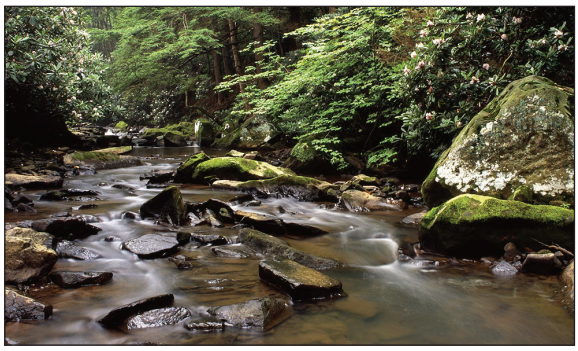
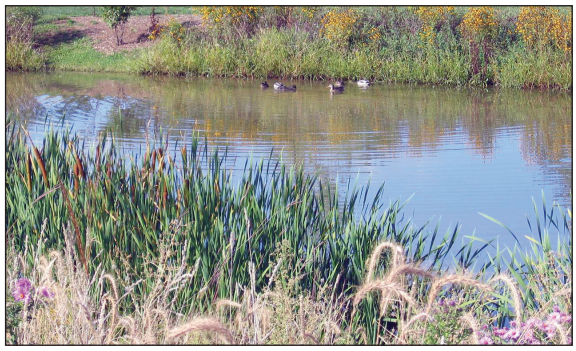
WESTMORELAND COUNTY'S

Integrated Water Resources Plan

Appendix



For more information contact:

J. Roy Houston Conservation Center
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Greensburg, PA 15601
724-837-5271

email: waterplan@wcdpa.com

www.westmorelandstormwater.org

2020

APPENDIX

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Meeting the Act 167 Plan

- Phase I Act 167 Plan cover sheet, table of contents, & introduction
- Phase 2 Act 167 Plan requirements & how they are met by the IWRP
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- Westmoreland County Resolution #R-26-2019 (letter of adoption)

Phase I Act 167 Plan Introduction

The entire plan may be found at

http://spcwater.org/pdf/acts/WestmorelandCounty/WestmorelandCounty_Phase1_Act167.pdf

Westmoreland County Department of Planning and Development

Greensburg, Pennsylvania

Act 167 Scope of Study for Westmoreland County Stormwater Management Plan

June 2010 ©

L.R. Kimball℠
ARCHITECTURE • ENGINEERING • COMMUNICATIONS TECHNOLOGY

PHASE 1 – SCOPE OF STUDY

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ACKNOWLEDGEMENTS

The preparation of this document was funded in part through a grant from the PA Department of Environmental Protection, Bureau of Watershed Management and the Westmoreland County Board of Commissioners

I. INTRODUCTION

Purpose

This report was prepared under and in accordance with a grant from the Pennsylvania Department of Environmental Protection (PADEP) for Westmoreland County to conduct a countywide Act 167 Stormwater Management Plan Phase 1. This report presents the results of the Phase 1 effort, which includes:

- A summary of County watershed characteristics
- An inventory of relevant problems
- A proposed Scope of Study, schedule and budget for completion of the Phase 2 Plan project.

Stormwater Runoff Problems and Solutions

The water that runs off the land into surface waters during and immediately following a rainfall event is referred to as stormwater. In a watershed undergoing land use conversion or urban expansion, the volume of stormwater resulting from a particular rainfall event increases because of the reduction in pervious land area (i.e., natural land cover being changed to pavement, concrete, buildings, or unmanaged cropland). These surface changes can also substantially degrade stormwater runoff water quality, increasing the pollutant load to the rivers and streams. The alteration of natural land cover and land contours to residential, commercial, industrial, and crop land uses results in decreased infiltration of rainfall, an increased rate and volume of runoff, and increased pollutant loadings to surface watercourses.

As the population of an area increases, land development is inevitable. As land disturbance and development increases, so does the problem of dealing with the increased quantity and decreased quality of stormwater runoff. Failure to properly manage this runoff results in greater flooding, stream channel erosion and siltation, degraded water quality, as well as reduced groundwater recharge. The cumulative effects of development in some areas of a watershed can result in flooding of natural watercourses with associated costly property damages, and can have a negative impact on wastewater treatment plant operations. These impacts can be minimized if the land use and development incorporates appropriate runoff and stormwater management systems and designs.

Individual land disturbance/development projects have historically been viewed as independent or discrete events or impacts, rather than as part of a larger watershed process. This has also been the case when the individual land development projects are scattered throughout a watershed (and in many different municipalities). However, it is now being observed that the cumulative nature of individual land surface changes dramatically affects runoff and flooding conditions. These cumulative effects of development and land disturbance in some areas have resulted in flooding of both small and large streams with the associated property damages and, in some cases, 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 approach or strategy is to be successful.

Pennsylvania Storm Water Management Act (Act 167)

Recognizing the need to address this serious and growing problem, the Pennsylvania General Assembly enacted Act 167 of 1978. The statement of legislative findings at the beginning of the Pennsylvania Storm Water Management Act (Act 167) sums up the critical interrelationship among land development, accelerated runoff, and floodplain management. Specifically, this statement of legislative findings points out that:

1. Inadequate management of accelerated stormwater runoff resulting from development throughout a watershed increases flood flows and velocity, 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 stormwater, undermines floodplain management and floodplain control efforts in downstream communities, reduces groundwater recharge, and threatens public health and safety.
2. 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 their environment.

The policy and purpose of Act 167 is to:

1. Encourage planning and management of storm water runoff in each watershed that is consistent with sound water and land use practices.
2. Authorize a comprehensive program of storm water management designated to preserve and restore the flood carrying capacity of Commonwealth streams; to preserve to the maximum extent practicable natural storm water runoff regimes and natural course, current and cross section of water of the Commonwealth; and to protect and conserve ground waters and groundwater recharge areas.
3. Encourage local administration and management of storm water 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.

Until the enactment of Act 167, stormwater management had been oriented primarily towards addressing the increase in peak runoff rates discharging from individual land development sites to protect property immediately downstream. Management of stormwater throughout the state paid minimal attention to the effects on locations further downstream (frequently because they were located in another municipality) or to designing stormwater controls within the context of the entire watershed. Stormwater management has also typically been regulated at the municipal level, with little or no design consistency (concerning the types or degree of storm runoff control to be practiced) between adjoining municipalities in the same watershed.

Act 167 changed this approach by instituting a comprehensive program of watershed stormwater management planning. The Act requires Pennsylvania counties to prepare and adopt stormwater management plans for each designated watershed within the County; and recent changes in PADEP Act 167 policy now provide for Act 167 planning efforts on a countywide basis. Perhaps most significantly, Act 167 plans are to be prepared in consultation with municipalities located in the County, working through a Watershed Plan Advisory Committee (WPAC). The plans are to provide technical standards and criteria throughout the County's watersheds for the management of stormwater runoff from new land development sites. The Act 167 Plan must now also address retrofits of existing sites to improve existing water quality impairments and existing sources of flooding problems.

The types and degree of controls that are prescribed in the stormwater management plan must be based on the development pattern and hydrologic characteristics of each individual watershed. The final product of the Act 167 watershed planning process is to be a comprehensive and practical implementation plan, developed with a firm sensitivity to the overall needs (financial, legal, political, technical, etc.) of the municipalities in Westmoreland County.

Act 167 Planning for Westmoreland County

Based on the above history and information, the countywide watershed planning process for Westmoreland County must be designed with the individual watershed characteristics in mind, as well as the resources (technical, political, and economic) of the County. This Phase 1 - Scope of Study presents the concept and approach that has been developed to meet these requirements, as well as the specific requirements of Act 167 for this countywide watershed stormwater management project.

The goal of Westmoreland County's Act 167 planning process is to provide a countywide comprehensive program for the planning and management of stormwater. With coordination from the sixty-five (65) municipalities in Westmoreland County, the resulting stormwater management ordinance will address stormwater related problems in critical areas throughout the County. Furthermore, all County municipalities must adopt the resulting stormwater management ordinance, or amend and implement ordinances and regulations as necessary to regulate development in a manner consistent with the proposed Plan and the provisions of Act 167. The stormwater management controls addressed in the stormwater management ordinance will collectively have a beneficial impact on the waters of Westmoreland County and those "problem" areas that presently remain unmanaged.

Westmoreland County has received Phase 1 Scope of Study funding from PADEP. The Phase 2 efforts will generate the final stormwater management plan and model ordinance.

Plan Benefits

1. Consistency in Stormwater Management Planning, Regulation, and Implementation

   The purpose and benefit of the study and implementation plan is to provide all of the municipalities in the County with an accurate and consistent implementation strategy and procedures for comprehensive stormwater management. Current stormwater management regulations, strategies, and enforcement criteria vary widely among the municipalities. Given the nature of storm runoff and its impacts, as described earlier in this document, a critical objective of sound stormwater management planning is to provide for consistency of implementation requirements throughout the watershed. Therefore, the primary objective of the technical study and planning process is to develop a technical and institutional support document to encourage and/or support the consistency of regulations for implementation of effective stormwater management based on watershed-wide consideration.

2. Integrated Stormwater Management Plan

   Water resources are one integrated resource, connected through the hydrologic cycle. Stormwater runoff is a major component of this cycle. Surface water and groundwater are interconnected. The Westmoreland County Stormwater Management Plan will not only address water quantity or peak flows, but will also take a more holistic approach to watershed management by also evaluating the interaction between surface water and groundwater, where and how water quality concerns should be addressed, and how stormwater management (or lack thereof) affects stream bank erosion. The results will be a Plan to preserve and enhance Westmoreland County's water resources though proper stormwater management.

3. Usable Technical Information in GIS Format

   The technical and institutional watershed planning approach recommended by the PADEP also provides the municipalities within this watershed with a considerable amount of usable technical information, such as a detailed watershed runoff simulation model, that can be used for numerous other associated purposes by participating municipalities. Consequently, the municipalities and the County will receive beneficial products that can be used for other planning and engineering purposes. For example, land use updates and environmental data management are functions that are necessary for effective planning in a watershed. The technical component of the plan, primarily the water resources geodatabase created for the watershed, will provide the County and municipalities with a tool to perform a range of environmental assessments, such as future water quality impact studies after the plan is completed.

4. Technical Information for Future Hydrologic and Hydraulic Analysis and Regulatory Activities

   In addition, technical support information, provided as a part of watershed modeling efforts, can be useful in the analysis, design and regulatory permitting process for floodplain management and bridge replacement efforts. Further, the stream encroachment permit process, which involves the need to supply detailed

stream flow data as a part of the application process, can be developed more efficiently and cost-effectively using the calibrated watershed model.

The benefits of the watershed planning process are extensive, even beyond the important functions of developing comprehensive stormwater management strategies and ordinance provisions.

The plan will investigate and provide solutions to correct existing problems. Specifically, the plan will identify and summarize problem areas; provide much of the hydrology that will be required in the design of proposed solutions; provide potential conceptual solutions to correct these problems; and will specify possible funding streams for project implementation.

Stormwater Management Planning Approach

In order to implement countywide comprehensive planning and management of stormwater runoff, it was necessary to take a close look at all major watersheds within Westmoreland County during Phase 1. Since the goals of the Act itself depend on municipal coordination and participation to provide for the planning and management of stormwater throughout their respective municipality, it was necessary to get "buy-in", endorsement, and involvement from each municipality early in the planning process.

In order to initiate municipal level involvement in the overall development of the plan, a Watershed Plan Advisory Committee (WPAC) was formed and consists of the Westmoreland County Department of Planning and Development, municipalities, the Westmoreland County Conservation District, and other interested agencies or organizations. Two WPAC meetings were held during Phase 1 to introduce the planning process, to distribute map-based Stormwater Management Planning Surveys, and to review the Phase 1 Scope of Study document.

The development process for the stormwater management plan is as follows:

1. Phase 1 - Scope of Study - Establishing procedures used to prepare the Plan. These procedures are determined by an overall survey of:
    - Specific watershed characteristics and hydrologic conditions.
    - Stormwater related problems and significant obstructions.
    - Alternative measures for control.
    - Goals, objectives, solution strategies, and estimated costs for the Phase 2 Plan.
2. Phase 2 - The Plan - The technical assessment and development of the model ordinance that includes:
    - Watershed modeling and planning.
    - Development of technical standards and criteria for stormwater management.
    - Conceptual solutions to identify problem areas.

- Identification of administrative procedures for implementation of the plan.
- Adoption of Plan by Westmoreland County.
- Approval of Plan by PADEP.
- Adoption of stormwater management ordinances by all municipalities.
- Municipal implementation and enforcement of stormwater management ordinances.

Previous County Stormwater Management Planning and Related Planning Efforts

In addition, the following relevant documents have been prepared and will provide a valuable source of information for the development of the Plan:

1. Westmoreland County Comprehensive Plan, Westmoreland County Department of Planning and Development, January 2005

2. Westmoreland County Subdivision and Land Development Ordinance of the County of Westmoreland, Westmoreland County Department of Planning and Development, 2002

3. Sewickley Creek Watershed Conservation Plan, August 2003

4. Tubmill Creek Watershed Protection and Restoration Project, 1991

5. Westmoreland County Natural Heritage Inventory, September 1998

6. Kiski Conemaugh Basin Greenway Feasibility Study, 1999

7. Turtle Creek Watershed Act 167 Stormwater Management Plan, 1991

8. Macroinvertebrate Study, Loyalhanna Watershed Association, 2004-2005

9. Loyalhanna Watershed Assessment and Restoration Plan, Loyalhanna Watershed Association, 2006

Westmoreland County Integrated Water Resources Plan

Phase 2 Act 167 Plan requirements & how they are met by the IWRP

Westmoreland County Integrate Water Resources Plan

MEETING THE ACT 167 PLAN

Required contents of Watershed Stormwater Plans under Sections 5(b) and 5(c) of Act 167
Elements under Section 5(b)

(1) A survey of existing runoff characteristics in small as well as large storms, including the impact of soils, slopes, vegetation and existing development; is addressed in the following sections:
Chapter 2 Overview of Westmoreland County, esp natural features, climate, land use
Chapter 3 Westmoreland County Water Resources, esp. precipitation, water resources
Chapter 4 Impacts, esp. stormwater management
Chapter 5 Issues and Challenges, esp. priority watershed modeling reports for individual watershed areas of interest

(2) A survey of existing significant obstructions and their capacities; is addressed in the following sections:
Chapter 4 Impacts, esp. stormwater management
Chapter 5 Issues and Challenges, esp. watershed modeling of individual watershed areas of interest

(3) An assessment of projected and alternative land development patterns in the watershed, and the potential impact of runoff quantity, velocity, and quality; is addressed in the following sections:
Chapter 2 Overview of Westmoreland County, esp. county comprehensive plan
Chapter 5 Issues and Challenges, esp. watershed modeling of individual watershed areas of interest
Chapter 6 Westmoreland County's Action Plan, esp. county comprehensive plan

(4) An analysis of present and projected development in flood hazard areas, and its sensitivity to damages from flooding or increased runoff; is addressed in the following sections:
Chapter 3 Westmoreland County Water Resources, esp. floodplains
Chapter 4 Impacts, esp. stormwater management, flood hazard areas
Chapter 5 Issues and Challenges, esp. watershed modeling of individual watershed areas of interest
Chapter 6 Westmoreland County's Action Plan, esp. performance districts

(5) A survey of existing drainage problems and solutions; is addressed in the following sections:
Chapter 3 Westmoreland County Water Resources, esp. water resources
Chapter 4 Impacts, esp. stormwater management, impairments

Chapter 5 Issues and Challenges, esp. watershed modeling individual watershed areas of interest, conceptual projects and costs
Chapter 6 Westmoreland County's Action Plan, esp. local initiatives

(6) A review of existing and proposed stormwater collection systems and their impacts; is addressed in the following sections:
Chapter 3 Westmoreland County Water Resources, esp. water resources,
Chapter 4 Impacts, esp. stormwater management
Chapter 5 Issues and Challenges, esp. watershed modeling, conceptual projects and costs

(7) An assessment of alternative runoff control techniques and their efficiency in the particular watershed; is addressed in the following sections:
Chapter 5 Issues and Challenges, esp. watershed modeling, conceptual projects and costs

(8) An identification of existing and proposed federal, state and local flood control projects located in the watershed and their design capacities; is addressed in the following sections:
Chapter 3 Westmoreland County Water Resources, esp. water resources
Chapter 4 Impacts, esp. stormwater management
Chapter 5 Issues and Challenges, esp. watershed modeling, conceptual projects and costs

(9) **A designation of those areas to be served by stormwater collection 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;** is addressed in the following sections:
Chapter 5 Issues and Challenges, esp. watershed modeling, conceptual projects and costs
Chapter 6 Westmoreland County's Action Plan, esp. local initiatives

(10) An identification of floodplains within the watershed; is addressed in the following sections:
Chapter 3 Westmoreland County Water Resources, esp. floodplains
Chapter 4 Impacts, esp. stormwater management

(11) Criteria and standards for the control of stormwater runoff from existing and new development which are necessary to minimize dangers to property and life and carry out the purposes of this act; is addressed in the following sections:
Chapter 5 Issues and Challenges, esp. watershed modeling, conceptual projects and costs
Chapter 6 Westmoreland County's Action Plan, esp. stormwater management ordinance, performance districts

(12) Priorities for implementation of action within each plan; is addressed in the following sections:
Chapter 6 Westmoreland County's Action Plan, esp. decision-making flowchart, stormwater management ordinance, performance districts, recommendations for implementation

(13) Provisions for periodically reviewing, revising and updating the plan; is addressed in the following sections:
Chapter 2 Overview of Westmoreland County, esp. county comprehensive plan
Chapter 6 Westmoreland County's Action Plan, esp. recommendations for implementation

Elements under 5(c)

(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; is addressed in the following sections:
Chapter 6 Westmoreland County's Action Plan, esp. model stormwater ordinance, decision making flowchart

(2) Consider and be consistent with other existing municipal, county, regional, and state environmental and land use plans; is addressed in the following sections:
Chapter 6 Westmoreland County's Action Plan, esp. local initiatives, model stormwater ordinance, decision making flowchart, recommendations for implementation

PA DEP Act 167 Plan approval
2-4-2020

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Southwest Regional Office

February 4, 2020

Mr. Greg Phillips
Westmoreland County Conservation District
218 Donohoe Road
Greensburg, PA 15601

RE: Approval of the Act 167 Westmoreland County Stormwater Management Plan and associated Model Stormwater Ordinance

Dear Mr. Phillips:

The Department has reviewed your January 2020 submission of the final draft of the Phase II Act 167 Westmoreland County Stormwater Management Plan (Plan) and associated Model Stormwater Ordinance (Model Ordinance) and have found it to be consistent with the purpose and policy of the Act 167: Stormwater Management Act.

The Department hereby approves the Plan and the Model Ordinance.

Thank you for all your efforts in developing the Plan and Model Ordinance. We hope that the residents of Westmoreland County all benefit from your labor.

Sincerely,

Stuart Demanski
Water Quality Specialist Supervisor
Waterways and Wetlands Program

cc: D. Drake
C. Kriley

Westmoreland County

(letter of adoption)

Resolution #R-26-2019

RESOLUTION #R-26 -2019

A RESOLUTION OF THE COUNTY OF WESTMORELAND APPROVING THE WESTMORELAND COUNTY INTEGRATED WATER RESOURCES PLAN / ACT 167 PLAN (SHORT TITLE: STORMWATER MANAGEMENT PLAN) PURSUANT TO 1978, OCT. 4, P.L. 864, NO. 167, KNOWN AS THE STORMWATER MANAGEMENT ACT, 32 P.S. SECT. 680.1 *et.seq.* ("ACT 167").

