is recommended that after the plan has been approved that all reports, map products and modeling be made available in native format so that this work may be used by designers and in future planning efforts. In particular the Geographic Information System (GIS) information should be made available. Response: It is planned to do as you suggest.
3	General Comments	We recommend that the GIS products include the Hydric Soil Ground mapping for the entire County. These maps were created by the North Hills Council of Governments (NHCOG) for the North Hills Act 167 Update and are very convenient for designers. The impervious cover GIS layers were also developed by 3 Rivers Wet Weather for the NHCOG project and it is our recommendation that these be updated and made available on the project website. Response: The GIS files to be provided to the County upon project completion will include all GIS layers and databases used in development of the Plan.
4	General Comments	The North Hills Council of Governments may also be able to provide additional mapping of SWM facilities in the North Hills. As a consultant to the NHCOG we collected detailed information on 179 SWM basins in the Pine Creek, Girty's Run, Squaw Run and Deer Creek Watersheds. Response: Your comments are appreciated. Information on SWM facilities was requested from all 130 municipalities in November 2015.
5	General Comments	The problem area lists were compiled based upon the responses received from each Municipality. In our opinion the list should be expanded based upon regional knowledge. For example, we note that no areas of flooding were listed in Millvale Borough or Ross Township. Based upon our experience working in the North Hills significant flooding exists along Girty's Run in those municipalities. First floor flooding has also occurred along Spruce Run (Union Avenue) in Ross Township. Response: Your comments are appreciated. Information on local and regional facilities was requested from all 130 municipalities in 2012.
6	General Comments	The Cemetery Lane project in the Girty's Run watershed should be listed in the Regional Detention Basin Analysis. A summary of the Cemetery Lane Project is provided below (detail not reproduced here). Response: Your comments are appreciated. Information on SWM facilities was requested from all 130 municipalities in November 2015.

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
7	Ordinance Related Comments	The proposed County Act 167 Ordinance is far less protective than the current Ordinance effect in the North Hills. For example, currently all projects having a disturbance of between 400 SF and 5000 SF are to have a Small Project SWM Plans completed. The Small Project SWM plans are prepared using a simplified approach contained in the Small Project Manual attached to this letter. Projects having greater than 5000 SF of disturbance now require a comprehensive SWM Plan be prepared. We noted that the draft County Act 167 Ordinance Section 302 (provided below) will exempt areas of less than 10,890 SF (0.25 Acre) from the requirement that a SWM Plan be prepared. Although, it is understood that this is a minimum standard and municipalities may adopt more protective standards, it is my concern that this recommendation may result in many more exemptions than currently are allowed under current the SWM Ordinances currently in place. The County should review the exemption standards in all of the existing municipal SWM Ordinances before making a change that may result in easing the requirement for SWM Planning. Note that if this recommendation was adopted in the North Hills the minimum disturbance requiring SWM planning would increase from 400 SF (small project plan requirement) to 10,890 SF. (detail not reproduced here) Response: The recommended change has been incorporated into the Plan and Model Ordinance. The Plan has been revised to include: "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." Other wording has been added for other watersheds without an approved Act 167 Plan.
8	Ordinance Related Comments	It is recommended that the Design Storms provided in Table 6.2 in the August Draft Act 167 Update Report be included in the Draft Act 167 SWM Ordinance (Ordinance). The current draft Ordinance references a PennDOT Manual, or allows use of NOAA Atlas 14, to determine Design Storm Total Precipitation. In our opinion it would be reasonable to state the Design Storm values directly in the Ordinance. (detail not reproduced here) Response: Your comments are appreciated, however, we also got comments concerned about climate change and future revisions to standards, therefore the County has decided not to include specific values but to refer to the latest versions of the reference publications.
9	Ordinance Related Comments	Section 4.4 of the Adopted Act 167 Ordinance that is currently used by the Municipalities in the North Hills has the following stream buffer requirements. It should be noted that the steam buffer requirements only apply to areas being newly developed and do not apply to existing disturbed sites that are redeveloped. It is recommended that the more detailed stream buffer requirements contained in the North Hills Ordinance be considered for the proposed County Wide Model Ordinance. The current Draft County Wide Ordinance mentions stream buffers in Section 305 but is not very detailed and does not base the requirements on watershed area, or allow for "stream buffer averaging". (detail not reproduced here) Response: Your comments are appreciated and some of the suggested provisions have been incorporated into Section 305.
10	Ordinance Related Comments	The County Wide Ordinance should define how ordinance waiver requests are addressed. Waivers were address in Section 2.3.2. (Provided below) of the North Hills Ordinance and require that the County or it's designee review and grant waivers. This was done to protect the interest of downstream communities. It was contemplated that the County's Designee for the North Hills would be a Committee of the North Hills Council of Governments (NHCOG) and that in future the NHCOG would review and work on SWM compliance in a more regional manor. It is my understanding that this approach has not been implemented. (detail not reproduced here) Response: The recommended change to define how ordinance waivers are implemented has been incorporated.
11	Ordinance Related Comments	Some of the detail we developed for the North Hills Small Project Manual (see attached) that should incorporated into the County Wide Model Ordinance Small Project Guidance. Response: Your comments are appreciated. Appendix C to the Model Ordinance is considered adequate for most situations in conjunction with the PADEP Stormwater BMP Manual. Municipalities can always supplement their ordinances with additional information.
12	Ordinance Related Comments	We have attached the Model Act 167 Ordinance that was prepared for the North Hills. It is recommended that the County consider using some of the standards and approaches that are included in the approved North Hills Act 167 Ordinance (as amended). A point by point comparison of approved North Hills Ordinance and the draft County Ordinance should be prepared as a tool to improve the draft Ordinance. Response: Your comments are appreciated. The PADEP has updated its Model SWM Ordinance and the Allegheny County Model Ordinance is based on that 2022 Model SWM Ordinance version.