WHEREAS, Section 680.5 of Act 167 requires each county in the Commonwealth to prepare and adopt a stormwater management plan for each watershed located in the county; and

WHEREAS, by Resolution #R-46-2015, the Westmoreland County Board of Commissioners authorized the Westmoreland Conservation District to undertake the process of creating a Stormwater Management Plan ("Stormwater Management Plan") for Westmoreland County, acting in cooperation with the Westmoreland County Department of Planning and Development; and

WHEREAS, Section 680.6 of Act 167 requires each county in the Commonwealth to establish a Watershed Plan Advisory Committee which is "responsible for advising the county throughout the planning process, evaluating policy and project alternatives, coordinating the watershed stormwater plans with other municipal plans and programs, and reviewing the plan prior to adoption;" and

WHEREAS, the watershed plan advisory committee ("the County WPAC") was composed of over 300 members representing not only Westmoreland County government but also representatives from all sixty-five units of local government within the County, as well as representatives from Federal and Commonwealth regulatory agencies, adjacent counties, watershed associations, and other interested parties; and

WHEREAS, the County WPAC held meetings over the course of three years on the developments of the Stormwater Management Plan; and

WHEREAS, during this period of time, the members of the County WPAC were kept apprised of the progress on the proposed Stormwater Management Plan and were provided with opportunities to review, comment on, and discuss the proposed Stormwater Management Plan as well as the proposed model Stormwater Management Ordinance to be used by local units of government within the County to implement the proposed Stormwater Management Plan; and

WHEREAS, as required by Section 680.8 (a) of Act 167, the County held a duly advertised public hearing to receive comments on the proposed Stormwater Management Plan on May 3, 2019 and following revisions to the Stormwater Management Plan on July 22, 2019; and

WHEREAS, Section 680.8 (b) of Act 167 requires that a Stormwater Management Plan must be adopted by a resolution carried by an affirmative vote of at least a majority of the members of the county governing body with the action being recorded on the adopted Stormwater Management Plan; and

WHEREAS, the Westmoreland County Board of Commissioners find that a comprehensive program of stormwater management which includes reasonable regulation of development and activities that may cause accelerated runoff is fundamental to the public health, safety, and welfare and protection of the citizens of the County, their resources, and the environment; and

WHEREAS, the Westmoreland County Board of Commissioners find that the proposed Stormwater Management Plan is consistent with the County's goals of preserving and restoring the flood-carrying capacity of streams; preserving to maximum extent practicable the natural storm water regimes and natural course, current, and cross-sections of the waters of the Commonwealth; and protecting and conserving ground waters and ground water recharge areas.

NOW, THEREFORE, BE IT RESOLVED, by the Board of Commissioners of Westmoreland County as follows:

SECTION 1. *Incorporation of the Preamble.*

The provisions set forth in the preamble to this Resolution are incorporated by reference in their entirety herein.

SECTION 2. *Adoption of Stormwater Management Plan for Westmoreland County.*

The Westmoreland County Commissioners hereby adopt the following four (4) documents, including all volumes containing figures, appendices, maps, charts, textual matters, and materials; along with related materials contained in the websites www.westmorelandstormwater.org; www.paiwrp.com ; and www.wcdpa.com pertaining to the Stormwater Management Plan, which are incorporated by reference in their entirety as the County Stormwater Management Plan of 2019:

1) Westmoreland County Act 167 Plan Phase 1 Report, June 2010;
2) Westmoreland County Integrated Water Resources Plan, Act 167 Phase 2 Report, 2019;
3) Westmoreland County Integrated Water Resources Plan, Act 167 Phase 2 Report, Appendix A, B, C, D, E, F, G, H, and I, 2019;
4) Westmoreland County Integrated Water Resources Plan, Act 167 Phase 2, Model Stormwater Management Ordinance, 2019.

The Chief Clerk shall keep a copy of the aforementioned documents with the original Resolution.

SECTION 3. **Submission of the County Stormwater Management Plan to the Commonwealth.**

The Westmoreland Conservation District are duly authorized to forward a copy of the County Stormwater Management Plan to the Pennsylvania Department of Environmental Protection for approval as required by Section 680.9 of Act 167.

SECTION 4. **Cooperative Actions.**

The Board of Commissioners are further authorized to take such additional actions necessary, including the execution of any documents, to carry out the purposes of this Resolution.

SECTION 5. **Severability.**

If any provision of this Resolution shall be determined to be unlawful, invalid, void, or unenforceable, then that provision shall be considered severable from the remaining provisions of this Resolution which shall be in full force and effect.

SECTION 6. **Repealer.**

Any Resolution or Ordinance or part thereof conflicting with the provisions of this Resolution is hereby repealed so far as the same affects this Resolution.

SECTION 7. **Effective Date.**

This Resolution shall take effect immediately.

RESOLVED AND ENACTED this 25th day of July, 2019, by the Board of Commissioners of the County of Westmoreland at a duly advertised public meeting with a quorum being present.

ATTEST:

Vera Spina, Chief Clerk

WESTMORELAND COUNTY
BOARD OF COMMISSIONERS

Gina Cerilli, Chairman

Ted Kopas, Vice Chairman

Charles W. Anderson, Secretary

APPENDIX B

Model Stormwater Management Ordinance

The entire document may also be found at

https://www.westmorelandstormwater.org

WESTMORELAND COUNTY
MODEL STORMWATER MANAGEMENT ORDINANCE
Implementing the Requirements of the Westmoreland County Stormwater Management / Integrated Water Resources Plan

The following Model Ordinance is based on the PADEP 2022 MODEL STORMWATER MANAGEMENT ORDINANCE (5/2016), and was created as part of the Westmoreland County Integrated Water Resources Plan 2020. Its creation was guided by the Watershed Planning Advisory Committee, the Westmoreland Conservation District, the Westmoreland County Department of Planning and Development; approved by the PA DEP February 4, 2020; and formally adopted by the Westmoreland County Commissioners by Resolution June 4, 2020.

The Pennsylvania Storm Water Management Act (Act 167 of 1978) requires municipalities to "adopt or amend, and shall 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 this act". **It is expected that by December 31, 2020, each of Westmoreland County's municipalities will adopt a stormwater management ordinance consistent with the principles and standards contained in this Model Stormwater Ordinance.**

Federal regulations at 40 CFR § 122.34 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). It is expected that MS4 municipalities will update existing ordinances to comply with the requirements of the MS4 program or, at a minimum, enact the DEP 2022 model ordinance by September 30, 2022.

DEP is directed under Act 167 to develop a model stormwater ordinance. DEP's intention in publishing the 2022 Model Stormwater Management Ordinance is that its use will satisfy both Act 167 requirements, and MS4 regulatory requirements.

Text highlighted in [gray] is an indicator where municipalities can tailor the ordinance to their communities, provided it is in compliance with all Commonwealth laws and regulations. Note – use of the Stream Restoration, Riparian Buffers and GI/LID requirements may be used toward meeting pollutant load reduction obligations of the NPDES [and MS4] permit if the permittee can demonstrate reductions from the optional practices. It is recommended that the **municipal consulting engineer** review the entire ordinance and make technical adjustments to tailor it to the needs of the municipality.

It is recommended that the **municipal solicitor** review the entire Ordinance, and especially Article VIII – Enforcement Procedures and Remedies, and make any revisions necessary to ensure enforcement is pursued commensurate with applicable municipal codes. Appendix B to the Model Stormwater Management Ordinance is a recommended format for a landowner Operation and Maintenance agreement.

STORMWATER MANAGEMENT ORDINANCE

ORDINANCE NO._____

MUNICIPALITY OF

_____

WESTMORELAND COUNTY. PENNSYLVANIA

Adopted at a Public Meeting Held On

_____, 2020

Westmoreland County

Model Stormwater Management Ordinance

Westmoreland County

Model Stormwater Management Ordinance

ARTICLE I General Provisions

§101. *Short Title*.

This Ordinance shall be known and may be cited as the "[Municipal] Stormwater Management Ordinance."

§102. *Findings*. The [Governing body] of the [Municipality] finds that:

A. Stormwater runoff from lands modified by human activities threatens public health and safety by causing decreased infiltration of rainwater and increased runoff flows and velocities, which overtax the carrying capacity of existing streams and storm sewers, causes property damage and risk to public safety, and greatly increases the cost to the public to manage stormwater.

B. Inadequate planning and management of accelerated stormwater runoff resulting from land development and redevelopment throughout a watershed can also harm surface water resources by changing the natural hydrologic patterns, accelerating stream flows (which increase scour and erosion of stream-beds and stream-banks thereby elevating sedimentation), destroying aquatic habitat and elevating aquatic pollutant concentrations and loadings such as sediments, nutrients, heavy metals and pathogens. Groundwater resources are also impacted through loss of recharge.

C. [Municipality] is located in the [watershed] Watershed(s) and as such will endeavor to cooperate with other municipalities located in the watershed(s) to address issues of stormwater management, water quality, pollution and flooding.

D. Non-stormwater discharges to municipal separate storm sewer systems can contribute to pollution of waters of the Commonwealth in the [Municipality].

E. Stormwater can be an important water resource by providing groundwater recharge for water supplies and base flow of streams, which also protects and maintains surface water quality.

F. Public education on the control of pollution of stormwater is an essential component in successfully managing stormwater.

G. A comprehensive program of stormwater management, including reasonable regulation of land development and redevelopment causing loss of natural infiltration, is fundamental to the public health, safety, welfare, and the protection of the people of the [Municipality] and all the people of the Commonwealth, their resources, and the environment.

H. The use of open space conservation, green infrastructure, low impact development (LID), and riparian buffers are intended to address the root cause of water quality impairment by using systems and practices which use or mimic natural processes to: 1) infiltrate and recharge, 2) evapotranspire, and/or 3) harvest and use precipitation near where it falls to earth. Green infrastructure practices, LID, and riparian buffers contribute to the restoration or maintenance of pre-development hydrology.

I. Stormwater structures are considered vital infrastructure and can pose a significant hazard. Outlets and waterways which carry stormwater shall be maintained free of obstructions to allow for non-restricted flow of stormwater to avoid impoundment of water.

J. Occupancy and modification of floodplains shall be avoided wherever there is a practicable alternative to reduce long and short term adverse impacts in order to reduce the risk of flood loss, minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.

K. Federal and State regulations require certain municipalities to implement a program of stormwater controls. These municipalities are required to obtain a permit for stormwater discharges from their municipal separate storm sewer systems (MS4) under the National Pollutant Discharge Elimination System (NPDES). [[Municipality] is subject to MS4 requirements]

L. The Westmoreland Conservation District (WCD) is a recognized regulatory agency with authority in the county and this municipality to regulate erosion and sediment controls and stormwater management related to land development activities. Because WCD's authority crosses municipal boundaries they are enabled to oversee environmental issues for the general benefit of all county residents.

M. The Westmoreland County Integrated Water Resources Plan (2018) addresses all water resources and provides a decision making tool for development and redevelopment with respect to those resources including stormwater and its management. Refer to www.paiwrp.com and www.westmorelandstormwater.org

§103. Purpose.

The purpose of this Ordinance is to promote health, safety, and welfare within the [Municipality] and its watersheds by minimizing the harms and maximizing the benefits described in this Section of this Ordinance, through provisions designed to:

A. Manage stormwater runoff impacts at their source by regulating activities that cause the problems, reduce runoff volumes and mimic natural hydrology.
B. Maintain existing flows and quality of streams and watercourses.
C. Prevent scour and erosion of streambanks and streambeds.
D. Utilize and preserve the existing natural drainage systems as much as possible.
E. Restore and preserve the natural and beneficial values served by streamside and waterbody floodplains.
F. Focus on infiltration of stormwater, to maintain groundwater recharge, to prevent degradation of surface and groundwater quality and to otherwise protect water resources.
G. Promote stormwater runoff prevention and emphasize infiltration and evapotranspiration through the protection and conservation of natural resource systems and the use of non-structural BMPs and other creative methods of improving water quality and managing stormwater runoff.
H. Promote the use of green infrastructure in development and redevelopment where it can also improve stormwater management within the broader watershed in which the project is located.
I. Meet legal water quality requirements under state law, including regulations at 25 Pa.Code, Chapter 93.4a, to protect and maintain "existing uses" and maintain the level of water quality to support those uses in all streams, and to protect and maintain water quality in "special protection" streams.

J. Provide review procedures and performance standards for stormwater planning and management.
K. Provide for proper operations and maintenance of all permanent stormwater management BMPs that are implemented in the [Municipality].
L. Provide a mechanism to identify controls necessary to meet the NPDES [and MS4] permit requirements, and to encourage infrastructure improvements that lead to separation of storm sewer systems from sanitary sewer systems.
M. [Assist in detecting and eliminating illicit stormwater discharges into the [Municipality]'s separate storm sewer system.]

§104. Statutory Authority

A. The [Municipality] is empowered to regulate land use activities that affect stormwater runoff by the authority of the Stormwater Management Act of October 4, 1978, P.L. 864 (Act 167), 32 P.S. Section 680.1, et seq., as amended, [and the Act of July 31, 1968, P.L. 805, No. 247, The Pennsylvania Municipalities Planning Code, as amended.]
B. The [Municipality] is also empowered to regulate land use activities that affect stormwater runoff by the authority of [other [municipal code] or empowerment] or [Act of July 31, 1968, P.L. 805, No. 247, The Pennsylvania Municipalities Planning Code, as amended]

§105. Applicability.

A. All regulated activities as defined by this ordinance are subject to regulation by this Ordinance.
B. This Ordinance applies to any land development or regulated earth disturbance activities within the [municipality], and all stormwater runoff entering into the municipality's separate or combined storm sewer system from lands within the boundaries of the municipality.
C. Earth disturbance activities and associated stormwater management controls are also regulated under existing State law and implementing regulations. This Ordinance shall operate in coordination with those parallel requirements; the requirements of this Ordinance shall be no less restrictive in meeting the purposes of this Ordinance than State law.

§106. Repealer

Any other ordinance provision(s) or regulation of the municipality inconsistent with any of the provisions of this Ordinance is hereby repealed to the extent of the inconsistency only.

§107. Severability

If any word, phrase, section, sentence, clause or part of this Ordinance is for any reason found to be unconstitutional, illegal or invalid, such unconstitutionality, invalidity or illegality by a court of competent jurisdiction, shall not affect or impair any of the remaining words, phrases, sections, sentences, clauses or parts of this Ordinance. It is hereby declared to be the intent of the [governing body] of the [municipality] that this Ordinance would have been adopted had such unconstitutional, illegal or invalid word, phrase, section, sentence, clause or part thereof not been included herein.

§108. Compatibility with Other Requirements.

A. Approvals issued and actions taken under this Ordinance do not relieve the applicant of the responsibility to secure required permits or approvals for activities regulated by any other code, law, regulation or ordinance. To the extent that this Ordinance imposes more rigorous or stringent requirements for stormwater management, the specific requirements contained in this Ordinance shall be followed.

B. Conflicting provisions in other municipality ordinances or regulations shall be construed to retain the requirements of this Ordinance addressing state water quality requirements.

§109. Erroneous Permit

Any permit or authorization issued or approved based on false, misleading or erroneous information provided by an applicant is void without the necessity of any proceedings for revocation. Any work undertaken or use established pursuant to such permit or other authorization is unlawful. No action may be taken by a board, agency or employee of the Municipality purporting to validate such a violation.

§110. Prohibitions

Shall be consistent with PAG-13 NPDES General Permit for stormwater discharges [from MS4 communities] and as listed here**.**

A. **Prohibited discharges**

1. No person in the [Municipality] shall introduce, permit or allow, or cause to introduce, permit or allow, stormwater discharges into the municipality separate storm sewer system which are not composed entirely of stormwater, except as permitted by this Ordinance, or
    a. as provided in paragraph 2. below, or
    b. discharges as authorized under a State or Federal permit.
2. Permissible discharges, based on a finding by the municipality that the discharge(s) do not significantly contribute to pollution to surface waters of the Commonwealth, are recommended to be discharged safely to a vegetated area or infiltration BMP, but can also be discharged to a storm sewer system, include but are not limited to:
    a. Discharges from firefighting activities.
    b. Potable water sources including dechlorinated water line and fire hydrant flushings.
    c. Non-contaminated irrigation drainage from agricultural practices.
    d. Routine external building washdown (which does not use detergents or other compounds).
    e. Non-contaminated Air conditioning condensate.
    f. Water from individual residential car, boat or other residential vehicle washing that does not use detergents or other compounds.
    g. Springs.
    h. Non-contaminated Water from basement or crawl space sump pumps.
    i. Non-contaminated water from foundation or from footing drains.
    j. Flows from riparian habitats and wetlands.
    k. Lawn watering.

l. Pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless all spill material has been removed) and where detergents are not used.
m. Splash pad (recreational spray patio with no standing water) discharges.
n. Non-contaminated groundwater.

3. In the event that the municipality determines that any of the discharges identified in paragraph 2. above significantly contributes to pollution of waters of the Commonwealth, or is so notified by DEP, the municipality will notify the landowner and/or the responsible person to cease the discharge.
4. Upon notice provided by the municipality under paragraph 3. above, the discharger will have a [reasonable time] as determined by the municipality, to cease the discharge consistent with the degree of pollution caused by the discharge.
5. Nothing in this Section shall affect, limit or alleviate a discharger's responsibilities under State or Federal law.

B. **Prohibited connections.**

The following sources, activities or connections are prohibited, except as provided in subsection A. 1. and 2. above:

1. Any drain or conveyance, whether on the surface or subsurface, which allows any non-storm water discharge including but not limited to, sewage, process wastewater and wash water, to enter the separate storm sewer system, and any connections to the storm drain system from indoor drains and sinks.
2. Any drain or conveyance connected from a commercial, industrial or other non-residential land use to the separate storm sewer system which has not been documented in plans, maps, or equivalent records, and approved by the [Municipality].
3. Drains carrying stormwater or groundwater shall not be connected to or discharge to any public or private sanitary sewer system or facility.

C. **Prohibited activities:**

1. A landowner may not alter the natural flow of surface water on his property by concentrating it in an artificial channel and discharging it upon lower land of his neighbor even though no more water is thereby collected than would naturally have flowed upon the neighbor's land in a diffused [shallow broad path or sheet flow] condition.
2. A landowner may not alter any BMPs, facilities or structures that were installed under the ordinance without written approval of the municipality.

D. **Roof Drains and Sump Pumps**

1. Roof drains and sump pumps shall discharge to infiltration or vegetative BMPs wherever feasible.

§111. Liability Disclaimer.

A. Neither the granting of any approval under the stormwater management provisions of this Ordinance, nor the compliance with the provisions of this Ordinance, or with any condition imposed by any public body of the [Municipality] or by a [Municipality] official, employee or consultant hereunder, shall relieve any person from any responsibility for damage to

person or property resulting therefrom, or as otherwise imposed by law, nor impose any liability upon the municipality for damages to persons or property.

B. The granting of a permit which includes any stormwater management does not constitute a representation, guarantee or warranty of any kind by the municipality or WCD, or by an official or employee thereof, of the practicability or safety of any structure, use or other plan proposed and shall create no liability upon or cause of action against such public body, official or employee for any damage that may result pursuant thereto.

ARTICLE II Definitions.

§201. Interpretations and word usage:

For the purposes of this Ordinance, the terms and words used herein shall be interpreted as follows:

A. Words used in the present tense include the future tense; the singular number includes the plural, and the plural number includes the singular; words of masculine gender include feminine gender; and words of feminine gender include masculine gender.
B. The word "includes" or "including" shall not limit the term to the specific example but is intended to extend its meaning to all other instances of like kind and character.
C. The words "shall" and "must" are mandatory; the words "may" and "should" are permissive.

§202. Definition of terms:

Act 167– the Stormwater Management Act, Act of October 4, 1978, P. L. 864, No. 167, as amended by the Act of May 24, 1984, No. 63, 32 P.S. §§680.1 *et seq*. The Municipality is empowered to regulate land use activities that affect runoff and surface and groundwater quality and quantity by the authority of the Act, the "Storm Water Management Act."

Accelerated erosion – the removal of the surface of the land through the combined action of human activities and the natural processes at a rate greater than would occur because of the natural process alone.

Agricultural Activity – Activities associated with agriculture such as agricultural cultivation, agricultural operation, and animal heavy use areas. This includes the work of producing crops and raising livestock including tillage, land clearing, plowing, disking, harrowing, planting, harvesting crops, or pasturing and raising of livestock and installation of Conservation Practices. Except for high tunnels that are exempt pursuant to the provisions of Act 15 of 2018, construction of new buildings or impervious areas is not considered an agricultural activity.

Applicant – a landowner, developer or other person who has filed an application for development or for approval to engage in any regulated earth disturbance activity at a project site in the [Municipality].

Animal Concentration (heavy use) Areas – A barnyard, feedlot, loafing area, exercise lots, or other similar animal confinement areas that will not maintain a growing crop, or where deposited manure nitrogen is in excess of crop needs, but excluding areas managed as pastures or other cropland, and pasture access ways, if they do not cause direct flow of nutrients to surface water or groundwater.

BMP (best management practice) – activities, facilities, designs, measures or procedures used to manage stormwater impacts from regulated development activities, to meet State water quality requirements, to promote groundwater recharge and to otherwise meet the purposes of this Ordinance. BMPs include, but are not limited to, infiltration, filter strips, low impact design, bioretention, wet ponds, permeable paving, grassed swales, forested buffers, sand filters and detention basins.

Channel – a perceptible natural or artificial waterway which periodically or continuously contains moving water or which forms a connecting link between two bodies of water. It has a definite bed and banks which confine the water.

Chapter 102 – Title 25 Pa Code Chapter 102 Erosion and Sedimentation Control.

Chapter 105 – Title 25 Pa Code Chapter 105 Dam Safety and Waterway Management.

Combined sewer system – A sewer system designed to serve as both sanitary sewer and storm sewer.

CSO, Combined sewer overflow – An intermittent flow or other untreated discharge from a municipal combined sewer system (including domestic, industrial and commercial wastewater and stormwater) which results from a flow in excess of the dry weather carrying capacity of the system.

Conservation District – the Westmoreland Conservation District (WCD), as defined in Section 3(c) of the Conservation District Law (3 P. S. § 851(c)) that has the authority under a delegation agreement executed with DEP to administer and enforce all or a portion of the regulations promulgated under 25 Pa. Code 102.

Conservation Plan – A plan written by an NRCS or SCS certified planner that identifies Conservation Practices and includes site specific BMPs for agricultural plowing or tilling activities and Animal Concentration Areas.

Conservation Practices – Practices installed on agricultural lands to improve farmland, soil and/or water quality which have been identified in a current Conservation Plan.

Conveyance –

(a) Any structure that carries a flow.
(b) The ability of a pipe, culvert, swale or similar facility to carry the peak flow from the design storm.

Culvert – a closed conduit for the free passage of surface drainage under a highway, railroad, canal or other embankment.

DEP – the Pennsylvania Department of Environmental Protection.

Demonstrated equivalency – A stormwater management project on an alternative site(s) within the same watershed as the proposed development that will provide equal or better achievement of the purpose of the Ordinance and will not substantially or permanently impair the appropriate use or development of adjacent property. Examples include streambank stabilization, creation or enhancement of riparian buffers, removal of existing impervious surfaces and establishment of 'green' easements, installation of stormwater management and water quality facilities, etc.

Design criteria –

(a) Engineering guidelines specifying construction details and materials.

(b) Objectives, results or limits which must be met by a facility, structure or process in performance of its intended functions.

Design storm – see "storm frequency."

Detention – the slowing, dampening or attenuating of runoff flows entering the natural drainage pattern or storm drainage system by temporarily holding water on a surface area in a detention basin or within the drainage system.

Detention basin – a pond, basin, reservoir or underground system constructed to impound or retard surface runoff temporarily.

Developer – a person that seeks to undertake or undertakes the activities associated with changes in land use or seeks to undertake or undertakes any regulated earth disturbance activities at a project site in the [Municipality]. The term "developer" includes, but is not limited to, the term subdivider, owner and builder, even though the person involved in successive stages of a project may change or vary.

Development – an "earth disturbance activity," as herein defined and any activity, construction, alteration, change in land use or practice that affects stormwater runoff characteristics. The term also includes redevelopment.

Development site – the specific tract of land where any development or earth disturbance activities in the [Municipality] are planned, conducted, undertaken or maintained.

Discharge – the flow or rate of flow from a canal, conduit, channel or other hydraulic structure.

Disturbed Area – A land area where an earth disturbance activity is occurring or has occurred.

Drainage – in general, the removal of surface water from a given area commonly applied to surface water and ground water.

Drainage area – any of the following activities:

(a) The area of a drainage basin or watershed, expressed in acres, square miles or other unit of area (also called "catchment area," "watershed," "river basin").

(b) The area served by a sewer system receiving storm and surface water, or by a watercourse.

Earth disturbance activity – a construction or other human activity which disturbs the surface of the land including, but not limited to, clearing and grubbing, grading, excavations, embankments, road maintenance, land development, building construction, oil and gas activities, well drilling, mineral extraction, and the moving, depositing, stockpiling, or storing of soil, rock or earth materials.

Encroachment – any structure or activity which in any manner changes, expands or diminishes, the course, current or cross-section of any watercourse, floodway or body of water.

Erosion – the process by which land, including channels, is worn away by water, wind, or chemical action.

Erosion control – the application of measures to reduce erosion of land surfaces.

Erosion and sediment control plan – a plan for a project site which identifies BMPs to minimize accelerated erosion and sedimentation of land.

Existing Condition – The dominant land cover during the 5-year period immediately preceding a proposed regulated activity.

FEMA – Federal Emergency Management Agency.

Floodplain – Any land area susceptible to inundation by water from any natural source or delineated by applicable FEMA maps and studies as being a special flood hazard area. Also includes areas that comprise Group 13 Soils, as listed in Appendix A of the Pennsylvania DEP Technical Manual for Sewage Enforcement Officers (as amended or replaced from time to time by DEP).

Floodway – The channel of the watercourse and those portions of the adjoining floodplains that are reasonably required to carry and discharge the 100-year flood. Unless otherwise specified, the boundary of the floodway is as indicated on maps and flood insurance studies provided by FEMA. In an area where no FEMA maps or studies have defined the boundary of the 100-year floodway, it is assumed--absent evidence to the contrary--that the floodway extends from the stream to 50 feet from the top of the bank of the stream.

Forest Management/Timber Operations – Planning and activities necessary for the management of forestland. These include conducting a timber inventory, preparation of forest management plans, silvi-cultural treatment, cutting budgets, logging road design and construction, timber harvesting, site preparation, and reforestation.

Green Infrastructure – Systems and practices that use or mimic natural processes to infiltrate, evapotranspire, or reuse stormwater on the site where it is generated.

Ground cover – materials and/or vegetation covering the ground surface.

Ground water – subsurface water occupying the saturation zone, from which wells and springs are fed.

Groundwater recharge – replenishment of existing natural underground water supplies.

High Tunnel – A structure which meets the following:

(1) Is used for the production, processing, keeping, storing, sale or shelter of an agricultural commodity as defined in section 2 of the act of December 19, 1974 (P.L.973, No.319), known as the Pennsylvania Farmland and Forestland Assessment Act of 1974, or for the storage of agricultural equipment and supplies.

(2) Is constructed consistent with all of the following:
    i. Has metal, wood or plastic frame
    ii. When covered, has plastic, woven textile or other flexible covering
    iii. Has a floor made of soil, crushed stone, matting, pavers or a floating concrete slab

Hot spots **-** Areas where land use or activities generate highly contaminated runoff, with concentrations of pollutants that are higher than those typically found in stormwater (e.g., vehicle salvage yards and recycling facilities, vehicle fueling stations, fleet storage areas, vehicle equipment and cleaning facilities, vehicle service and maintenance facilities, and certain industrial/commercial activity areas).

Hydrologic Soil Group (HSG) – Infiltration rates of soils vary widely and are affected by subsurface permeability as well as surface intake rates. Soils are classified into four HSGs (A, B, C, and D) according to their minimum infiltration rate, which is obtained for bare soil after prolonged wetting. The NRCS defines the four groups and provides a list of most of the soils in the United States and their group classification. The soils in the area of the development site may be identified from a soil survey report that can be obtained from local NRCS offices or conservation district offices. Soils become less permeable as the HSG varies from A to D (NRCS1,2).

Impervious surface **–** a surface that prevents the infiltration of water into the ground. Impervious surfaces (or areas) shall include, but not be limited to: roofs, additional indoor living spaces, patios, garages, storage sheds, and similar structures; and any new streets or sidewalks. Decks, parking areas, gravel areas, and driveway areas are counted as impervious areas if they directly prevent infiltration.

Infiltration **–** any of the following activities:
(a) The flow or movement of water through the interstices or pores of a soil or other porous medium.
(b) The absorption of liquid by the soil.

Land development **–** any of the following activities:
(a) The improvement of one lot or two or more contiguous lots, tracts or parcels of land for any purpose involving:
    i A group of two or more residential or nonresidential buildings, whether proposed initially or cumulatively, or a single nonresidential building on a lot or lots regardless of the number of occupants or tenure.
    ii The division or allocation of land or space, whether initially or cumulatively, between or among two or more existing or prospective occupants by means of, or for the purpose of streets, common areas, leaseholds, condominiums, building groups or other features.
(b) A subdivision of land.

Land disturbance **–** any activity involving the changing, grading, transportation, fill and any other activity which causes land to be exposed to the danger of erosion.

Low Impact Development (LID) – Site design approaches and small-scale stormwater management practices that promote the use of natural systems for infiltration, evapotranspiration, and reuse of rainwater. LID can be applied to new development, urban retrofits, and revitalization projects. LID utilizes design techniques that infiltrate, filter, evaporate, and store runoff close to its source. Rather than rely on costly large-scale conveyance and treatment systems, LID addresses stormwater through a variety of small, cost-effective landscape features located on-site.

Maintenance – the upkeep necessary for efficient operation of physical properties.

MS4 (municipal separate storm sewer system) - A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

(a) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law)...including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the Clean Water Act that discharges into waters of the United States.
(b) Designed or used for collecting or conveying stormwater;
(c) Which is not a combined sewer; and
(d) Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2."

Municipalities Planning Code – Act 247 of 1968, as amended by Act 170 of 1988, 53 P.S. §10101 *et seq.*

Municipality – [Municipality], Westmoreland County, Pennsylvania.

Native Vegetation – Plant species that have historically grown in Pennsylvania and are not invasive species, controlled plants or noxious weeds as defined by PA DCNR, or PA Department of Agriculture.

Natural stormwater runoff regime – a watershed where natural surface configurations, runoff characteristics and defined drainage conveyances have attained the conditions of equilibrium.

NPDES – National Pollutant Discharge Elimination System, the Federal government's system for issuance of permits under the Clean Water Act, which is delegated to DEP in Pennsylvania.

NRCS – Natural Resources Conservation Service (previously Soil Conservation Service).

Outfall – "point source" as described in 40 CFR §122.2 at the point where the [Municipality] storm sewer system discharges to surface waters of the Commonwealth. Also, the point, location or structure where drainage discharges from a sewer, drain or other conduit as well as the conduit leading to the ultimate discharge point.

Outlet control structure – the means of controlling the relationship between the head water elevation and the discharge, placed at the outlet or downstream end of any structure through which water may flow.

Overland flooding – flooding that occurs for a variety of reasons all stemming from excessive stormwater runoff including too much rain in too little time, added impervious development, change in land use, malfunction or clogging of existing stormwater systems.

Peak discharge – The maximum rate of stormwater runoff from a specific storm event.

Peak flow – maximum flow.

Pervious Area – Any material or surface that allows water to pass through at a rate equal to or greater than natural ground cover.

Pennsylvania DEP – Pennsylvania Department of Environmental Protection.

Performance standard – a standard which establishes an end result or outcome which is to be achieved but does not prescribe specific means for achieving it.

Person – an individual, partnership, public or private association or corporation, firm, trust, estate, municipality, governmental unit, public utility or any other legal entity whatsoever which is recognized by law as the subject of rights and duties. Whenever used in any section prescribing or imposing a penalty, the term "person" shall include the members of a partnership, the officers, members, servants and agents of an association, officers, agents and servants of a corporation, and the officers of a municipality or county, but shall exclude any department, board, bureau or agency of the Commonwealth.

Point source – any discernible, confined and discrete conveyance including, but not limited to, any pipe, ditch, channel, tunnel, or conduit from which stormwater is or may be discharged, as defined in State regulations at 25 Pa.Code §92.1.

[Pollutant Reduction Plan (PRP) – a plan required by the MS4 permit to calculate existing pollutants of concern and the minimum reduction in loading from stormwater discharges, and to select the best management practices to achieve the minimum reductions.]

Project site – the specific area of land where any development or regulated earth disturbance activities in the [Municipality] are planned, conducted, undertaken or maintained.

Qualified Professional – Any person licensed by the Pennsylvania Department of State or otherwise qualified under Pennsylvania law to perform the work required by this Ordinance.

Record drawings – Drawings showing the stormwater management system of a site as built, created after the completion of construction and intended for use as a permanent record of the stormwater management system.

Redevelopment – earth disturbance activities on land which has previously been disturbed or developed.

Regulated development activity – Any earth disturbance activities or any activities that involve the change of land cover, alteration or development of land in a manner that may affect stormwater runoff as listed in the Regulated Development Activity table. This includes earth disturbance on any portion of, part, or during any stage of, a larger common plan of development. With regard to road maintenance activities the term only includes activities involving [1 acre] or more or earth disturbance. Refer to the Regulated Development Activity Table in Article III of this ordinance.

Release Rate – The percentage of existing conditions peak rate of runoff from a site or subarea to which the proposed conditions peak rate of runoff must be reduced to protect downstream areas.

Release rate percentage – the watershed factor determined by comparing the maximum rate of runoff from a subbasin to the contributing rate of runoff to the watershed peak rate at specific points of interest.

Resource extraction – any activity that involves withdrawing materials from the natural environment.

Retention basin – a pond, basin, usually enclosed by artificial dikes, that is used to retard stormwater runoff by temporarily storing the runoff and releasing it at a predetermined rate.

Retention Volume/Removed Runoff – The volume of runoff that is captured and not released directly into the surface waters of this Commonwealth during or immediately after a storm event.

Return period – the average interval in years over which an event of a given magnitude can be expected to recur.

Riparian Buffer – A permanent area of native vegetation including herbaceous material, shrubs and/or trees located adjacent to streams, lakes, ponds and wetlands.

Road maintenance – earth disturbance activities within the existing road cross-section, such as grading and repairing existing unpaved road surfaces, cutting road banks, cleaning or clearing drainage ditches and other similar activities.

Runoff – that part of precipitation which flows over the land.

Runoff characteristics – the surface components of any watershed which affect the rate, amount and direction of stormwater runoff. These may include, but are not limited to, vegetation, soils, slopes and manmade landscape alterations.

SALDO – Subdivision and land development ordinance

Sediment – mineral or organic solid material that is being transported or has been moved from its site of origin by air, water or ice and has come to rest.

Sedimentation – the process by which mineral or organic matter is accumulated or deposited by moving water, wind or gravity.

Separate storm sewer system – a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels or storm drains) primarily used for collecting and conveying stormwater runoff. Refer to MS4.

Small project – Regulated development activities that, measured on a cumulative basis from 5 years prior to the application, create additional impervious areas of more than [1,000] square feet and less than [3,000] square feet or involve earth disturbance activity of an area less than [5,000] square feet and do not involve the alteration of stormwater facilities or water courses.

State water quality requirements – as defined under State regulations– protection of designated and existing uses (See 25 Pa.Code, Chapters 93 and 96)–including:

(a) Each stream segment in Pennsylvania has a "designated use," such as "cold water fishery" or "potable water supply," which are listed in 25 Pa.Code, Chapter 93. These uses must be protected and maintained, under State regulations.

(b) "Existing uses" are those attained as of November 1975, regardless whether they have been designated in 25 Pa.Code, Chapter 93. Regulated earth disturbance activities must be designed to protect and maintain existing uses and maintain the level of water quality necessary to protect those uses in all streams, and to protect and maintain water quality in special protection streams.

(c) Water quality involves the chemical, biological and physical characteristics of surface water bodies. After regulated earth disturbance activities are complete, these characteristics can be impacted by addition of pollutants such as sediment, and changes in habitat through increased flow volumes and/or rates as a result of changes in land surface area from those activities. Therefore, permanent discharges to surface waters must be managed to protect the stream bank, streambed and structural integrity of the waterway, to prevent these impacts.

Storage facility – Any surface or sub-surface facility that stores stormwater runoff, see "detention basin" and "retention basin."

Storm frequency – the average interval in years over which a storm event of a given precipitation volume can be expected to occur. The magnitude and temporal distribution of precipitation from a storm event measured in probability of occurrence (e.g., a 5-year storm) and duration (e.g., 24 hours) used in the design and evaluation of stormwater management systems. Also see Return Period.

Storm sewer – a sewer that carries intercepted surface runoff, street water and other drainage but excludes domestic sewage and industrial waste.

Stormwater – drainage runoff from the surface of the land resulting from precipitation or snow or ice melt.

Stormwater collection systems – natural or manmade structures that collect and transport stormwater through or from a drainage area to the point of final outlet including, but not limited to, any of the following conduits and appurtenant features, canals, channels, ditches, streams, culverts, streets and pumping stations.

Stormwater management facility – a constructed measure for detention, retention, infiltration and water quality treatment of stormwater runoff.

Stormwater management plan – the plan for managing stormwater runoff rate, volume and water quality as required by the Stormwater Management Act, 32 P.S. §680.1 *et seq*.

Stormwater Management Performance District – an area designated by the Watershed Stormwater Performance District Map which includes standards for stormwater rate, volume and water quality. Refer to Appendix A.

Subdivision – As defined in The Pennsylvania Municipalities Planning Code, Act of July 31, 1968, P.L. 805, No. 247, as amended.

Swale – a low-lying stretch of land which gathers or carries surface water runoff.

USDA – United States Department of Agriculture.

Watercourse – a channel or conveyance of surface water, such as a run, stream or creek, having defined bed and banks, whether natural or artificial, with perennial or intermittent flow.

Waters of the Commonwealth – any and all rivers, streams, creeks, rivulets, impoundments, ditches, watercourses, storm sewers, lakes, dammed water, wetlands, ponds, springs, and all other bodies or channels of conveyance of surface water, or parts thereof, whether natural or artificial, within or on the boundaries of this Commonwealth.

Watershed – the entire region or area drained by a river or other body of water whether natural or artificial. A "designated watershed" is an area delineated by the Pennsylvania DEP and approved by the Environmental Quality Board for which Counties are required to develop watershed stormwater management plans.

Watershed stormwater management plan – the plan for managing stormwater runoff throughout a designated watershed as required by the Pennsylvania Stormwater Management Act (Act 167), 32 P.S. §680.1 *et seq*.

Wetland – Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, and similar areas.

ARTICLE III Stormwater Management Performance Standards.

§301. Stormwater Management Performance Districts.

For purposes of stormwater management, the [Municipality] is located in the following [Creek / River] Watershed(s), which includes the Stormwater Management Performance District(s) shown on the map entitled' [watershed] Performance District Map', which is hereby adopted as a portion of the Ordinance. For areas not covered by a stormwater performance district, the release rate shall be [80%]* of the pre-development peak flow as set by the municipality. For more information refer to www.westmorelandstormwater.org .

**In areas not covered by a Stormwater Performance District, an 80% release rate or less is recommended as a standard. This is to apply a "Factor of Safety" to stormwater calculations; to account for the many variables in site design and stormwater management; and to avoid a land development project inadvertently increasing runoff and causing harm downstream.*

§302. General Requirements.

A. Preparation and implementation of a stormwater management site plan is required for all regulated activities, unless preparation of a SWM site plan is specifically exempted.

B. Projects that propose greater than 1 acre of earth disturbance are subject to NPDES Permit requirements and will require a Stormwater Management Plan.

C. No regulated activities, unless exempted, shall commence until the municipality issues written approval of an SWM Site Plan, which demonstrates compliance with the requirements of this Ordinance.

D. Regulated Development Activities shall be as follows:

[REGULATED DEVELOPMENT ACTIVITY TABLE]

SWM Plan Requirement	New Impervious Area for New and Redevelopment	Disturbed Area*	Next Steps
Exempt	0	Less than 1 acre	Comply with **Exemption** section of this ordinance
[No-Harm]	Up to [1,000] sf for urban OR [3,000] square feet for suburban/rural areas	Less than [3,000] sf urban OR [5,000] square feet for suburban/rural areas	Comply with **No-Harm** section of this ordinance
Waiver / Modification / Demonstrated Equivalency	Less than 1 acre, subject to municipal approval	Less than 1 acre	Comply with **Waiver / Modification / Demonstrated Equivalency** section of this ordinance
Small Project (per definition), refer to Appendix C	[1,000] [3,000] square feet to [10,000] square feet	[3,000] [5,000] square feet to [20,000] square feet	Submit **Small Project Site Plan** complete with all attachments

Stormwater Management Plan meeting the Ordinance requirements	Greater than [10,000] square feet if Exempt and Small Project criteria are not met, or if improvements do not meet No-Harm criteria	Greater than [20,000] square feet	Consult a qualified professional

Note: Items in [ ] are criteria to be set by the municipality as deemed appropriate and in compliance with all Commonwealth laws and regulations.

*The above Table is only applicable for projects with earth disturbance less than 1 acre and that have not had cumulative impacts, within 5 years preceding the permit application date, that are in excess of the square foot limits.

§303. Exemption from performance standards.

A. The following regulated activities are specifically **exempt** from the Stormwater Management Plan preparation and submission requirements articulated in this Ordinance:

1. Agricultural activity limited to plowing or tilling activities, for animal concentrated (heavy) use areas provided the activities are performed according to the requirements of Chapter 102, or Conservation Practices being installed as part of the implementation of a Conservation Plan written by an NRCS or SCS-certified planner. This exemption does not include any other type of earth disturbance subject to NPDES permit requirements such as earth disturbance equal to or greater than one (1) acre.
2. A high tunnel, if proof is provided that the high tunnel is exempt pursuant to the provisions of Act 15 of 2018. Such an exemption does not exempt high tunnels from other requirements applicable under Federal, State or municipal laws.
3. Forest management and timber operations, provided the activities are performed according to the requirements of Chapter 102.
4. Resource extraction activities, provided they are done in accordance with applicable PA DEP regulations.
5. 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,
6. Domestic landscaping and/or vegetable gardening.
7. Voluntary Green Infrastructure (GI) or the retrofit of stormwater management infrastructure as conversion to green infrastructure BMPs to correct existing problems, that are solely intended to better manage runoff from existing development, are not part of new development or redevelopment, and that do not fall under the requirements of this or other development ordinances.