PGH2O Pittsburgh Water & Sewer Authority

February 24, 2017

William McLain
Allegheny County Economic Development
Chatham One
112 Washington Place, Suite 900
Pittsburgh, PA 15219

Dear Mr. McLain:

This letter offers comments regarding Allegheny County's REVISED Draft Stormwater Management Ordinance prepared for the Act 167 Plan process, following the WPAC meeting on February 15, 2017. Please note that these comments have not been reviewed by PWSA leadership.

General comments:

Thank you for your careful attention to improving the original draft.

Article I – General Provisions

Section 110. C. "No waiver or modification of any regulated stormwater activity involving earth disturbance greater than or equal to one (1) acre may be granted by the Municipality unless that action is approved in advance by the Department of Environmental Protection (DEP) or the Allegheny County Conservation District (ACCD). If a response from the DEP or ACCD is not received within _____ days, the waiver or modification shall be deemed acceptable. Prior DEP or ACCD approval of the particular waiver or modification will constitute approval for use of the particular waiver or modification for similar circumstances or conditions."

-Clarify the process for waivers, including how the municipality should determine which agency should review the waiver.

Article II – Definitions

-Consider adding a definition of "Designated Plan Reviewer." This term is not defined until Section 403 A but is referenced several times before that (301 G 3, 303 A and B, 401 C 10, etc.).

Article III – General Requirements

Section 301 F. "Stormwater flows onto adjacent or downstream property shall not be created, increased, decreased, relocated, or otherwise altered without written notification to, and consent by, the affected property owner(s) included as part of the

SWM Plan submission to the Municipality. Such stormwater flows shall be subject to the requirements of this Ordinance."

-Clarify the process for notification and/or protection of property owners who may be affected by the change in stormwater flow due to a regulated activity, or leave this up to the municipality. It is important to develop a process that protects upstream or downstream property owners from dramatic changes in flow without unreasonably hindering development.

Section 302 C.

-In reference to Appendix C, please see our comments below regarding concerns with the content of Appendix C.