B. 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, safety, property or the environment.

[§304. No-Harm Option]

Applicants may request approval of a 'no-harm option' regarding stormwater management for their project. 'No-harm option' requests must meet the following criteria deemed appropriate by [Municipality] *and in compliance with all Commonwealth laws and regulations*:

A. Project located near or adjacent to [significantly larger body of water]
B. Project able to discharge directly into [existing flood control feature]
C. Project of a small size [<1,000] for urban, [<3,000] square feet for suburban and rural] of new impervious surface or [< 3,000] for urban, [<5,000] square feet for suburban and rural] of land use changes. Refer to the Regulated Development Activity Table in Article III this ordinance.
D. Project will generate less than [0.5 cubic feet] per second for the [ten year storm] peak rate increase as compared to pre-development peak rate
E. Project is not part of a larger development being 'piecemealed' in order to avoid stormwater management regulations
F. Project is not part of a larger development which has grown 'piecemeal' over the past [five] years without SWM
G. Project is a small percentage [<5%] of a much larger site and is incidental to the much larger site
H. Project is not located in a neighborhood, watershed, or location where known stormwater problems exist, such as overland flooding like flooding of structures or roadways.
I. Project does not discharge to a combined sewer
J. Project will not degrade water quality of the receiving stream. Refer to the Westmoreland County Integrated Water Resources Plan www.westmorelandstormwater.org for maps of impaired streams to determine if the project area is not within an impaired stream corridor or provide documentation that further degradation will not occur.

To qualify for the 'no-harm' option, applicant may, at the request of the municipality, submit calculations, drawings, and details showing that the project meets the above criteria. Projects approved for the 'no-harm' option may be exempted from constructing all or some of the usual stormwater management practices regularly required for similar projects.

To be approved, no-harm requests must be reviewed and approved by ~~both~~ the [Municipality] engineer [and by the WCD], but final approval rests with [Municipality].

§305. Waivers / Modifications / Demonstrated Equivalency

A. If the [Municipality], in conjunction with the municipality engineer, [WCD, or DEP as applicable], determines that any requirement under this Ordinance cannot be achieved for a particular regulated activity, the municipality may, after an evaluation of alternatives, approve measures other than those in this Ordinance, subject to this Section paragraphs B, C and D *and in compliance with all Commonwealth laws and regulations*. The request for a waiver, modification, or demonstrated equivalency shall originate with the Landowner, shall be in writing, include a study of downstream effects, and accompany the Stormwater Management Plan submission to the municipality. The request shall provide the facts on which the request is based, the provision(s) of the Ordinance involved and the proposed modification or demonstrated equivalency. The municipality

engineer [and WCD] shall review the request to determine if it meets the requirements of the Ordinance including this Section, paragraphs B, C and D. If acceptable to the municipality [and WCD] and the regulated stormwater activity involving earth disturbance is less than one (1) acre, the municipality may grant the waiver or modification. If the regulated stormwater activity involving earth disturbance is equal to or greater than one (1) acre, the plan will be subject to the NPDES requirements of DEP.

B. Waivers, modifications, or demonstrated equivalency of the requirements of this Ordinance may be approved by the municipality if enforcement will exact undue hardship because of unique physical circumstances or pre-existing site conditions peculiar to the land in question, provided that the modifications or demonstrated equivalency will not be contrary or detrimental to the public interest and shall achieve the intended outcome, and that the purpose of the Ordinance is preserved. Hardship must be due to such unique physical circumstances or pre-existing site conditions and not the circumstances or conditions generally created by the provisions of the Stormwater Management Ordinance; and there is no possibility that the property can be developed in strict conformity with the provisions of the Stormwater Management Ordinance. Cost or financial burden shall not be considered a hardship. Hardship cannot have been created by the landowner or developer. Modification or demonstrated equivalency shall not substantially or permanently impair the appropriate use or development of adjacent property(s) not under the Landowner's control. Modification or demonstrated equivalency may be considered if an alternative standard or approach will provide equal or better achievement of the purpose of the Ordinance.

C. No waiver, modification or demonstrated equivalency 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 Westmoreland Conservation District (WCD).

D. Applicants may request approval of a demonstrated equivalent stormwater activity for their project in lieu of performing traditional stormwater management. Demonstrated equivalent stormwater activity requests will be evaluated by the municipal engineer [and/or the WCD] on a case-by-case basis. Prior approval of a demonstrated equivalent stormwater activity on a site does not set a precedent for future approval of the same or other alternative activities on any site. The approval of a demonstrated equivalent stormwater activity does not excuse the applicant from following standard E&S and SWM practices as applicable on the original site.
    1. Demonstrated equivalent stormwater activities shall only be approved when the following criteria are met:
        a) Traditional stormwater management activities on the site are precluded by a particular site limitation, such as contaminated soil, steep slopes, existing buildings/infrastructure, combined sewer;
        b) Construction of traditional stormwater management activities on the site would require extra permits or lead to excessive permitting activities and delays;

c) The site in question does not already have a stormwater management problem; and
d) The site in question is not already contributing to water quality problems in the receiving stream.

2. Approvable demonstrated equivalent stormwater activities may include the following:
   a) Restoration of an existing degraded wetland, stream channel, floodplain, or riparian buffer, including daylighting of a stream.
   b) Restoration, retrofit or upgrade an existing stormwater management feature (inadequate detention pond, for example).
   c) Creation of new stormwater management features, especially green infrastructure, for a previously unmanaged site
   d) Provide a water-based benefit to the public other than stormwater management (for example, extend a public sewer to an area not already served).
   e) Treatment of abandoned mine drainage.
3. The proposal for demonstrated equivalency shall be accompanied by documentation or methodology quantifying the equivalency of the proposed project to what would have been originally required. Acceptable documentation or methodology may include use of the Worksheets and Checklist found in PA DEP NPDES permit application, Appendix D or approved method showing the proposed equivalency:
   a) Controls approximately the same amount of runoff volume as what would originally have been proposed
   b) Improves approximately the same amount of runoff quality as would have been originally proposed
   c) Is located within an impaired watershed or stream segment which will benefit from the proposed project. Impairment may include stream impairment, reduced stream buffer, and pollutant loading. Refer to the Westmoreland County Integrated Water Resources Plan at www.westmorelandstormwater.org .
4. The demonstrated equivalent stormwater activity shall:
   a) Be constructed concurrently with the project for which it is being applied;
   b) Be constructed according to plans approved by the municipality [and the WCD] including any erosion control and stormwater management practices as applicable;
   c) Obtain all necessary permits;
   d) Be located on land owned by or controlled by the applicant or by a cooperating public or private entity(s) (school, church, club, municipality, etc.);
   e) Be protected by a perpetual easement or deed restriction, or landowner agreement;
   f) Be located in the same general watershed as the project for which it is being applied; and
   g) Have an Operation and Maintenance Plan (O&M) specifying who is responsible for what tasks.

§306. Small Project

A. When a regulated development activity (refer to Table in Section 302 of this ordinance) creates impervious area between [3,000] and [10,000] square feet, or total earth disturbance between [5,000] and [20,000] square feet, the stormwater management requirements are as follows. Refer also to Appendix C.

B. For new impervious surfaces, the first [1] [2] inch(s) of runoff shall be permanently removed from the runoff flow, and shall not be released to waters of the Commonwealth. Removal options include reuse, evaporation, transpiration and infiltration.

C. Facilities, to the greatest extent possible and subject to municipality approval, shall be designed to drain the permanently removed runoff volume in a period no greater than 72 hours. Runoff volumes in excess of [1] [2] inch(s) shall be safely conveyed to a stable vegetated area, natural watercourse, the curb or gutter line of roadway or existing storm collection/conveyance/control system as applicable.

D. This method is exempt from the requirements of Section 402 of this ordinance.

E. A Small Project Stormwater Management Plan must be submitted to the [Municipality] [and the WCD] and shall consist of the following items and related support material needed to determine compliance with Sections 307 to 311 of this ordinance. The applicant can also use protocols listed in Appendix C.

1. Narrative: General description of proposed stormwater management techniques, including calculations, assumptions and criteria used in the design of the stormwater management facilities and BMPs, and construction specifications of the materials to be used for stormwater management facilities and BMPs.
2. Stormwater Management Plan: Showing locations of all stormwater management facilities and BMPs, especially green infrastructure, limits of disturbance, including the type and amount of proposed impervious area, structures, roads, paved areas and buildings;
3. Small Project Stormwater Management Worksheet;
4. Signed [acknowledgement] [agreement] page for operation and maintenance of stormwater facilities and BMPs (Refer to Appendix B); and
5. Erosion and Sediment Control Plan: including all reviews and letters of adequacy from the Conservation District.

§307. General Standards.

A. Proposed land development must consider avoiding, minimizing, and mitigating impacts to the site that may increase stormwater runoff from the proposed project. Applied sequentially, these three low impact development strategies should be an overall guide as a project is planned and carried out.

B. The Westmoreland County Integrated Water Resources Plan provides an online decision making tool to assist developers, designers, property owners in addressing all water resources during development and redevelopment and should be consulted. Refer to www.paiwrp.com and www.westmorelandstormwater.org .

C. The following provisions shall be considered the overriding performance standards against which all proposed stormwater control measures shall be evaluated and shall apply throughout the [Municipality].

1. Any landowner and any person engaged in the alteration or development of land which may affect stormwater runoff characteristics shall implement such measures as are reasonably necessary to prevent injury to health, safety or other property. For alteration or development taking place in stages, the cumulative development must be used in determining conformance with this ordinance. Such measures shall include such actions as are required:
    a. To assure that the maximum rate of stormwater runoff is no greater after development than prior to development activities for the [2-, 10-, 50-, 100-] year storms. Rainfall data shall be obtained from NOAA Atlas 14 or other source approved by the municipality.
    b. To manage the water quality, rate and volume and direction of resulting stormwater runoff in a manner which otherwise adequately protects health and property from possible injury.
    c. To notify adjacent property owners or owners of affected properties of any alteration or increase of stormwater flows.
2. Runoff treatment BMPs must be employed where necessary to ensure the water quality, rate and volume requirements are met.
3. Volume control BMPs shall be used to maintain existing hydrologic conditions for small storm events by promoting groundwater recharge and/or evapotranspiration. Runoff volume controls shall be implemented using the PA DEP Stormwater BMP Manual 2006 or other approved method such as those listed in the following chart:

Acceptable Computation Methodologies for Stormwater Management Plans:

METHOD:	**DEVELOPED BY:**	**APPLICABILITY:**
Win TR-20 (or commercial computer package based on TR-20)	USDA NRCS	Applicable where use of full hydrologic computer model is desirable or necessary.
Win TR-55 (or commercial computer package based on TR-55 ie. VT/PSUHM	USDA NRCS	Applicable for land development plans within limitations described in TR-55
HEC-1, HEC-HMS	US Army Corps of Engineers	Applicable where use of full hydrologic computer model is desirable or necessary.
PennDOT 584 (based on rational method)	PennDOT	Applicable under standards established by PennDOT
EFH2	USDA NRCS	Applicable in agricultural areas subject to the program limits.

SWMM	EPA	Applicable in urban and suburban areas subject to limits established by EPA
PA DEP BMP Manual 2006	PA DEP	Applicable under standards established by PA DEP
Other Methods	Varies	Other methodologies approved by the municipality

C. The project plan shall specify permanent stormwater BMPs to be implemented, operated and maintained to meet legal water quality, rate and volume requirements. If methods other than low impact development (LID) and green infrastructure methods are proposed to achieve the volume and rate controls required under this ordinance, the SWM Site Plan must include a detailed justification demonstrating that the use of LID and green infrastructure is not practicable.

D. In order to protect and maintain water quality, additional stormwater runoff created by the development project must be captured, stored and treated. In addition, post construction stormwater infiltration of runoff must replicate preconstruction infiltration of runoff to the maximum extent possible with the exception of **hot spots**. As a minimum, this shall be a volume of additional runoff generated by a 2-year, 24 hour storm. Preferred BMP's for a **hot spot** include storm inlet filters, proprietary stormwater quality devices, underground detention tanks, detention ponds with forebays, tree planting, green roof. Permeable pavement, infiltration BMP's, and rain gardens are not recommended for hotspots.

E. In addition to the provisions set forth in paragraphs A. through C., inclusive, as set forth above, all regulated development activities within the [Municipality] shall be designed, implemented, operated and maintained to meet the purposes of this Ordinance, through these two elements:

1. Erosion and sediment control during the earth disturbance activities (e.g., during construction).
2. Water quality, rate and volume protection measures after completion of earth disturbance activities (e.g., post-construction stormwater management), including operations and maintenance.

F. No regulated development activities within the [Municipality] shall commence until the requirements of this Ordinance are met.

G. All best management practices (BMPs) used to meet the requirements of this Ordinance shall conform to the State water quality requirements, and any more stringent requirements as determined by the [Municipality].

H. LID and green infrastructure techniques described in the PA DEP Stormwater BMP Manual 2006 or most current edition are encouraged.

I. [Projects proposed in municipalities which are subject to the MS4 regulations must comply with that municipality's approved MS4 permit, including compliance with the six Minimum Control Measures (MCM's) and with the municipality's Pollutant Reduction Plan (PRP).]

§308. Watershed Standards

A. The stormwater management performance standards in this Ordinance are intended to implement the provisions, standards and criteria contained in the Pennsylvania Stormwater Management Act (Act 167), 32 P.S. §680.1 *et seq*. If there is any discrepancy between the provisions of this Ordinance and the provisions, standards and criteria of the Act, or if a stormwater management plan is subsequently approved and adopted by the appropriate governmental agency or body, then the provisions, standards and criteria of the current watershed plan shall govern.

B. Management of stormwater runoff is key objective of 25 Pa.Code, Chapter 93, of the DEP Regulations, because runoff can change the physical, chemical and biological integrity of waterbodies thereby impacting rate, volume and water quality.

C. The project plan shall describe how these rate, volume and water quality protection requirements will be met. Infiltration BMPs shall be evaluated and utilized to the maximum extent possible to manage the net change in stormwater runoff generated so that post construction discharges do not degrade the physical, chemical or biological characteristics of the receiving waters. These BMPs may be used to satisfy all or part of the requirements found within this Ordinance.

D. Refer to the Stormwater Performance Districts outlined in Appendix A, and the Westmoreland County Integrated Water Resources Plan (IWRP) at www.westmorelandstormwater.org . The project plan shall describe how the proposed project will address performance standards, impairments, and pollutant loading found in the IWRP. For areas not covered by a stormwater performance district, the release rate shall be [80%] of the pre-development peak flow as set by the municipality.

§309. Design Criteria for Stormwater Management Facilities and BMPs.

A. *General Criteria*.

1. Applicants may select runoff control techniques, or a combination of techniques, which are most suitable to control stormwater runoff from the development site. Refer to the Acceptable Computation Methodologies table of this ordinance. All controls must be subject to approval of the [Municipality] engineer [and the WCD]. The [Municipality] engineer may request specific information on design and/or operating features of the proposed stormwater controls in order to determine their suitability and adequacy in terms of the standards of this Ordinance.

2. If the proposed development site is located in an impaired water shed according to Category 4 of the PA Integrated Water Quality Monitoring and Assessment Report, or in a watershed with a TMDL according to Category 5 of the same Report, the applicant shall identify the source and cause of impairment and shall propose, if required or applicable the use of BMPs to mitigate any impacts to the waters.

3. The applicant should consider the effect of the proposed stormwater management techniques on any special soil conditions or geological hazards which may exist on the development site. In the event such conditions are identified on the site, the [Municipality] engineer may require in depth studies by a competent geotechnical engineer. Not all stormwater control methods may be advisable or allowable at a particular development site.

4. The applicant shall consider the effect of the proposed stormwater management techniques on existing stream impairments and pollutant loading. Refer to the Westmoreland County Integrated Water Resources Plan (IWRP) at www.westmorelandstormwater.org .
5. The applicant shall consider existing conditions on the site for the prior [five] years to determine prevailing land use and impervious cover, and shall consider 20% of existing impervious cover as meadow for pre-existing conditions on redevelopment sites.
6. The stormwater management practices to be used in developing a stormwater management plan for a particular site shall be selected according to the following order of preference:
   a. Site planning for locating proposed buildings, impervious areas and grading which minimizes disruption of the natural site characteristics especially utilizing low impact development techniques.
   b. Minimization of impervious areas and promotion of retentive grading.
   c. Implementation of non-structural measures (refer to the PA DEP Stormwater BMP Manual 2006 or current edition).
   d. Implementation of innovative / green infrastructure structural measures (refer to the PA DEP Stormwater BMP Manual 2006 or current edition).
   e. Stormwater detention/retention structures.
7. Any BMP which is a dam, culvert, stream obstruction or encroachment or outfall as defined in 25 Pa.Code, Chapter 105, shall be designed according to the requirements in those regulations.
8. Drainage easements shall be provided for all stormwater conveyance and BMPs serving multiple properties and not located within a public right of way. Easements shall include ingress and egress to a public right of way, and shall be recorded at the County with the final plan. Terms of easement shall prohibit excavation or placement of fill or structures and any alteration that may adversely affect the flow of stormwater within any portion of the easement.
9. No person shall install, create, modify, remove, fill, landscape or otherwise alter or place any structure, soil, rock, material or vegetation in or on, or otherwise adversely affect, any stormwater management facility or any area within a stormwater easement without the written approval of the [Municipality] [and/or approval of the WCD].
10. Persons engaged in land development activities shall provide the required [financial security, O&M Agreements] to the [municipality] as outlined in the Appendix B.

B. *Criteria for Stormwater Management Facilities and BMPs.*

1. If stormwater management facilities and BMPs are utilized for the development site, the facility(s) shall be designed such that post-development peak runoff rates from the developed site are controlled to those rates defined by a Stormwater Management Performance District for the [2-, 10-, 50-, 100-] year storm frequencies. Rainfall data shall be obtained from NOAA Atlas 14 or other source as approved by the municipality.
2. All stormwater management facilities and BMPs shall be equipped with

outlet/overflow structures to provide rate discharge control for the designated storm frequencies. Provision shall also be made to safely pass the entire post-development 100-year storm without breaching or otherwise damaging the facilities, downstream or neighboring properties.

3. Release of stormwater flow from a development site must be to an existing stormwater conveyance or easement whether natural or man-made. Calculations and information shall be presented as to the ownership, responsible party, capacity, and stability of such conveyance. Release of 'sheet flow' as from a level spreader, will be permitted on a case-by-case basis as approved by the municipality [and WCD].
4. All stormwater management facilities and BMPs shall be designed to control volume and water quality as defined by the Stormwater Management Performance District. Refer to Appendix A.
5. Shared stormwater management facilities and BMPs, which provide control of runoff for more than one development site within a single subarea may be considered and are encouraged. Such facilities shall meet the criteria contained in this Section. In addition, runoff from the development sites involved shall be conveyed to the facility in a manner that avoids adverse impacts (such as flooding or erosion) to channels and properties located between the development site and the shared storage facilities.
6. Where stormwater management facilities and BMPs will be utilized, multiple use facilities, such as wetlands, lakes, ballfields or similar recreational/open space uses are encouraged wherever feasible, subject to the approval of the [Municipality].
7. Other considerations which shall be incorporated into the design of the stormwater management facilities and BMPs include:
    a. Inflow and outflow structures shall be designed and installed to prevent erosion and embankments, cuts, fills and bottoms of impoundment type structures should be protected from soil erosion.
    b. Control and removal of debris both in the storage structure and in inlet or outlet devices shall be a design consideration.
    c. Inflow and outflow structures, pumping stations and other structures shall be designed and protected, using safety benches, trash racks, energy dissipaters and other means to minimize safety hazards.
    d. Access may be restricted as specified by [the provisions for fencing swimming pools] as found in the municipality Zoning Ordinance, and in appropriate instances such restriction of access may include [fencing in a minimum height of [6 feet]].
    e. Interior slopes of storage ponds shall not exceed a ratio of three to one horizontal to vertical dimension with a combination of interior and exterior slopes not exceeding five. Steeper slopes may be approved by the municipality engineer if documented to be stable by a geotechnical analysis.
    f. Landscaping shall be provided for the facility which stabilizes disturbed areas and preserves the natural and beneficial values of the surrounding area.
    g. Facility shall be located to facilitate maintenance, considering the frequency and type of equipment that will be required.

h. Underground detention / retention / infiltration facilities shall be equipped with open grate inlet or manhole access to facilitate visual inspections.