Section 303. Volume Controls

Section 303. A. 2.

-Clarify that "detained for 72 hours" means that the facility is designed for a 72 hour dewatering time, not that all detained water is released at the 72nd hour. Note that 72 hours is generally considered the maximum allowable stormwater detention time.

Section 303. B. 2.

-See comment for 303. A. 2.

Section 303. C. "Developers are encouraged to design stormwater management impoundments for a 72-hour dewatering time in areas served by combined sewer systems."

-It is not clear how this statement differs from what has been added to 303. A. 2. and 303. B. 2. regarding detaining runoff for 72 hours. Note that 72 hours is generally considered the maximum allowable stormwater detention time.

Section 304. Rate Controls

Section 304. A.

-Clarify: "Peak flows should be computed using the methods included in Chapter 8 of the PADEP Stormwater Management BMP Manual." Consider referring to the chapter title - "Stormwater Calculations and Methodology" – such that this section can be referenced in future versions of the PADEP Stormwater Management BMP Manual.

Section 305. Riparian Buffers

Section 305. F. "Stormwater drainage pipes shall be permitted within the Riparian Buffer Easement, but they shall cross the Easement in the shortest practical

distance. ~~Other stormwater management facilities are not permitted within the Riparian Buffer Easement.~~"

Some practices designed to improve water quality are most effective when located adjacent to a waterway.

Section 401. B. We agree with the comment made at the WPAC meeting that it is appropriate to include the phrase "based on the information submitted" to protect plan reviewers with professional licenses.

Section 402. Plan Submission

-Clarify when the submission to the ACCD is applicable.

Section 404. Modification of Plans.

-The structure of this sentence may lead to confusion. Clarify what the Designated Plan Reviewer has to determine, or add commas: "A modification to a submitted SWM Site Plan that involves a change in SWM BMPs or techniques, or that involves the relocation or redesign of SWM BMPs, or that is necessary because soil or other conditions are not as stated on the SWM Site Plan, as determined by the Designated Plan Reviewer, shall require a resubmission of the modified SWM Site Plan in accordance with this Article."

Appendix C.

1. It seems that the guidance in Appendix C uses a 2" design storm standard, while the Model Ordinance says "at least the first inch" of runoff should be controlled.

2. The "Design Considerations" for a Dry Well should list the need for an overflow or surcharge pipe. It is shown in the diagram but not listed.

3. The calculations for sizing a rain garden are unclear – we're having a hard time following the assumptions, and the units are not consistent. The dry well calculations are also confusing. In general, we think referring to the calculations and diagrams in the PA BMP Manual should be sufficient. The Homeowner's Guide To Stormwater could also be a useful reference. This can be found on PWSA's website at http://apps.pittsburghpa.gov/pwsa/Homeowner_Stormwater_Guide.pdf.

Please contact me if you have any questions or comments.

Sincerely,

Katherine Camp

Katherine Camp
Green Infrastructure Program Manager

CC: Robert A. Weimar

George Robinson

Ruari Egan

Joshua Lippert, City Planning

Tom Batroney, Mott MacDonald

Shannon, John

From: Ruari Egan <REgan@pgh2o.com>
Sent: Thursday, March 02, 2017 8:25 AM
To: Shannon, John
Cc: Katherine Camp
Subject: Additional PWSA Comments - Model Ordinance

John,

Please accept these comments as an addendum to the letter submitted on February 24, 2017.

Section 110.B
It might be helpful to clarify in this section that waivers are typically due to some sort of pre-existing condition. For example former contaminated brownfield site or undermining. "...because of unique physical circumstances or *pre-existing site* conditions peculiar..." - "Hardship must be due to such unique physical circumstances or *pre-existing site* conditions and not the circumstances...."

Section 303.A.2 and 3030.B.2
As previously suggested, 1.5 inches is consistent with many other cities and PWSA's modelling.