C. *Criteria for Collection/Conveyance Facilities*.

1. All stormwater runoff collection or conveyance facilities, whether storm sewers or other open or closed channels, shall be designed in accordance with the following basic standards:
   a. All building sites shall use measures to provide drainage away from and around the structure in order to prevent any potential flooding damage as much as practical. Such measures shall include grading the surrounding lawn or pavement area so that it slopes away from the structure by a minimum of [5% slope] over a minimum distance of [10 feet]; raising the floor of the structure so that it is a minimum of [6 inches] above the predominate surrounding land elevation and above the designated floodplain elevation for those located within a floodplain; eliminating or waterproofing penetrations thru the structure's walls or foundation; constructing berms, curbs, or swales to divert surface water around the structure; arranging roof and area drains to carry water away from the structure.
   b. Developers proposing a land development or subdivision shall arrange internal drainage within the subdivision so that surface water is safely directed and channeled away from all structures within and adjacent to the development site.
   c. Developers shall provide to all persons constructing a structure within a land development site, standards including drawings and specifications to ensure that those persons adhere to the general site plans and stormwater management plans for the development. Persons constructing a structure within a land development site shall submit to the municipal engineer [and WCD] drawings, calculations, and other information to show how they will meet the stormwater management requirements of the development site.
   d. Lots located on the high side or low side of streets shall extend roof, trench and area drains to a stable vegetated area, natural watercourse, the curb or gutter line of roadway or storm collection/conveyance/control system (if applicable) in accordance with the approved stormwater management plan for the development site.
   e. For all building sites and lots, the inclusion of rain barrels, rain gardens, drywells and other strategies for infiltration of roof runoff close to its source is encouraged.
   f. Collection/conveyance facilities should not be installed parallel and less than [10 feet] from the top or bottom of an embankment, greater than or equal to [15 feet] height to avoid the possibility of failing or causing the embankment to fail, unless documented to be stable by a geotechnical analysis.
   g. All collection/conveyance facilities shall be designed to convey the [25year

storm] peak flow rate from the contributing drainage area and to carry it to the nearest suitable outlet such as a stormwater control facility, curbed street, storm sewer or natural watercourse.

h. Where drainage swales or open channels are used, they shall be suitably lined to prevent erosion and designed to avoid erosive velocities.

2. Wherever storm sewers are proposed to be utilized, they shall comply with the following additional criteria:

a. Where practical, designed to traverse under seeded and planted areas. If constructed within [10 feet] of road paving, walks or other surfaced areas, drains shall have a narrow trench and maximum compaction of backfill to prevent settlement of the superimposed surface or development.

b. Preferably installed after excavating and filling in the area to be traversed is completed, unless the drain is installed in the original ground with a minimum of [3 feet] cover and/or adequate protection during the fill construction.

c. *Designed*.

i. With cradle when traversing fill areas of indeterminate stability.

ii. With anchors when gradient exceeds 20 percent.

iii. With encasement or special backfill requirements when traversing under a paved area.

d. Designed to adequately handle the anticipated stormwater flow and be economical to construct and maintain. The minimum pipe size shall be [15 inches] in diameter, with the exception of roof drains, foundation drains or similar conveyance.

e. Drain pipe, trenching, bedding and backfilling requirements and appropriate grates, catch basins, stormwater inlets, manholes and other appurtenances shall conform to the requirements of the municipality and/or applicable PennDOT specifications, Publication 408.

f. All corrugated metal pipe shall be polymer coated, and with paved inverts where prone to erode. Pipe within a municipality right-of-way shall be reinforced concrete pipe or high performance polypropylene pipe with a minimum diameter of [15 inches].

g. Storm inlets and structures shall be designed to be adequate, safe, self-cleaning and unobtrusive and consistent with municipality standards with sufficient capture and conveyance capacity and spacing of inlets and cleanouts for maintenance.

h. Where a proposed sewer or conveyance connects with an existing storm sewer or conveyance system, the applicant shall demonstrate that sufficient capacity exists in the downstream system to handle the additional flow.

i. Storm sewer outfalls shall be equipped with energy dissipation devices to prevent erosion and conform with applicable requirements of the Pennsylvania DEP for stream encroachments (Section 7 of the Dam Safety and Encroachments Act, 32 P.S. §693.1, et seq., and the rules and regulations promulgated thereunder at 25 Pennsylvania Code §105.441-105.449).

D. *[Criteria for Riparian Buffers]*

1. If a riparian buffer is required by PA DEP as part of an NPDES permit, then DEP regulations will govern.
2. If a Riparian Buffer is used to meet stormwater management requirements [and/or MS4 pollutant load reduction credits] it shall meet the following requirements:
    a. In order to protect and improve water quality, a Riparian Buffer Easement may be created and recorded as part of any subdivision or land development that encompasses a Riparian Buffer.
    b. Except as required by PA Code Title 25 Chapter 102, the Riparian Buffer Easement shall may be measured to a minimum of 35 feet measured from the top of the nearest bank (on each side), or an average of 35 feet with no distance from top of bank less than 25 feet.
    c. Minimum Management Requirements for Riparian Buffers:
        i. Existing native vegetation shall be protected and maintained within the Riparian Buffer Easement.
        ii. 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.
        iii. There shall be no earth disturbance beyond which is necessary to establish or maintain a planted buffer.
3. 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 a required by Zoning, unless otherwise specified in the municipal Zoning Ordinance.
4. 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.
5. Stormwater drainage pipes and all other linear utility lines as approved by the municipality shall be permitted within the Riparian Buffer Easement, but they shall cross the Easement in the shortest practical distance. Other stormwater management facilities and BMPs are not permitted within the Riparian Buffer Easement.
6. The following conditions shall apply when public and/or private recreation trails are permitted within Riparian Buffers:
    a. Trails shall be for non-motorized use only.
    b. Trails shall be designed to have the least impact on native plant species and other sensitive environmental features.
7. 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.

E. *[Criteria for Stream Restoration Project]*

1. A stream restoration project may eligible for stormwater management [and/or MS4 load reduction credits] if it meets qualifying criteria set by the municipality and as follows:

a. Existing conditions, such as channel or streambank erosion and an actively enlarging or incising urban stream condition, shall be documented prior to restoration.
b. Projects should be located on 1st to 3rd order (small) streams to be effective.
c. Project should address a minimum of 100 linear feet of stream channel and both sides where need to do so is evident.
d. Upstream impervious area should be sufficiently treated to address peak flows that may exceed engineering design thresholds or compromise channel form and function.
e. Utilize a comprehensive approach employing a mix of techniques appropriate to the site, creating long-term stability of the streambed, streambanks and floodplain.
f. Armored length of streams (ie using riprap or gabions) may be used to maintain channel stability, but the same length shall not be included in the load reduction calculation.
g. Project shall maximize floodplain reconnection, with minimal channel invert elevation increase (ie bank height ratio = 1.0 or less) to achieve the objective.
h. Project shall include a minimum 35 ft permanent riparian buffer.
i. Project shall include an O&M plan identifying O&M activities, frequencies and responsible parties.

§310. ***Erosion and Sedimentation Controls***.

A. No regulated development activities within the [Municipality] shall commence until approval by the [Municipality] and the WCD of an erosion and sediment control plan for construction activities.
B. Any earth disturbance activity of 5,000 square feet or more requires an erosion and sedimentation control plan under 25 Pa.Code §102.4(b). Refer to the PA DEP Erosion and Sediment Pollution Control Manual 2012 or most recent version.
C. In addition, under Title 25 Pa.Code, Chapter 92, a DEP NPDES construction activities permit is required for regulated development activities.
D. Evidence of any necessary permit(s) for regulated development activities from the appropriate DEP regional office or Westmoreland Conservation District must be provided to the municipality. The issuance of an NPDES construction permit (or permit coverage under the Statewide General Permit (PAG-2) may satisfy the requirements under subsection 1. upon review and approval by the municipality.
E. A copy of the erosion and sediment control plan and any permit required by DEP or the [Municipality] shall be available at the project site at all times.

§311. ***Water Obstructions and Encroachments***

A. No regulated development activities which require Chapter 105 (Water Obstructions and Encroachment) permit from either PA DEP or Westmoreland Conservation District shall commence until all permits have received PA DEP or WCD approval, and municipal approval.
B. Evidence of any necessary Chapter 105 permit from PA DEP / WCD shall be provided to the municipality.

C. Proposed development shall avoid the long and short term adverse impacts associated with the occupancy and modification of floodplains as designated by FEMA, to the extent possible wherever there is a practicable alternative in order to reduce the risk of flood loss, minimize the impacts of floods on human safety, health and welfare, and restore and preserve the natural and beneficial values served by flood plains.
D. Any proposed development found to be within the base floodplain of a waterway shall include the identification of impacts, an evaluation of practicable alternatives outside the floodplain, and when impacts cannot be avoided, the development of measures to minimize the impacts and restore and preserve the floodplain as appropriate. Findings shall be presented at a public meeting and a determination made by the [governing body] of the [municipality].
E. Any proposed stormwater management plan should be consistent with the provisions of the PA Floodplain Management Act 166 of 1978 and applicable municipal floodplain ordinances.

ARTICLE IV Stormwater Management Plan Requirements.

§401. *General Requirements*.

No development plan, subdivision plat or land development plan shall be approved; no permit authorizing construction or development issued; nor any earth disturbance activity subject to this Ordinance shall be initiated or undertaken unless and until a stormwater management plan for such activity is reviewed and approved in accord with the provisions of this Ordinance.

A. No regulated development activities within the municipality shall commence until approval by the municipality of a stormwater management plan which demonstrates compliance with State water quality requirements after construction is complete. Refer to the Regulated Development Activity Table located in Article III of this ordinance.

B. The stormwater management plan must be designed, implemented and maintained to meet State water quality requirements, and any other more stringent requirements as determined by the municipality.

C. To control post-construction stormwater impacts from regulated development activities, State water quality requirements can be met by BMPs, including site design and green infrastructure, which provide for replication of pre-construction stormwater infiltration and runoff conditions, so that post-construction stormwater discharges do not degrade the physical, chemical or biological characteristics of the receiving waters. As described in the DEP Comprehensive Stormwater Management Policy (#392-0300-002, September 28, 2002), this may be achieved by the following:

1. *Infiltration*. Replication of pre-construction stormwater infiltration conditions.
2. *Treatment*. Use of water quality treatment BMPs to ensure filtering out of the chemical and physical pollutants from the stormwater runoff.
3. *Streambank and Streambed Protection*. Management of volume and rate of post-construction stormwater discharges, using detention / retention and other means, to prevent physical degradation of receiving waters (e.g., from scouring).

D. In the absence of an existing stormwater conveyance or easement whether natural or man-made for release of stormwater flow from a development site, an easement must be provided. Information shall be presented as to the ownership, responsible party, and agreement for said easement.

E. The stormwater management plan must meet DEP regulations that require municipalities to ensure design, implementation and maintenance of best management practices ("BMPs") that control runoff from new development and redevelopment after regulated development activities are complete. These requirements include the need to implement post-construction stormwater facilities and BMPs with assurance of long-term operations and maintenance of those BMPs.

F. Evidence of any necessary permit(s), such as Chapter 102 erosion and sedimentation control or Chapter 105 stream encroachment, for regulated development activities from WCD or the appropriate DEP regional office must be provided to the municipality. The issuance of an NPDES construction permit (or permit coverage under the Statewide General Permit (PAG-2) may satisfy the requirements of paragraph (A) above, after review and approval by the municipality.

G. Appropriate sections from the municipality's Subdivision and Land Development

Ordinance (SALDO), and other applicable local ordinances, shall be followed in preparing the SWM Plans. [In instances where the Municipality lacks subdivision and land development regulations, SWM Plans shall be reviewed and approved pursuant to the county's Subdivision and Land Development Ordinance (SALDO). If the county's SALDO does not have provisions for review and approval of SWM plans, the SWM plans must be reviewed and approved pursuant to the municipal SWM ordinance]

H. The Municipality shall not approve any SWM Plan that is deficient in meeting the requirements of this Ordinance. At its sole discretion and in accordance with this Article, when a SWM Plan is found to be deficient, the municipality may either disapprove the submission and require a resubmission, or in the case of minor deficiencies, the Municipality may accept submission of modifications.

I. *Professional Certification*. The stormwater management plan (including all calculations) must be prepared and sealed by a qualified professional with training and expertise in hydrology and hydraulics. Documentation of qualifications may be required by the [Municipality].

§402. *Stormwater Management Plan Contents*.

General Format. The stormwater management plan shall include a narrative and a set of plan drawings. Refer to checklist Appendix D.

A. A narrative describing the overall stormwater management concept for the project.

1. A determination of site conditions in accordance with the PA DEP Stormwater BMP Manual. A detailed site evaluation shall be completed for projects proposed environmentally sensitive areas, such as brownfields.
2. *Runoff Calculations*. Stormwater runoff design calculations for determining pre- and post-development discharge rates, for designing proposed stormwater control facilities and to demonstrate that the maximum practicable measures have been taken to meet the requirements of this Ordinance, must be submitted with the stormwater management plan. All calculations shall be prepared using the methods and data prescribed by general requirements in Section [302]. Refer to the Acceptable Computation Methodologies table in Article III Section 307 of this ordinance.
    a. Runoff volume and rate shall be calculated according to generally accepted methods such as those listed under Stormwater Management Performance Standards, General Standards.
    b. Detention/retention requirements, including volume, routing, etc. for BMPs shall be calculated using commonly acceptable standard method(s).
    c. Water quality calculations shall be determined by using the PA DEP Stormwater BMP Manual 2006 or current edition Worksheets 12 and 13 [or acceptable alternative method by the municipality].
3. Expected project time schedule for the installation of all temporary and permanent stormwater control measures and devices. If the development is to be constructed in stages, the applicant must describe how stormwater facilities and BMPs will be

sequentially installed to manage stormwater runoff safely during each stage of development.

4. The effect of the project (in terms of runoff rate, volumes, and water quality) on surrounding properties and aquatic features and on any existing stormwater conveyance system that may be affected by the project.
5. If appropriate, the narrative should provide justification as to why any preferred stormwater management techniques, such as LID and green infrastructure, as listed in this Ordinance, are not proposed for use. Refer to the PA DEP Stormwater BMP Manual 2006 or most recent edition for list of acceptable management techniques.
6. Operation and maintenance program and responsible party(s) for permanent stormwater facilities and BMPs. Refer to Section VI of this ordinance.

B. The stormwater management plan drawings shall be drawn to a scale of not less than 1 inch equals 100 feet. All sheets shall contain a title block with name and address of applicant and designer, scale, north arrow, legend and date of preparation.

1. *Existing and Proposed Features*. The plan shall show the following:
    a. *Watershed Location.* Provide a key map (using USGS Topo maps) showing the location of the development site within the watershed(s) and watershed subarea(s). On all site drawings, show the boundaries of the watershed(s) and subarea(s) as they are located on the development site and identify watershed name(s) and subarea number(s). Refer to Appendix A Watershed Performance District Maps.
    b. *Floodplain Boundaries*. Identify 100-year floodplains on the development site (as appropriate) based on the municipality Flood Insurance Study maps.
    c. *Natural Features*. Show all bodies of water (natural or artificial), watercourses (permanent and intermittent), swales, wetlands and other natural drainage courses on the development site, or which will be affected by runoff from the development.
    d. *Soils*. Provide an overlay showing soil types and boundaries within the development site (consult WCD, SCS and U.S. Geological Survey for information).
    e. *Contours.* Show existing and final contours at intervals of 2 feet; in areas with slopes greater than 15 percent, 5-foot contour intervals may be used.
    f. *Land Cover*. Show existing and final land cover classifications, including existing and proposed improvements, as necessary to support and illustrate the runoff calculations performed.
    g. *Drainage Area Delineations*. Show the boundaries of the drainage areas and points of interest employed in the runoff calculations performed.
    h. *Utilities and easements*. Show any existing utilities, stormwater management or drainage controls and/or structures, such as sanitary sewers, water, gas, electric, telecommunications, storm sewers, swales, culverts, and any easements, which are located on the development site, or which are off site but may be affected by runoff from the development.
2. *Proposed Stormwater Facilities and BMPs*. All proposed stormwater runoff control

measures must be shown on the plan including methods for collecting, conveying and storing stormwater runoff onsite, which are to be used both during and after construction. Erosion and sedimentation controls shall be shown in accordance with applicable [Municipality] [and WCD] requirements. The plan shall provide information on the exact type, location, sizing, design and construction of all proposed facilities and relationship to the existing watershed drainage system.

a. If the development is to be constructed in stages, the applicant must demonstrate that stormwater facilities will be installed to manage stormwater runoff safely during each stage of development.

b. A schedule for the installation of all temporary and permanent stormwater control measures and devices shall be included in the narrative and shown on the site plan.

c. Operation and maintenance program and responsible party(s) for permanent stormwater BMPs. Refer to Section VI of this ordinance.

3. *Easements, Rights of Way, Deed Restrictions*. BMPS and stormwater management facilities that provide control for more than one lot shall be located on a separate dedicated lot or in an easement. All existing and proposed easements for any BMPs and stormwater management facilities and controls for access, inspections, maintenance, repair, preservation and use shall be shown on the plan and, if required, dedicated to the entity, association or person required. The easement and the purpose for the same shall be set forth on the plan and in the agreement required by the Ordinance.

§403. *Other Permits/Approvals*.

A list of any approvals/permits relative to stormwater management that will be required from other governmental agencies (e.g., Chapter 102 Erosion and Sedimentation Control, PennDOT HOP, Chapter 105 Water Obstruction and Encroachment Permit from PA DEP) and anticipated dates of submission/receipt should be included with the stormwater plan submission. Copies of permit applications may be requested by the [Municipality] where they may be helpful for the plan review.

§404. *Operation and Maintenance Plan*.

The application shall contain a proposed operation and maintenance plan (O&M) for all stormwater control facilities in accordance with the following and as described in Article VI of this ordinance:

A. Identify the responsible party and their responsibilities as described in Article VI Section 601 (e.g., municipality, property owner, private corporation, homeowner's association or other entity).

B. Include an operation and maintenance plan for all stormwater facilities, outlining the routine maintenance actions and schedules necessary to ensure proper operation of the stormwater control facilities as described in Article VI Section 602.

C. [Submit any legal agreements required to implement the maintenance program and copies of the maintenance agreement as required by this Ordinance. Refer to Article VI Section 603.]

D. [Identify method of financing continuing operation and maintenance if the facility is to be owned by other than the [Municipality] or governmental agency. Refer to Article VI Section 604.]

§405. [*Financial Guarantees*]

[Submit financial guarantees in accordance with the provisions of this Ordinance. Refer to the Appendix.]

ARTICLE V Stormwater Management Plan Submission and Review Procedures.

§501. *Preapplication Phase*.

A. The Westmoreland County Integrated Water Resources Plan provides an online decision making tool to assist developers, designers, property owners in addressing all water resources during development and redevelopment and should be consulted. Refer to www.paiwrp.com for the decision-making tool and www.westmorelandstormwater.org .

B. Applicants should refer to the Westmoreland County Integrated Water Resources Plan (IWRP) located at www.westmorelandstormwater.org, for mapping of impaired streams, riparian buffers and pollutant loading to determine appropriate BMPs to address sources of impairments.

C. Before submitting the stormwater management plan, and any other plan required by a reviewing agency, applicants are urged to consult with the municipality, Westmoreland County Department of Planning and Development and Westmoreland Conservation District, and PennDOT where applicable, on the requirements for safely managing the development site in a manner consistent with the municipality ordinances, applicable watershed stormwater management plan and Federal and State requirements. These agencies may also be helpful in providing necessary data for the stormwater management plan.

D. Applicants are encouraged to submit a sketch plan with a narrative description of the proposed stormwater management controls for general guidance and discussion with the municipality and other agencies.

E. The pre-application phase is not mandatory; any review comments provided by the municipality or other agencies are advisory only and do not constitute any legally binding action on the part of the municipality or any County agency.

§502. *Stormwater Management Plan Submission and Review.*

A. *Submission of Plans*. Stormwater management plan application shall be submitted with the preliminary and final subdivision/land development applications or if no subdivision or land development is involved, then with the application for development.

Copies of the SWM Site Plan shall be submitted to the following agencies as determined by [Municipality]:

1. [Two] copies to the municipality(ies).
2. One copy to the municipal engineer (when applicable).
3. One copy to the Westmoreland Conservation District (when applicable).
4. One copy to the local Sanitary Authority (when applicable).
5. One copy to the Westmoreland County Department of Planning and Development. (if applicable)
6. One copy to the Westmoreland County Department of Public Safety / local emergency management coordinator (when applicable)
7. One copy to DEP (when applicable)

B. *Notification of Affected Municipalities*. The municipality shall notify municipalities upstream and downstream of the development site which may be affected by the stormwater runoff and proposed controls for the site. Copies of the plans will be made available to the affected municipalities upon request. Comments received from any

affected municipalities will be considered by the [Municipality] engineer and County agencies in their reviews.

C. *Review by [Municipality] Engineer [and Westmoreland Conservation District (WCD)]*. Stormwater management plans shall be reviewed by the municipality engineer [and WCD]. BMPs shall be shown on all stormwater management plans and erosion and sedimentation control plans, as applicable. At its discretion, the municipality [and/or WCD] may also engage other specialists in hydrology or hydraulics to assist with the stormwater management plan review. [The WCD will review the plan for general compliance with the watershed plan standards and criteria and watershed-wide impacts and, where appropriate, may consult with adjacent municipalities and counties for their comments. If the WCD review identifies the improper application of the watershed standards and criteria or the possibility of harmful impacts downstream from the development site's proposed stormwater management system, the applicant and municipality engineer will be notified so that the necessary modifications can be made to promote safe stormwater management.]

The municipality [and the WCD] shall notify the applicant in writing within 45 days whether the SWM site plan is approved or disapproved. If the SWM site plan involves a subdivision and land development plan, the notification shall occur within 90 days, unless the applicant is notified that a longer notification period is provided by other statute regulation or ordinance. If modifications are required, the review period may be extended by the municipality [and the WCD], in order for the applicant to address inadequacies.

D. A disapproved stormwater management plan may be resubmitted, with the revisions addressing the Municipality's [and/or WCD's] concerns, to the Municipality [and the WCD] in accordance with this article.

E. *[Municipality] Engineer Review*. The municipality engineer shall approve or disapprove the stormwater management plan based on the requirements of the [Municipality] ordinances, the standards and criteria of the watershed plan, applicable State and Federal requirements and good engineering practice. The [Municipality] Engineer shall submit a written report, along with supporting documentation, stating the reasons for approval or disapproval.

F. *Status of the Engineer's Determination*. The approval/disapproval of the site's stormwater management plan by the municipality engineer shall be submitted to the [municipality] [governing body] for final action. Final approval of the plan rests with the municipality.

G. *Permits Required From Other Governmental Agencies*. Where the proposed development requires a permit from the Pennsylvania DEP, PennDOT, or an erosion/sedimentation permit or Chapter 105 permit from the Westmoreland Conservation District, then final stormwater management plan approval shall be conditional upon receipt of such permits. However, no building permit shall be issued, nor construction or development started, until the permits are received and copies filed with the municipality.

H. Reviews by the Municipality [and WCD] may be subject to fees as outlined in Article VII section 706 of this Ordinance.

§503. ***Status of Stormwater Management Plan after Approval***.

A. Upon final stormwater management plan approval and receipt of all necessary permits, [financial guarantees and agreements,] the applicant may commence to install or implement the approved stormwater management plan, BMPs plan or erosion and sedimentation plan controls.

B. If site development or building construction does not begin within [2] years of the date of final approval of the stormwater management plan, then before doing so, the applicant shall re-submit the stormwater management plan, BMPs plan or erosion or sedimentation plan to verify that no condition has changed on the property, adjacent to the site or within the watershed that would affect the feasibility or effectiveness of the previously approved stormwater management controls. Further, if for any reason development activities are suspended for [2] years or more, then the same requirement for re-submission of the stormwater management plan shall apply.

§504. ***Modification of Stormwater Management Plan*.**

If the request for a plan modification is initiated before construction begins, the stormwater management plan must be resubmitted and reviewed according to the procedures, contained in this ordinance.

A. If the request for a plan modification is initiated after construction is underway, the [Municipality] Engineer [and / or the WCD] shall have the authority to approve or disapprove the modification based on field conditions; provided:

1. The requested changes in stormwater controls do not result in any modifications to other approved municipality land use/development requirements (e.g., building setbacks, yards, etc.).
2. The performance standards in this Ordinance are met. Notification of the Engineer's [and / or WCD's] action shall be sent to the [municipality] [governing body] which may issue a stay of the plan modification within 5 days and require the permittee to re-submit the plan modification for full stormwater management plan review in accordance with this ordinance.

B.It shall be unlawful to, and no person shall, alter, replace, modify, landscape or remove, or otherwise adversely affect, any permanent stormwater management facilities, BMP controls, or any area within a stormwater easement or dedicated or designated area for stormwater facilities and BMPs required by an approved stormwater management plan, BMP operations and maintenance plan, or to allow the property to remain in a condition which does not conform to an approved stormwater management plan, BMP operations and maintenance plan, unless an exception is granted in writing by the municipality and/or approval is secured from all relevant agencies of the Commonwealth.

§505. ***Inspection of Stormwater Management Facilities and BMPs***.

A. The municipality engineer or a designated representative shall inspect the implementation, construction, condition, operation and maintenance of the temporary and permanent stormwater management system and controls for the development site. The municipality or a designated representative shall have the right to temporarily

locate on any BMP in the municipality such devices as are necessary to conduct monitoring and/or sampling the discharge from such BMP.

B. The permittee shall notify the [municipal] engineer [and the WCD] 48 hours in advance of the completion of the following key development phases:
    1. At the completion of preliminary site preparation including stripping of vegetation, stockpiling of topsoil and construction of temporary stormwater management control facilities.
    2. At the completion of rough grading but prior to placing topsoil, permanent drainage or other site development improvements and ground covers.
    3. During construction of the permanent stormwater facilities and BMPs at such times as specified by the municipality engineer.
    4. Completion of permanent stormwater management facilities and BMPs including established ground covers and plantings.
    5. Completion of final grading, vegetative control measures or other site restoration work done in accordance with the approved plan and permit.

C. The Municipality [and/or WCD] may conduct inspections during construction as it deems appropriate.

D. No work shall commence on any subsequent phase until the preceding one has been inspected and approved. If there are deficiencies in any phase, the municipality engineer [and/or WCD] shall issue a written description of the required corrections and stipulate the time by which they must be made.

E. If, during construction, the contractor or permittee identifies any site condition, such as subsurface soil conditions, alterations in surface or subsurface drainage, which could affect the feasibility of the approved stormwater facilities, or erosion and sedimentation controls he/she shall notify the municipality engineer [and/or WCD] within 24 hours of the discovery of such condition and request a field inspection. The municipality engineer [and/or WCD] shall determine if the condition requires a modification of the stormwater management plan, BMPs plan or erosion and sedimentation control plan.

F. In cases where stormwater facilities or erosion and sedimentation controls are to be installed in areas of landslide-prone soils or other special site conditions exist, the [Municipality] may require special precautions such as a geotechnical study, soil tests and core borings, full-time inspectors and/or similar measures. All costs of any such measures shall be borne by the permittee.

§506. ***Record Drawings, Completion Certificate, and Final Inspection***

A. The developer shall be responsible for providing record drawings of all stormwater management facilities and BMPs as built and included in the approved Stormwater Management Plan. The record drawings and an explanation of any discrepancies with the construction plans shall be submitted to the Municipality [and/or WCD].

B. The record drawing submission shall include a certification of completion signed by a qualified professional verifying that all permanent stormwater management facilities and BMPs have been constructed according to the approved plans and specifications. The latitude and longitude coordinates for all permanent stormwater management facilities and BMPs must also be submitted, at the central location of the BMPs. If any licensed qualified professionals contributed to the construction plans, then a licensed qualified professional must sign the completion certificate.

C. After receipt of the completion certification by the Municipality, the Municipality [and/or WCD] may conduct a final inspection.

ARTICLE VI Operation and Maintenance of Stormwater Facilities and BMPs

§601. *Operation and Maintenance Responsibilities*.

A. The stormwater management plan for the development site shall contain an operation and maintenance plan prepared by the developer and approved by the [Municipality] [and/or WCD]. The operation and maintenance plan shall outline the responsible party(ies) and required routine maintenance actions and schedules necessary to insure proper operation of the stormwater control facility(s).

B. The stormwater management plan for the development site shall establish responsibilities for the continuing operation and maintenance (O&M) of all stormwater facilities and BMPs, consistent with the following:

1. If a development consists of structures or lots which are to be separately owned and in which streets, sewers and other public improvements are to be dedicated to the municipality, stormwater facilities and BMPs should also be dedicated to and maintained by the municipality, except for those individual on-lot facilities and BMPs for privately owned structures.
2. If a development site is to be held in single ownership or if sewers and other public improvements are to be privately owned, operated and maintained, then the operation and maintenance of stormwater facilities and BMPs should be the responsibility of the owner or private management entity.
3. Person(s) responsible for operation and maintenance of stormwater facilities and BMPs shall be named with contact information provided.

C. The [municipality] [governing body], upon recommendation of the municipality Engineer, shall make the final determination on the continuing maintenance responsibilities prior to final approval of the stormwater management plan. The [municipality] [governing body] reserves the right to accept the ownership and operating responsibility for any or all of the stormwater management facilities and BMPs.

D. If the development site involves land located in more than one municipality, then the plan shall be reviewed by the municipality [and/or Conservation District] to determine if all activities both within and without the municipality meets the requirements of this Ordinance.

E. Stormwater facilities and BMPs shall be inspected by the owner/responsible party named in the O&M plan on a [regular] basis as determined by the municipality or as approved in the O&M plan. Inspections may include photographs, written reports, measured drawings as necessary to document conditions of the facility(s) and the report shall be provided to the municipality [as requested.]

§602. *Stormwater Facility and BMP Operations and Maintenance Plan Requirements*.

A. No regulated development activities within the municipality will be considered complete until approval by the municipality of BMP operations and maintenance plan

which describes how the permanent (i.e., post-construction) stormwater facilities and BMPs will be properly operated and maintained.

B. The following items shall be included in the BMP operations and maintenance plan:
   1. Map(s) of the project area, in a form that meets the requirements for recording at the Office of the Recorder of Deeds of Westmoreland County, refer to the http://www.wcdeeds.us/dts/ . The contents of the maps(s) shall include, but not be limited to:
      a. Ownership and operation and maintenance responsibilities of stormwater facilities and BMPs.
      b. Clear identification of the location and nature of permanent stormwater facilities and BMPs.
      c. The location of the project site relative to highways, municipality boundaries or other identifiable landmarks.
      d. Existing and final contours at intervals of 2 feet are required if the general slope of the site is less than 15 percent, and at vertical intervals of 5 feet if the general slope is equal to or greater than 15 percent.
      e. Existing streams, lakes, ponds, or other bodies of water within the project site area.
      f. Other physical features including flood hazard boundaries, sinkholes, streams, existing drainage courses, and areas of natural vegetation to be preserved.
      g. The locations of all existing and proposed utilities, sanitary sewers, and water lines within 50 feet of property lines of the project site.
      h. Proposed final changes to the land surface and vegetative cover, including the type and amount of impervious area that would be added.
      i. Proposed final structures, roads, paved areas, and buildings.
      j. A 15-foot wide access easement around all stormwater facilities and BMPs that would provide ingress to and egress from a public right-of-way.
   2. A description of how each permanent stormwater facilities and BMPs will be operated and maintained, and the identity of the person(s) responsible for operations and maintenance.
   3. The name of the project site, the name and address of the owner of the property, and the name of the individual or firm preparing the plan.
   4. A statement, signed by the landowner, acknowledging that the stormwater facilities and BMPs are fixtures that can be altered or removed only after approval by the municipality.

C. Each stormwater facility and BMP shall be recorded with the County as permanent real estate appurtenances, and as deed restrictions or conservation easements that run with the land. Prior to final approval of the stormwater plan the property owner shall sign and record an O&M agreement for those facilities and BMPs. Refer to Appendix B of this ordinance.

D. If the owner fails, refuses or neglects to maintain any stormwater facility and/or BMP, the municipality reserves the right to conduct maintenance work and charge and assess the owner [any and all costs, expenses incurred and fees] set by the municipality. The

municipality reserves the right to take enforcement actions for failure to perform required O&M. Refer to article VII of this ordinance.

E. [A financial guarantee for timely installation and proper construction of stormwater facilities and BMPs shall be as specified in Article VII of this ordinance.]

§603. [*Operations and Maintenance Agreement for Privately Owned Stormwater Facilities and BMPs*.]

A. Prior to final approval of the site's stormwater management plan the property owner shall sign and record a maintenance agreement covering all stormwater facilities and BMPs which are to be privately owned. The agreement (refer to Appendix B) shall stipulate that:

1. The owner, successors and assigns shall maintain all facilities in accordance with the approved maintenance schedule and shall keep all facilities in a safe and functional manner and consistent with the surrounding natural area.
2. The owner, successors and assigns shall convey to the municipality easements and/or rights-of-way to assure access for periodic inspections by the municipality and maintenance, if required.
3. The owner, successors and assigns shall keep on file with the municipality the name, address and telephone number of the person or company responsible for maintenance activities; and in the event of a change, new information will be submitted to the municipality within 10 days of the change.
4. If the owner, successors and assigns fails to maintain the stormwater facilities and BMPs following due notice by the municipality to correct the problem(s), the municipality may perform the necessary maintenance work or corrective work and the owner shall reimburse the municipality for all costs.

B. Other items may be included in the agreement where determined necessary to guarantee the satisfactory inspection and maintenance of all stormwater facilities and BMPs for a [10] year period. The maintenance agreement shall be subject to the review and approval of the municipality Solicitor and the [municipality] [governing body] and shall be in a form such as may be recorded in the Office of the Recorder of Deeds in the County in which the facility is located.

C. The property owner shall sign an operations and maintenance agreement with the municipality covering all stormwater facilities and BMPs that are to be privately owned. The agreement shall be substantially the same as the agreement in the Appendix of this Ordinance.

§604. [*[Municipality] Stormwater Facility and BMP Operation and Maintenance Fund*.]

A. Persons installing stormwater facilities or BMPs shall be required to pay a specified amount to the municipality stormwater facilities and BMPs fund to help defray costs of periodic inspections and maintenance expenses. The amount of the deposit shall be determined as follows:

1. If the stormwater facilities and/or BMPs are to be privately owned and maintained, the deposit shall cover the cost of periodic inspections performed by the municipality for a period of 10 years, as estimated by the municipality Engineer. After that period of time, inspections will be performed at the expense of the municipality.

2. If the stormwater facilities and/or BMPs are to be accepted, owned and maintained by the municipality, the deposit shall cover the estimated costs for maintenance and inspections for 10 years. The municipality Engineer will establish the estimated costs utilizing information submitted by the applicant.

3. The amount of the deposit to the fund shall be converted to present worth of the annual series values. The municipality engineer shall determine the present worth equivalents which shall be subject to the approval of the [governing body] of the [municipality].

B. If stormwater facilities and BMPs are proposed that also serves as a recreation facility (e.g., ball field, lake), the municipality may reduce or waive the amount of the maintenance fund deposit based upon the value of the land for public recreation purposes, or the municipality may accept the maintenance fund deposit on behalf of the agency managing the recreation resource and make said fees available to the agency's maintenance department.

C. If at some future time stormwater facilities and BMPs (whether publicly or privately owned) are eliminated due to the installation of storm sewers or other stormwater facilities and BMPs, the unused portion of the maintenance fund deposit will be applied to the cost of abandoning the facility and connecting to the storm sewer system or other facility. Any amount of the deposit remaining after costs of abandonment are paid will be returned to the depositor.

ARTICLE VII [Fees, Financial Guarantees and Dedication of Public Improvements]

§701. *Guarantee of Completion*.

A. A completion guarantee or financial security in the form of a bond, cash deposit, cashier's check or other negotiable securities acceptable to the municipality shall provide for, and secure to the municipality, the completion of any improvements which may be required on or before the date fixed in the formal action of approval or accompanying agreement for completion of the improvements. The guarantee or security shall cover any and all stormwater management facilities, BMPs, erosion and sedimentation controls and other required improvements (collectively, "improvements") and shall be equal to 110% of the cost of completion estimated as of 90 days following the date scheduled for completion by the developer. Annually the municipality may adjust the amount of financial security by comparing the actual cost of the improvements which have been completed and the estimated cost for the completion of the remaining improvements as of the expiration of the 90th day after either the original date scheduled for completion or a rescheduled date of completion. Subsequent to said adjustment, the municipality may require the developer to post additional security in order to assure that the financial security equals said 110%. Any additional security shall be posted by the developer in accordance with this subsection.

B. The amount of the guarantee or financial security required shall be determined utilizing the provisions of [§509 (g) of the Municipalities Planning Code].

§702. *Release of Completion Guarantee*.

The completion guarantee or financial security shall be returned or released upon written certification by the municipality Engineer or a designated agent that improvements and facilities have been installed and completed in accordance with the approved plan and specifications. The procedures for requesting and obtaining a release of the completion guarantee shall be [in a manner prescribed by the §510 of the Municipalities Planning Code].

§703. *Default of Completion Guarantee*.

If improvements are not installed in accordance with the approved final plans, the [governing body] of the [municipality] may enforce any corporate bond or any security by appropriate legal and equitable remedies. If proceeds of such bond or other security are insufficient to pay the cost of installing or making repairs or corrections to all the improvements covered by said security, the [municipality] [governing body] may at its option install part of such improvements in all or part of the development and may institute appropriate legal or equitable action to recover the monies necessary to complete the remainder of the improvements. All proceeds, whether resulting from the security or from any legal or equitable action brought against the developer, or both, shall be used solely for the installation of the improvements covered by such security and not for any other municipality purpose.

§704. *Dedication of Public Improvements*.

A. When streets, sanitary sewers, stormwater management facilities, BMPs, erosion and sedimentation controls or other required improvements in the development have

been completed in accordance with the final plans, such improvements shall be deemed private until such time as they have been offered for dedication to the [Municipality] and accepted by separate ordinance or resolution or until they have been condemned for use as a public facility. The municipality shall be under no obligation to accept such facilities or controls unless and until the municipality so determines that it is in the best interest of the municipality to do so.

B. Prior to acceptance of any improvements or facilities, the municipality engineer shall inspect the same to ensure that the same are constructed in accordance with the approved plans and are functioning properly.

C. The owner shall submit as-built plans for all facilities proposed for dedication.

§705. ***Maintenance Guarantee*.**

Prior to acceptance of any improvements or facilities, the applicant shall provide financial security to secure the structural integrity and functioning of the improvements. The security shall:

A. Be in the form of a bond, cash, cashier's check or other negotiable securities acceptable to the municipality.

B. Be for a term of 18 months.

C. Be in an amount equal to 15 percent of the actual cost of the improvements and facilities so dedicated.

§706. ***Fee Schedule***.

The [municipality] [governing body] may adopt by resolution, from time to time, a reasonable schedule of fees to cover the cost of pre-submitted and pre-construction meetings, plan reviews, inspections and other activities necessary to administer, monitor and enforce the provisions of this Ordinance. All fees shall be set in accordance with the applicable provisions of [the Municipalities Planning Code, 53 P.S. §10101 *et seq*.,] and any dispute over the fee amount shall be resolved in the manner prescribed by [the Municipalities Planning Code.]

ARTICLE VIII Enforcement Procedures and Remedies.

§801. *Right of Entry*.

Upon presentation of proper credentials, duly authorized representatives of the [Municipality] may enter at reasonable times upon any property to inspect, investigate or ascertain the condition of the subject property in regard to an aspect related to stormwater management regulated by this Ordinance. Prohibitions and unreasonable delays in allowing the municipality access to a stormwater management facility pursuant to this Ordinance is a violation of this Ordinance. The failure of any person or entity to grant entry or to undertake any action which impedes or prevents entry is prohibited and constitutes a violation of this Ordinance. Unless in the event of an emergency, the municipality shall notify the property owner and/or developer within twenty-four hours prior to entry.

§802. *Enforcement Generally*. [requires municipal solicitor review]

A. It shall be unlawful for a person to undertake any regulated activity except as provided in an approved SWM Site Plan, unless specifically exempted in Article III Section 303 of this Ordinance.
B. It shall be unlawful to alter any BMPs, facilities or structures that were installed under the Ordinance without written approval of the municipality.
C. In the event that the applicant, developer, owner or his/her agent fails to comply with the requirements of this Ordinance or fails to conform to the requirements of any permit a written notice of violation shall be issued. Such notification shall set forth the nature of the violation(s) and establish a time limit for correction of the violation(s). Upon failure to comply within the time specified, unless otherwise extended by the municipality, the applicant, developer, owner or his/her agent shall be subject to the enforcement remedies of this Ordinance. Such notice may require without limitation:

    1. Whenever the municipality finds that a person has violated a prohibition or failed to meet a requirement of this Ordinance, the municipality may order compliance by written notice to the responsible person. Such notice may require without limitation, any or all of the following:

        a. The performance of monitoring, analyses, and reporting.
        b. The elimination of prohibited connections or discharges.
        c. Cessation of any violating discharges, practices, or operations.
        d. The abatement or remediation of stormwater pollution or contamination hazards and the restoration of any affected property.
        e. Payment of a fine to cover administrative and remediation costs.
        f. The implementation of stormwater management measures or facilities.
        g. Operation and maintenance of stormwater management measures and/or facilities
        h. Assessment and payment of any and all costs and expenses relative to corrective measures taken or to be taken and reasonable costs, expenses and attorney fees incurred by the municipality in and related to enforcement and collection proceedings.

2.Such notification shall set forth the nature of the violation(s) and establish a time limit for correction of these violations(s). Said notice may further advise that, if applicable, should the violator fail to take the required action within the established deadline, the work will be done by the municipality or designee and the expense thereof shall be charged to the violator.