Section 401.C.9
List what is specifically required in a sufficient O&M Plan. For example, expected frequency of maintenance, record keeping of maintenance activities and logs (photographs, site conditions, remediation activities, etc.), submission of maintenance activities and logs to the Municipality every **x** number of year(s).
For reference, here is an example (from SWM Plan requirements in Pittsburgh's zoning code):
a. Type of maintenance activities
b. Probable frequencies of maintenance activities
c. Personnel and equipment requirements
d. Estimated annual maintenance costs
e. Method of financing continuing operation and maintenance

If possible, it would be helpful to include an example O&M form in the Appendix that may be adopted by the Municipality.

Section 407.C
Consider adding: "If inspections performed by the Municipality reveal deficiencies from the submitted and approved SWM Site Plan, the Municipality may request corrective actions. Any corrective action shall be at the cost of the stormwater facility owner."

Thank you for taking the time to consider and incorporate our comments throughout this process.

Best,
Katherine Camp and Ruari Egan

PGH2O Pittsburgh Water & Sewer Authority

Ruari Egan
Green Infrastructure Engineer II
412.255.8800 ext. 2503
regan@pgh2o.com

Pittsburgh Water and Sewer Authority
1200 Penn Ave, Pittsburgh, PA 15222

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Plan Review Comments

Project: Allegheny County Act 167 SWM Plan
Subject: Review of Revised Draft County-wide SWM Model Ordinance
County Project Manager: William D. McLain, Allegheny County Economic Development
SWM Plan Consultant: Michael Baker International, Inc.
Reviewer(s): Katherine Camp, Green Infrastructure Program Manager, Pittsburgh Water and Sewer Authority
Ruari Egan, Green Infrastructure Engineer II, Pittsburgh Water and Sewer Authority

Date(s): February 24, 2017 and March 2, 2017; March 6, 2017

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE Response: NA
Comments on the Model Ordinance		
1	Section 110. B	It might be helpful to clarify in this section that waivers are typically due to some sort of pre-existing condition. For example former contaminated brownfield site or undermining. "…because of unique physical circumstances or pre-existing site conditions peculiar…" - "Hardship must be due to such unique physical circumstances or pre-existing site conditions and not the circumstances…." Response: The recommended change has been incorporated.
2	Section 110. C	Clarify the process for waivers, including how the municipality should determine which agency should review the waiver. Response: The recommended change has been incorporated.
2a	Section 110. C	Consider adding a definition of "Designated Plan Reviewer." This term is not defined until Section 403 A but is referenced several times before that (301 G 3, 303 A and B, 401 C 10, etc.). Response: The recommended change has been incorporated.
3	Section 301. F	Clarify the process for notification and/or protection of property owners who may be affected by the change in stormwater flow due to a regulated activity, or leave this up to the municipality. It is important to develop a process that protects upstream or downstream property owners from dramatic changes in flow without unreasonably hindering development. Response: The recommended change has been incorporated.
4	Section 302. C	In reference to Appendix C, please see our comments below regarding concerns with the content of Appendix C Response: Your comment regarding the relationship between Section 302.C and Appendix C is not clear.
5	Section 303. A.2	Clarify that "detained for 72 hours" means that the facility is designed for a 72 hour dewatering time, not that all detained water is released at the 72nd hour. Note that 72 hours is generally considered the maximum allowable stormwater detention time. Response: The recommended change has been incorporated.
5a	Section 303. A.2 and 3030. B.2	As previously suggested, 1.5 inches is consistent with many other cities and PWSA's modelling. After further consideration of your comment regarding 1.5" and comments from other commenters, the decision was retained that 1" is appropriate for the Allegheny County SWM Plan; municipalities have the option of making their ordinance more stringent and using 1.5".
6	Section 303. B.2	See comment for 303. A. 2. Response: The recommended change has been incorporated.
7	Section 303. C	"Developers are encouraged to design stormwater management impoundments for a 72-hour dewatering time in areas served by combined sewer systems." -It is not clear how this statement differs from what has been added to 303. A. 2. and 303. B. 2. regarding detaining runoff for 72 hours. Note that 72 hours is generally considered the maximum allowable stormwater detention time. Response: The recommended change has been incorporated.

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
8	Section 304. A	Clarify: "Peak flows should be computed using the methods included in Chapter 8 of the PADEP Stormwater Management BMP Manual." Consider referring to the chapter title - "Stormwater Calculations and Methodology" - such that this section can be referenced in future versions of the PADEP Stormwater Management BMP Manual.
		Response: The recommended change has been incorporated.
9	Section 305. F Riparian Buffers	"Stormwater drainage pipes shall be permitted within the Riparian Buffer Easement, but they shall cross the Easement in the shortest practical distance. Some practices designed to improve water quality are most effective when located adjacent to a waterway.
		Response: After consideration of your comment, Allegheny County has decided to keep the general language as it was. If value can be shown on an individual basis, the municipality could approve a waiver in the Riparian Buffer, as long as the intent of the Buffer is preserved.
10	Section 401. B	We agree with the comment made at the WPAC meeting that it is appropriate to include the phrase "based on the information submitted" to protect plan reviewers with professional licenses.
		Response: The recommended change has been incorporated.
11	Section 401. C.9	List what is specifically required in a sufficient O&M Plan. For example, expected frequency of maintenance, record keeping of maintenance activities and logs (photographs, site conditions, remediation activities, etc.), submission of maintenance activities and logs to the Municipality every x number of year(s). For reference, here is an example (from SWM Plan requirements in Pittsburgh's zoning code): a. Type of maintenance activities b. Probable frequencies of maintenance activities c. Personnel and equipment requirements d. Estimated annual maintenance costs e. Method of financing continuing operation and maintenance
		Response: The recommended change has been incorporated.
11a	Section 401. C.9	If possible, it would be helpful to include an example O&M form in the Appendix that may be adopted by the Municipality.
		Response: After consideration of your comment, it appears that O&M requirements will vary by municipality.
12	Section 402. Plan Submission	Clarify when the submission to the ACCD is applicable.
		Response: The recommended change has been incorporated.
13	Section 404. Modification of Plans	The structure of this sentence may lead to confusion. Clarify what the Designated Plan Reviewer has to determine, or add commas: "A modification to a submitted SWM Site Plan that involves a change in SWM BMPs or techniques, or that involves the relocation or redesign of SWM BMPs, or that is necessary because soil or other conditions are not as stated on the SWM Site Plan, as determined by the Designated Plan Reviewer, shall require a resubmission of the modified SWM Site Plan in accordance with this Article."
		Response: The recommended change has been incorporated.
14	Section 407. C	Consider adding: "If inspections performed by the Municipality reveal deficiencies from the submitted and approved SWM Site Plan, the Municipality may request corrective actions. Any corrective action shall be at the cost of the stormwater facility owner."
		Response: The recommended change has been incorporated.
15	Appendix C 1.	It seems that the guidance in Appendix C uses a 2" design storm standard, while the Model Ordinance says "at least the first inch" of runoff should be controlled.
		Response: Appendix C is for small projects for which Section 303.B would be applicable. 303.B requires: "Stormwater facilities shall capture at least the first two (2) inches of runoff from the net increase in impervious surfaces."

Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
15a	Appendix C 2.	The "Design Considerations" for a Dry Well should list the need for an overflow or surcharge pipe. It is shown in the diagram but not listed.
		Response: The recommended change has been incorporated.
15b	Appendix C 3.	The calculations for sizing a rain garden are unclear- we're having a hard time following the assumptions, and the units are not consistent. The dry well calculations are also confusing. In general, we think referring to the calculations and diagrams in the PA BMP Manual should be sufficient. The Homeowner's Guide To Stormwater could also be a useful reference. This can be found on PWSA's website at http://apps. pittsburghpa.gov/pwsa/Homeowner _ Stormwater _Guide. pdf.
		Response: The recommended change has been incorporated, the calculations have been clarified.