3.Failure to comply within the time specified shall also subject such person to the penalty provisions of this Ordinance. All such penalties shall be deemed cumulative and shall not prevent the municipality from pursuing any and all other remedies available in law or equity.

§803. ***Suspension and Revocation***

A. Any approval or permit issued by the Municipality pursuant to this Ordinance may be suspended or revoked for:
   1. Non-compliance with or failure to implement any provision of the approved SWM Site Plan or O&M Agreement.
   2. A violation of any provision of this Ordinance or any other applicable law. ordinance, rule, or regulation related to the Regulated Activity.
   3. The creation of any condition or the commission of any act during the Regulated Activity which constitutes or creates a hazard, nuisance, pollution, or endangers the life or property of others.

B. A suspended approval may be reinstated by the Municipality when:
   1. The Municipality has inspected and approved the corrections to the violations that caused the suspension.
   2. The Municipality is satisfied that the violation has been corrected.

C. An approval that has been revoked by the municipality cannot be reinstated. The applicant may apply for a new approval under the provisions of this Ordinance.

D. If a violation causes no immediate danger to life, public health, or property, at its sole discretion, the Municipality may provide a limited time period for the owner to correct the violation. In these cases, the Municipality may provide the owner, or the owner's designee, with a written notice of the violation and the time period allowed for the owner to correct the violation. If the owner does not correct the violation within the allowed time period, the municipality may revoke or suspend any, or all, applicable approvals and permits pertaining to any provision of this Ordinance.

§804. ***Preventative Remedies*****.** [requires municipal solicitor review]

A. In addition to other remedies, the municipality may institute and maintain appropriate actions by law or in equity to restrain, correct or abate a violation, to prevent unlawful construction, to recover damages and to prevent illegal occupancy of a building or premises.

B. In accordance with the Municipalities Planning Code, 53 P.S. §10101 *et seq.*, the municipality may refuse to issue any permit or grant approval to further improve or develop any property which has been developed in violation of this Ordinance.

§805. ***Violations and Penalties*****.** [requires municipal solicitor review]

A. Any person who has violated or knowingly permitted the violation of the provisions of this Ordinance or has refused, neglected or failed to perform any of the actions required pursuant to the Notice set forth in 2.A. above, upon conviction thereof in an action brought before a magisterial district judge in the manner provided for the enforcement of summary offenses under the Pennsylvania Rules of Criminal Procedure, shall be guilty of a summary offense, and shall be sentenced to pay a fine of not less than $100.00 nor more than $1,000.00 for each violation, plus costs, together with reasonable attorney fees; and, in default or failure of full and timely payment of such fine, costs and fees, to a term of imprisonment not to exceed ninety (90) days or to a term of imprisonment to the extent permitted by law for the punishment of violations of summary offenses, whichever is less. Each day that a violation of this Ordinance continues or each Section of this Ordinance which shall be found to have been violated shall constitute a separate offense. No judgment shall commence or be imposed, levied or be payable until the date of the determination of a violation by the magisterial district judge. Each day that a violation of this Ordinance continues or each Section of this Ordinance which shall be found to have been violated shall constitute a separate offense.

B. If the defendant neither pays nor timely appeals the judgment, the [Municipality] may enforce the judgment pursuant to applicable rules of civil procedure.

C. Each day that a violation continues shall constitute a separate violation unless the magisterial district judge further determines that there was a good faith basis for the person violating this Ordinance to have believed that there was no such violation. In such case there shall be deemed to have been only one such violation until the fifth day following the date of the district justice's determination of the violation; thereafter each day that a violation continues shall constitute a separate violation.

D. All judgments, costs and reasonable attorney fees collected for the violation of this Ordinance shall be paid over to the municipality.

E. The court of common pleas, upon petition, may grant an order of stay, upon cause shown, tolling the per diem fine pending a final adjudication of the violation and judgment.

F. Nothing contained in this Section shall be construed or interpreted to grant to any person or entity other than the municipality, the right to commence any action for enforcement pursuant to this Section.

G. Each day that a violation of any provision of this Ordinance shall constitute a separate violation and be deemed a public nuisance.

§806. ***Additional Remedies*****.** [requires municipal solicitor review]

In addition to the above remedies, the municipality may also seek the remedies and penalties under applicable Pennsylvania statutes, or regulations adopted pursuant thereto including, but not limited to, the Stormwater Management Act, 32 P.S. §§693.1 *et seq*., and the erosion and sedimentation regulations, 25 Pa.Code, Chapter 102. Any activity conducted in violation of this

Ordinance or any Pennsylvania approved watershed stormwater management plan may be declared a public nuisance by the municipality and abatable as such.

§807. ***Appeals*.** [requires municipal solicitor review[1]]

A. Appeals.

1. Any person aggrieved by a decision of the Municipality or any of its authorized persons or agencies, may appeal in writing said decision to the [governing body] within thirty (30) days of any decision. Any appeal must be filed with the [governing body] If a decision appealed is from an authorized person or agency of the Municipality, a copy of the written appeal must be filed with such person or agency by such appellant within thirty (30) days of such decision.
2. The appellant shall pay to the Municipality at the time of filing the appeal, any and all fees and charges as set forth in a Resolution of the Municipality.

B. Procedure. Any Appeal filed pursuant to this section shall be governed by the Local Agency Law of the Commonwealth of Pennsylvania (2 Pa. C.S.A. §105, specifically 2 Pa. C.S.A. §551-§555).

C. Hearing. The [governing body] shall schedule a hearing within sixty (60) days of receipt of said Appeal. Written notice of the hearing shall be given to the party filing the Appeal and any authorized person or agency of the Municipality involved, not less than fifteen (15) days prior to said hearing.

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[1] As a comment to the municipality and municipal solicitor, please review the following: A Municipality without a Zoning Ordinance may use the language in the model ordinance concerning appeals. A Municipality with a Zoning Ordinance would be required to comply with the following sections of the MCP. Section 909.1. of the MPC, entitled "Jurisdiction", provides that

(a) The zoning hearing board shall have exclusive jurisdiction to hear and render final adjudications in the following matters:

(9) Appeals from the determination of the zoning officer or municipal engineer in the administration of any land use ordinance or provision thereof with reference to sedimentation and erosion control and storm water management insofar as the same relate to development not involving Article V or VII applications.

(Meaning that the Zoning Hearing Board's jurisdiction on E&S and SWM matters must relate to the Official Map of the municipality (found in Article IV of the MPC) or its Zoning Ordinance (found in Article VI of the MPC).)

Section 901.1(b).6 of the MPC specifies that the governing body or the planning commission, where designated, shall have exclusive jurisdiction to render final adjudications from the determination of the zoning officer or the municipal engineer in the administration of any land use ordinance or provisions thereof with reference to sedimentation and erosion control and stormwater management with respect to MPC Articles V (Subdivision and Land Development) and VII (Planned Residential Development).

D. Hearing Procedure.

1. All testimony may be stenographically recorded and a full and complete record be kept of the proceedings. In the event all testimony is not stenographically recorded and a full and complete record of the proceedings is not provided by the local agency, such testimony shall be stenographically recorded and a full and complete record of the proceedings and shall be kept at the request of any party agreeing to pay the costs thereof.
2. The [governing body] shall not be bound by technical rules of the evidence at the aforesaid hearing, and all relevant evidence of reasonably probative value may be received. Reasonable examination and cross-examination shall be permitted.

E. Adjudication.

The adjudication of the [governing body] shall be in writing, shall contain findings and the reasons for the adjudication, and shall be served upon all parties to the Appeal or their counsel personally, or by mail.

F. Appeal from Adverse Adjudication.

Pursuant to 2 Pa. C.S.A. Section 751 et seq. any person aggrieved by the adjudication of [governing body] who has a direct interest in such adjudication shall have the right to appeal therefrom to the Court vested with jurisdiction of such appeals by or pursuant to Title 42 (Relating to Judiciary and Judicial Procedure).

REFERENCES

1. U.S. Department of Agriculture, National Resources Conservation Service (NRCS). *National Engineering Handbook.* Part 630: Hydrology, 1969-2001. Originally published as the ***National Engineering Handbook***, Section 4: Hydrology. Available from the NRCS online at: http://www.nrcs.usda.gov/.

2. U.S. Department of Agriculture, Natural Resources Conservation Service. 1986. ***Technical Release 55: Urban Hydrology for Small Watersheds***, 2nd Edition. Washington, D.C.

3. Pennsylvania Department of Environmental Protection. No. 363-0300-002 (December 2006), as amended and updated. ***Pennsylvania Stormwater Best Management Practices Manual***. Harrisburg, PA.

4. Pennsylvania Department of Environmental Protection. No. 363-2134-008 (March 31, 2012), as amended and updated. ***Erosion and Sediment Pollution Control Program Manual***. Harrisburg, PA.

5. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Hydrometeorological Design Studies Center. 2004-2006. ***Precipitation-Frequency Atlas of the United States, Atlas 14***, Volume 2, Version 3.0, Silver Spring, Maryland. Internet address: http://hdsc.nws.noaa.gov/hdsc/pfds/.

6.PennDOT **Publication 408 – Construction Specifications, Publication 584 - Drainage Manual** current editions.

Appendix A Stormwater Management Performance Districts (TBD)
Appendix B Example: Operation and Maintenance Agreement [requires municipal solicitor review]
Appendix C Small Project Stormwater Management Site Plan
Appendix D Stormwater Management Plan Checklist
[Appendix E Fees, Financial Guarantees - TBD by municipality]

Westmoreland County Model Stormwater Management Ordinance

APPENDIX A

STORMWATER MANAGEMENT PERFORMANCE DISTRICT MAPS

Refer to the Watershed Performance District (Release Rate) Maps at
www.westmorelandstormwater.org

NOTE: For areas not covered by current recommended Performance District (release rate) Maps, municipalities are authorized to establish performance standards / release rates as discussed in 308.D of the Stormwater Management Ordinance.

NOTE: Municipalities are authorized to establish release rates stricter than those established by the recommended Performance District Maps upon consultation with WCD and their municipal engineer.

Westmoreland County Model Stormwater Management Ordinance
APPENDIX B

[LANDOWNER LETTER OF ACKNOWLEDGMENT]

Project Name: _____Date:_____.
Location:_____.

- New impervious areas can potentially increase stormwater runoff from this site and the use of proposed stormwater facilities and/or best management practices (BMPs) can manage those impacts by mimicking natural processes to provide groundwater recharge and stream base flow.
- Regulated development activities on this site shall not begin until [municipality] has issued an approval for a Small Project Stormwater Management Plan.
- If stormwater management facilities and/or BMPs included on the approved Small Project Stormwater Site Plan require revisions or changes, the applicant shall submit a revised plan to the [municipality] for approval. If a problem arises, the applicant may need to seek the assistance of a qualified professional.
- Installed stormwater facilities and/or BMPs shall not adversely affect any property, septic systems, or drinking water wells on this or any other property.
- The applicant acknowledges that the installed stormwater management facilities and/or BMPs will be a permanent fixture of the property, shall be inspected and maintained regularly to retain the original function, and cannot be altered or removed without the approval of the [municipality].

I (we) _____, hereby acknowledge the above statements and agree to assume full responsibility for the implementation, construction, operation, and maintenance of the proposed stormwater management facilities and/or BMPs. Furthermore, I (we) acknowledge that the steps, assumptions, and guidelines provided in the [municipality] Small Project Stormwater Management Plan and Worksheet will be adhered to.

Signature:_____ Date: _____

Signature:_____ Date: _____

Westmoreland County Model Stormwater Management Ordinance

APPENDIX B
[OPERATION AND MAINTENANCE (O&M) AGREEMENT (solicitor review) STORMWATER MANAGEMENT BEST MANAGEMENT PRACTICES (SWM BMPs)]

THIS AGREEMENT, made and entered into this day _____of _____, 20_____ , by and between _____ (hereinafter the "Landowner"), and _____, Westmoreland County, Pennsylvania (hereinafter "Municipality");

WITNESSETH

WHEREAS, the Landowner is the owner of certain real property as recorded by deed in the land records of Westmoreland County, Pennsylvania, Deed Book _____ at page_____ , (hereinafter "Property").

WHEREAS, the Landowner is proceeding to build and develop the Property; and

WHEREAS, the SWM BMP Operation and Maintenance (O&M) Plan approved by the Municipality (hereinafter referred to as the "O&M Plan") for the property identified herein, which is attached hereto as Appendix A and made part hereof, as approved by the Municipality, provides for management of stormwater within the confines of the Property through the use of BMPs; and

WHEREAS, the Municipality, and the Landowner, his successors and assigns, agree that the health, safety, and welfare of the residents of the Municipality and the protection and maintenance of water quality require that on-site SWM BMPs be constructed and maintained on the Property; and

WHEREAS, the Municipality requires, through the implementation of the SWM Site Plan, that SWM BMPs as required by said SWM Site Plan and the Municipal Stormwater Management Ordinance be constructed and adequately operated and maintained by the Landowner, successors, and assigns.

NOW, THEREFORE, in consideration of the foregoing promises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The Landowner shall construct the BMPs in accordance with the plans and specifications identified in the SWM Site Plan.

2. The Landowner shall operate and maintain the BMPs as shown on the SWM Site Plan in good working order in accordance with the specific operation and maintenance requirements noted on the approved O&M Plan.

3. The Landowner hereby grants permission to the Municipality, its authorized agents and employees, to enter upon the property, at reasonable times and upon presentation of proper credentials, to inspect the BMPs whenever necessary. Whenever possible, the Municipality shall notify the Landowner prior to entering the property.

4. In the event the Landowner fails to operate and maintain the BMPs per paragraph 2, the Municipality or its representatives may enter upon the Property and take whatever action is deemed necessary to maintain said BMP(s). It is expressly understood and agreed that the Municipality is under no obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the Municipality. A timeline shall be set as mutually agreed upon …….

5. In the event the Municipality, pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner shall reimburse the Municipality for all expenses (direct and indirect) incurred within 10 days of receipt of invoice from the Municipality.

6. The intent and purpose of this Agreement is to ensure the proper maintenance of the on-site BMPs by the Landowner; provided, however, that this Agreement shall not be deemed to create any additional liability of any party for damage alleged to result from or be caused by stormwater runoff.

7. The Landowner, its executors, administrators, assigns, and other successors in interests, shall release the Municipality from all damages, accidents, casualties, occurrences, or claims which might arise or be asserted against said employees and representatives from the construction, presence, existence, or maintenance of the BMP(s) by the Landowner or Municipality.

8. The Municipality intends to inspect the BMPs at a minimum of once every three years to ensure their continued functioning.

This Agreement shall be recorded at the Office of the Recorder of Deeds of Westmoreland County, Pennsylvania, and shall constitute a covenant running with the Property and/or equitable servitude, and shall be binding on the Landowner, his administrators, executors, assigns, heirs, and any other successors in interests, in perpetuity.

ATTEST:

WITNESS the following signatures and seals:

(SEAL)

For the Municipality:

_____

For the Landowner:

_____

ATTEST:

_____(City, Borough, Township)

County of Westmoreland, Pennsylvania

I, _____ , a Notary Public in and for the county and state aforesaid, whose commission expires on the day _____ of _____ , 20_____ , do hereby certify that whose name(s) is/are signed to the foregoing Agreement bearing date of the _____ day of _____, 20_____, has acknowledged the same before me in my said county and state.

GIVEN UNDER MY HAND THIS _____ day of _____ , 20 _____.

_____ _____

NOTARY PUBLIC **(SEAL)**

Westmoreland County Model Stormwater Management Ordinance
APPENDIX C
[Municipality]
SMALL PROJECT STORMWATER MANAGEMENT PLAN

This small project stormwater management plan has been developed to assist those proposing residential projects to meet the requirements of the *Westmoreland County Model Stormwater Management Ordinance* (SWO) without having to draft a formal stormwater management plan. This small project stormwater management plan is only permitted for projects with new impervious area between [1,000] [3,000] and [10,000] square feet, or total earth disturbance between [3,000] [5,000] and [20,000] square feet, (Section 302 Regulated Development Activity Table of the SWO) and by using the recommendations in this Appendix for Volume Control. Additional information can be found in Chapter 6 of the PA SW BMP Manual 2006 or most recent version.

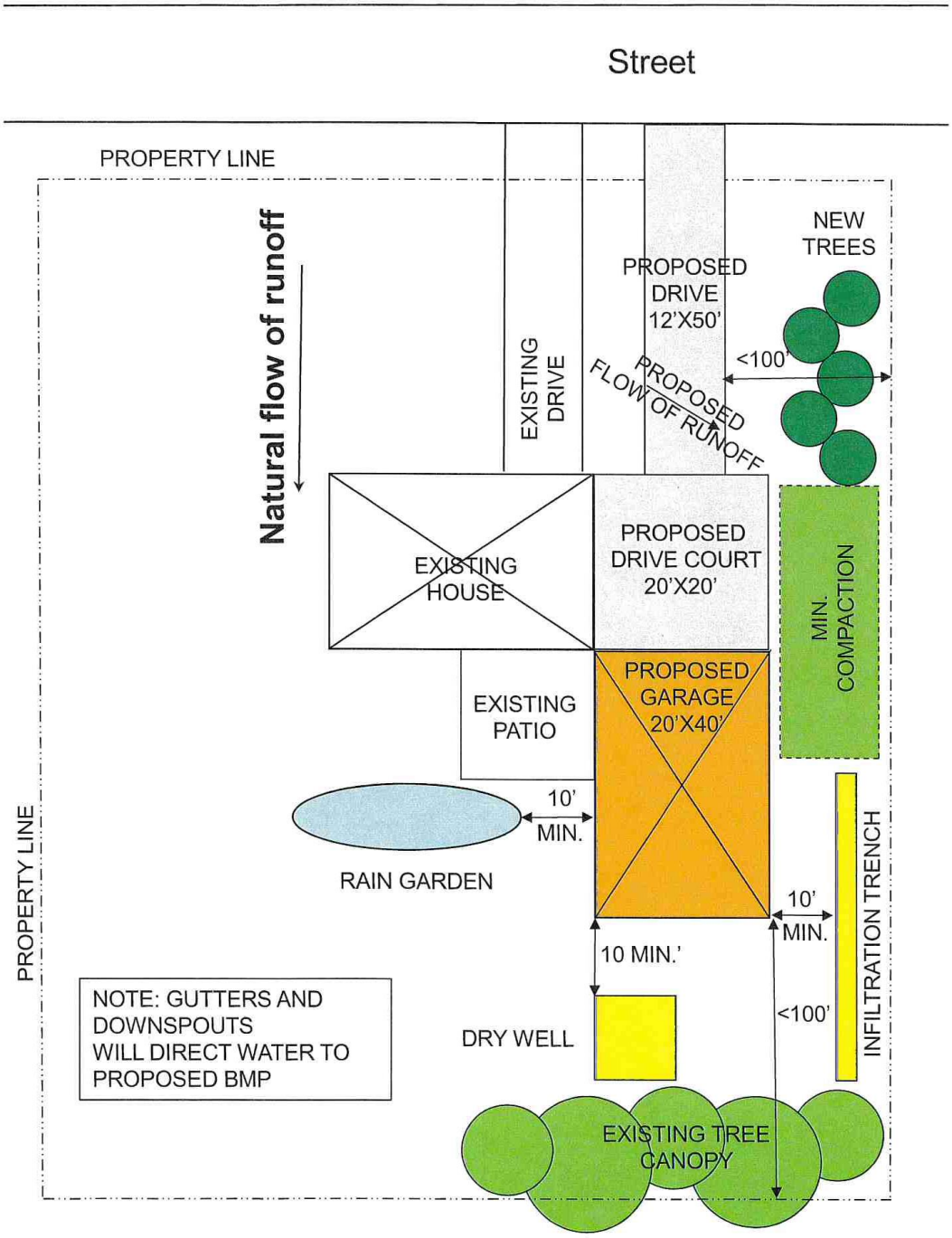
A. What is an applicant required to submit?
All requirements of Section 306 of the [Municipality] Stormwater Management Ordinance, including:

- A narrative including a brief description of the proposed stormwater facilities and BMPs, types of materials to be used, total square footage of proposed impervious areas, volume calculations;
- A sketch plan showing location of existing and proposed structures, driveways, or other paved areas with approximate surface area in square feet; location of any existing or proposed utilities, especially onsite septic system and/or potable water wells showing proximity to infiltration facilities, location and dimensions of all proposed stormwater facilities and BMPs;
- Small Project Stormwater Management Worksheet;
- Signed [acknowledgment] [agreement] page for installation, operation and maintenance of stormwater facilities and BMPs (Refer to Appendix B); and
- Conservation District erosion and sediment control "Adequacy" letter as required by Municipal, County or State regulations;

B. Determination of Required Control Volume and Sizing Stormwater Facilities and BMPs
By following the simple steps outlined below in the provided example and Small Project Stormwater Management Worksheet, an applicant can determine the runoff volume that is required to be controlled and how to choose the appropriate stormwater facility or BMP to permanently remove the runoff volume from the site. Impervious area calculations must include all areas on the lot proposed to be covered by roof area or pavement which would prevent rain from naturally percolating into the ground, including proposed impervious surfaces such as sidewalks, driveways, parking areas, patios or swimming pools. **NOTE: Sidewalks, driveways or patios that are designed and constructed to allow for infiltration (permeable paving systems) are not included in this calculation.**

Small Project Sketch Plan: ***Example***

Project Name: _____ Date: _____.
Location: _____.