Township of South Park
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Phone (412) 831-7000 Fax: (412) 831-0425 www.southparktwp.com

Board of Supervisors:
David J. Bucheuricz
Walter C. Sackinsky
Edward T. Snee

Township Manager:
Karen J. Fosbaugh

March 1, 2017

John M. Shannon, P.E.
Michael Baker International
100 Airside Drive
Airside Business Park
Moon Township, PA 15108

Re: Comments to Revised Stormwater Management Ordinance

Dear Mr. Shannon:

Please be advised that the revised Stormwater Management Ordinance was distributed to the Township Solicitor and the Township Engineer for comment. A workshop session was held and included Municipal officials. The following points were raised:

1. **Section 301. General Requirements:**

Item F.: We are requesting that the word "impeded" be added to the first sentence, "....shall not be created, increased, decreased, relocated, impeded, or otherwise..."

2. **Section 302. Exemptions:**

Item B: Further clarification is required with regard to the one-quarter (.25) acre provision referred to in this particular section. Many people would be uncertain as to the one-quarter (.25) square footage parameters. It is suggested that a numerical square footage figure be inserted as well.

3. **Section 701. Prohibited Discharges and Connections:**

Item No. C – 7: We are again questioning the burden being placed upon Municipal officials to effectively monitor residential car washing activities when cleaning agents are utilized. This is extremely onerous to the municipality.

Item No. C – 9: We are again reiterating our request that hot tubs be added to this section immediately after swimming pools. Hot tub water has the potential to contain chlorine or salt and should be required to drain to a sanitary sewer.

Thank you again for providing our community with the opportunity to offer comment relative to the revised Ordinance. Do not hesitate to contact me should additional information or clarification be required.

Sincerely,

Karen F. Fosbaugh,
Township Manager

/kff

Enclosures

Cc: Board of Supervisors (w/enclosures)
Gary Wargo, Code Enforcement Officer
Bruce Beaver, Director of Public Works
Paul J. Gitnik, Esq., Township Solicitor
Rob Arnold, Township Engineer
Kay Pierce, Manager, Allegheny County Planning Division
Sue Means, Representative, Allegheny County Council

Plan Review Comments		
Project: Allegheny County Act 167 SWM Plan		
Subject: Review of Revised Draft County-wide SWM Model Ordinance		
County Project Manager: William D. McLain, Allegheny County Economic Development		
SWM Plan Consultant: Michael Baker International, Inc.		
Reviewer(s): Karen F. Fosbaugh, Manager, Township of South Park		
Date(s): March 1, 2017; March 6, 2017		
Comment Number	Page or Sheet No.	Reviewer's Comment / Question Designer's Response
Comments with regard to the Plan		
		NONE Response: NA
Comments on the Model Ordinance		
1	Section 301. General Requirements	Item F.: We are requesting that the word "impeded" be added to the first sentence, "....shall not be created, increased, decreased, relocated, impeded, or otherwise..." Response: The recommended change has been incorporated.
2	Section 302. Exemptions	Item B: Further clarification is required with regard to the one-quarter (.25) acre provision referred to in this particular section. Many people would be uncertain as to the one-quarter (.25) square footage parameters. It is suggested that a numerical square footage figure be inserted as well. Response: The recommended change has been incorporated
3a	Section 701. Prohibited Discharges & Connections	Item No. C - 7: We are again questioning the burden being placed upon Municipal officials to effectively monitor residential car washing activities when cleaning agents are utilized. This is extremely onerous to the municipality. Response: The language is from PADEP's 2016 Model Stormwater Management Ordinance.
3b	Section 701. Prohibited Discharges & Connections	Item No. C - 9: We are again reiterating our request that hot tubs be added to this section immediately after swimming pools. Hot tub water has the potential to contain chlorine or salt and should be required to drain to a sanitary sewer. Response: The recommended change has been incorporated.