Step 1: Determine Total Impervious Surfaces and Required Control Volume:

TABLE 1: ***Example***

New Impervious Surface	Dimensions (width x length) (FT)	Area in SF		[1"] [2"] storm Multiplier (0.083) (0.167)	Required Control Volume [1"] [2"] in CF	
Garage Roof	*20'x40'*	*800*	SF	0.167	*133*	CF
Driveway Court	*20'x20'*	*400*	SF	0.167	*67*	CF
Driveway	*12'x50'*	*600*	SF	0.167	*100*	CF
			SF			CF
			SF			CF
			SF			CF

Total Required Control Volume (enter in Table 2): ***300*** **CF**

In Table 1, as in the example above and as shown on the Figure 1 example sketch plan, list each of the new improvements that create impervious area on the property along with their dimensions and total area in square feet in the first three columns. Then, depending on the design storm required by the municipality, multiply the area in square feet by the design storm multiplier to determine required control volume and list in the last column. Add each of the required control volumes together to equal the Total Required Control Volume and enter in Table 2.

Step 2: Sizing the Selected Volume Control BMP(s)

Several Best Management Practices (BMPs) are suitable for small stormwater management projects. However, their application depends on the volume required to be controlled, how much land is available, and the site constraints. Proposed residential development activities can apply both nonstructural and structural BMPs to control the volume of runoff from the site. A number of these different volume control BMPs are described below. Note that Figure 1 is an example of how these BMPs can be utilized on a property to control the total required control volume.

Credit can be taken for non-structural best management practices (BMPs) on a site to reduce the total volume required to be controlled. Credits must follow the requirements listed in this Appendix. Fill out Table 2 with proposed non-structural BMP credits and structural BMP control volumes entered in Tables 6 and 10 to meet the total required control volume.

TABLE 2: ***Example***

Required Control Volume (Table 1)	***300*** **CF**
Non-structural BMP Credit (Table 6)	*137* CF
Adjusted Required Control Volume (after credits) (Table 1 - Table 6)	***163*** **CF**
Structural BMP Control Volume (Table 10)	*202* CF
TOTAL Volume Controlled (Table 6 +Table 10)	***338*** **CF**

NOTE: Total Volume Controlled shall be **greater than or equal to** Required Control Volume**.**

Step 3: Choosing and Measuring Non-Structural BMPs

1. Tree Planting and Preservation

Trees and forests reduce stormwater by capturing, storing and evapotranspiring rainfall through their roots and leaves. Tree roots and leaf litter also create soil conditions that promote infiltration of rainwater into the soil and that breakdown excessive nutrients and pollutants. For more information refer to the PA DEP BMP Manual 5.6.3.

Considerations for credit:

- New tree plantings must be at least 6 feet in height and have at least a 2 inch caliper trunk, and the quantity entered in Table 3
- New tree plantings must be native to Pennsylvania. Refer to http://www.dcnr.pa.gov/Conservation/WildPlants/Pages/default.aspx
- Existing trees must have at least a 4" caliper trunk, and must be located within 100 feet of impervious surfaces
- Measure existing tree canopy by determining the square foot area covered within the drip line of the tree(s), and enter the area in Table 4
- Site runoff should be directed via sheet flow to the area(s) of trees being used for volume control

TABLE 3: New Tree(s)

New Trees	Volume Control Multiplier	Tree Quantity	Volume Controlled (CF)
Deciduous	6 CF	*2*	*12* CF
Evergreen	10 CF	*3*	*30* CF

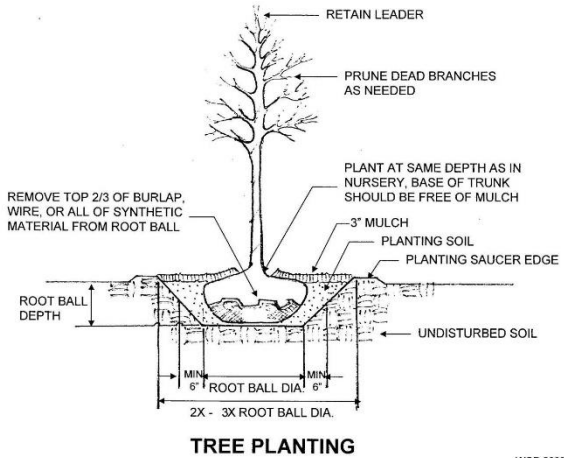
Total Volume Control Credit (new trees) **enter in Table 6**: *42* CF

TABLE 4: Existing Tree Canopy

Existing Tree Canopy (SF)	Distance of Impervious to Canopy (FT)	Volume Control Multiplier	Volume Controlled (CF)
SF	0 FT to 20 FT	0.0833	CF
2000 SF	20 FT to 100 FT	0.0416	*83* CF

Total Volume Control Credit (ex. trees) **enter in Table 6**: *83* CF

Remove all synthetic material from the root ball before planting



TREE PLANTING

WCD 2009 N.T.S.

2. Minimize Soil Compaction and Revegetate (lawn or meadow seeding)

When soil is overly compacted during construction it can cause a drastic reduction in the permeability of the soil and rarely is the soil profile completely restored. Runoff from overly compacted vegetated areas can resemble increased runoff from impervious areas. Minimizing soil compaction during the construction process, or restoring and amending compacted soils and revegetating them after construction can greatly increase natural infiltration on a site. For more information refer to the PA DEP BMP Manual 5.6.2 and 5.6.3.

Considerations for credit:

- Area(s) shall not be stripped of topsoil and areas shall be protected from construction vehicles and lay down space with construction fencing or mats. Enter square foot area in Table 5.
- Soil ripping and soil amendments can be used to restore the soils
- Vegetation should be used, especially native plants and meadow mixes as an alternative to lawn

TABLE 5: Minimize Soil Compaction *Example*

Type of stabilization	Area of minimal compaction (SF)	Volume Control Multiplier	Volume Controlled (CF)
Meadow	SF	0.0275	CF
Lawn	*600* SF	0.0208	*12* CF

Total Volume Control Credit (min. compaction) **enter in Table 6**: *12* CF

Plywood sheets protect lawn from compaction

Fencing protects areas from compaction

Step 4: Determining Non-Structural BMP Credit:

TABLE 6: Non-Structural BMP Credit Summary: *Example*

Non- structural BMP	**Storage Volume Credit (CF)**
New Tree	*42* CF
Existing Tree Canopy	*83* CF
Minimized Soil Compaction	*12* CF
TOTAL (enter in Table 2)	***137*** **CF**

Step 5: Choosing and Sizing Structural BMPs

1. Infiltration Trench

An infiltration trench is a linear stormwater management BMP consisting of a continuously perforated pipe at a minimum slope in a stone-filled trench. During small storm events, infiltration trenches can significantly reduce volume and serve in the removal of fine sediments and pollutants. Runoff is stored in the pipe and between the stones and infiltrates through the bottom of the facility and into the surrounding soil matrix. Runoff should be pretreated using vegetative buffer strips or swales to limit the amount of coarse sediment entering the trench which can clog and render the trench ineffective. In all cases, an infiltration trench should be designed with a positive overflow to a stable outlet point. For more information refer to the PA DEP BMP Manual 6.4.4.

Design Considerations:

- Continuously perforated pipe (min 4" diameter) set at a minimum slope (1%) in a stone filled, nearly level-bottomed trench on un-compacted soils.
- The trench width and depth can vary, but it is recommended that infiltration trenches be no wider than four (4) feet, and a minimum of thirty (30) inches and maximum six (6) feet in depth.
- Stone fill should be clean, angular stone, separated from soil layers by four (4) inches of straw (top and bottom) or a nonwoven geotextile (top, sides, and bottom).
- A minimum of 6" of topsoil can be placed over trench and vegetated.
- Cleanouts or inlets should be installed at both ends and at intersections of the infiltration trench and at appropriate intervals to allow access to the perforated pipe.
- The discharge or outlet from the infiltration trench should be safely conveyed to a stable vegetated area, natural watercourse, the curb or gutter line of roadway or existing storm collection/conveyance/control system as applicable.
- Volume of facility = Depth x Width x Length x Void Space of the gravel bed (assume 40%).

Maintenance:

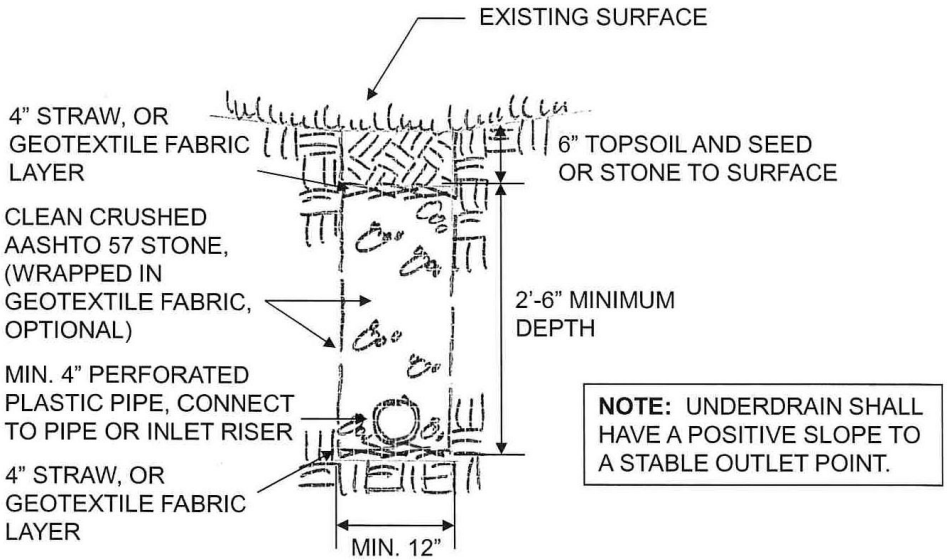
- Cleanouts, catch basins and inlets should be inspected at least two times a year and cleaned out as necessary to maintain function of the system.
- The vegetation along the surface of the infiltration trench should be maintained in good condition and any bare spots should be re-vegetated as soon as possible.
- Vehicles should not be parked or driven on the trench and care should be taken to avoid soil compaction by lawn mowers.

TABLE 7 - Determining size of infiltration trench for volume control: *Example*

Required Control Volume (CF) From Table 2	Storage Volume Divider	Trench Volume (CF)	Trench Depth (FT)	Trench Width (FT)	Trench Length (FT)	Volume Controlled
163	0.4	*413 CF*	*3FT*	*3FT*	*46FT*	*165 CF*

Total Volume Control Credit (Inf. trench) **enter in Table 10***:* *165* CF

Infiltration Trench Construction:



Perforated pipe covered with stone and wrapped in fabric

Perforated pipe covered in stone with straw separation layers

2. Rain Garden

A rain garden is a landscaped shallow depression that uses mulch, soil mix, and deep rooted plants to capture, adsorb and infiltrate stormwater runoff from roofs, and pavement. For more information refer to the PA DEP BMP Manual 6.4.5.

Design considerations:

- A rain garden should be located on nearly level to gently sloping ground and no closer than 10 feet to a building foundation and 25 feet from septic field or wellhead.
- A rain garden can vary in length, width and depth, but should have a ponding depth of 6 to 12 inches, and a total surface depth of no greater than 18 inches.
- Side slopes within the garden should not exceed 3:1 horizontal to vertical.
- The rain garden should be constructed in layers with a (min 4") perforated underdrain in a clean angular stone envelope, separated from soil layers by four (4) inches of straw (top and bottom) or a nonwoven geotextile (top, sides, and bottom), covered with 12 inches to 36 inches of 50-30-20 topsoil-sand-compost mix or as approved by the municipality, and 3 inches of shredded bark mulch or vegetated cover. Soil depth should be determined by plant choices and control volume requirements.
- Vegetation should be deep rooted and tolerant of wet and dry conditions, salts and environmental stress.
- An emergency overflow should be set in the rain garden such as a vertical pipe or inlet box, with basket type grate set even with the ponding depth, below the surrounding ground elevation and connected to the perforated underdrain and an outlet pipe.
- The outlet from the rain garden should be safely conveyed to a stable vegetated area, natural watercourse, the curb or gutter line of roadway or existing storm collection/conveyance/control system as applicable.

Maintenance:

- Cleanouts, catch basins and inlets should be inspected at least two times a year and cleaned out as necessary to maintain function of the system. Detritus should be removed from the rain garden as necessary to prevent clogging of the overflow outlet.
- The vegetation should be maintained in good condition and replaced as necessary. Rain garden plants may need to be watered during dry spells.
- Rain garden should be weeded and shredded bark mulch should be amended as necessary to prevent volunteer weeds.

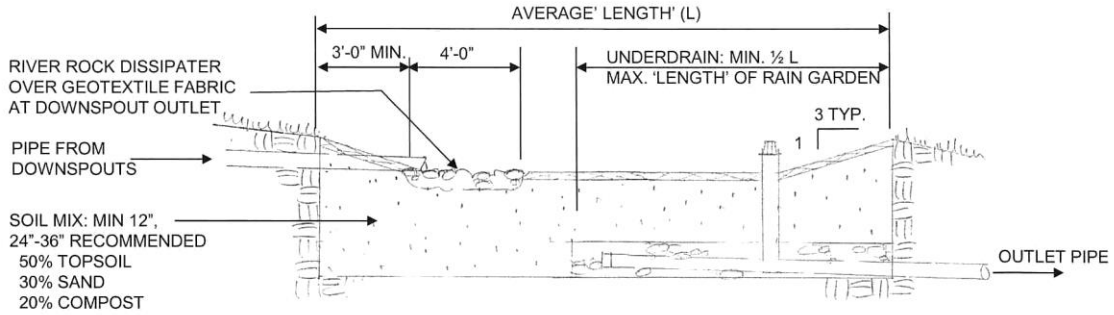
TABLE 8 – Determining Size of Rain Garden for volume control: *Example*

(surface volume, soil storage volume should **each** be greater than or equal to required control volume)

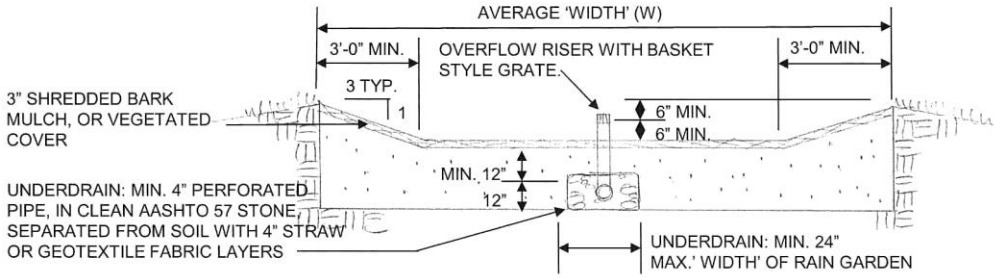
Required Control Volume (CF) from Table 2	Ponding Depth (0.5 FT to 1.0 FT) Divider	Rain Garden Surface Area (SF)	Rain Garden Width (FT)	Rain Garden Length (FT)	Soil Mix Depth (1 FT to 3 FT) Multiplier	Soil Storage Volume Multi-plier	Soil Storage Volume (<= RCV)	Volume Controlled (soil)
165 CF	**0.5**	*330 SF*	*12 FT*	*28FT*	*2 FT*	0.3	*202 CF*	*202 CF*

Total Volume Control Credit (rain garden) **enter in Table 10***:* *202* CF

Rain Garden Construction:



SECTION AA



SECTION BB

Mark rain garden location to avoid utilities

Excavate rain garden at least 10’ from foundation

Separate underdrain layer from soil with fabric or straw

Use decorative but tolerant plants for seasonal interest

3. Dry Well / Seepage Pit

A dry well or seepage pit is a subsurface storage facility that temporarily stores stormwater runoff from roofs and infiltrates it into the surrounding soils. Roof downspouts connect directly to a dry well or seepage pit that is an excavated pit filled with clean angular stone with an overflow pipe to ensure the system will not be overwhelmed. Prefabricated chamber systems or perforated pipe sections are commercially available for use as dry wells and should be designed, constructed and maintained according to the manufacturer's recommendations. For more information on dry wells and seepage pits refer to the PA DEP BMP Manual 6.4.6.

Design considerations:

- A dry well / seepage pit should be located on nearly level to gently sloping ground and no closer than 10 feet to a building foundation and 25 feet from septic field or wellhead.
- A dry well / seepage pit can vary in length, width and depth, but should be a minimum depth of 3 feet.
- A downspout should direct water to the surface, a system of perforated pipes should distribute the water throughout the system with an inspection/cleanout pipe to the surface, and an over flow pipe should outlet excess water during intense storms.
- The storage system can be clean angular stone, separated from soil layers by four (4) inches of straw (top and bottom) or a nonwoven geotextile (top, sides, and bottom).
- The outlet from the dry well / seepage pit should be safely conveyed to a stable vegetated area, natural watercourse, the curb or gutter line of roadway or existing storm collection/conveyance/control system as applicable.

Maintenance:

- Drywells and seepage pits should be inspected at least 4 times a year, and after each storm event exceeding 1 inch.
- Remove sediment, debris, detritus and any other waste material from the system as necessary.
- Regularly clean out gutters and downspouts to ensure proper connections and to maintain effectiveness of the system.
- Replace any filter screen or clean out any sump box that may intercept roof runoff as necessary.

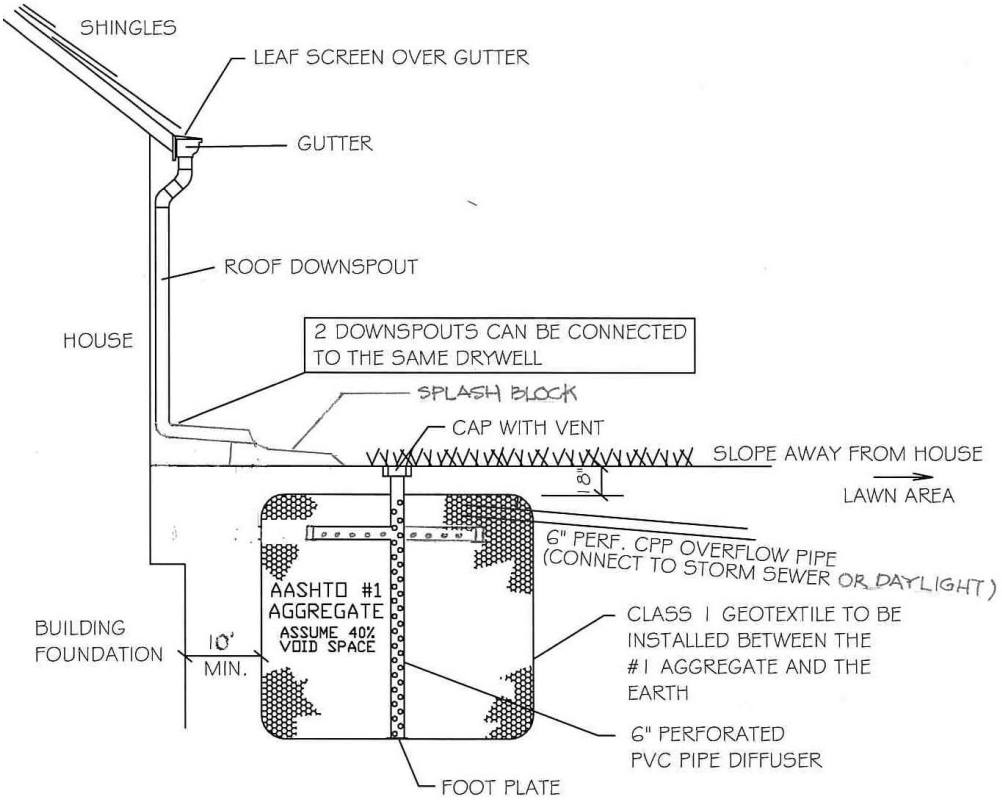
Table 9: Determining Size of Dry Well (stone filled) for volume control: *Example*

Required Control Volume (CF) from Table 2	Storage Volume Divider	Dry Well Volume (CF)	Dry Well Depth (FT)	Dry Well Width (FT)	Dry Well Length (FT)	Volume Controlled (CF)
165	**0.4**	*413 CF*	*5 FT*	*9 FT*	*9.2 FT*	*165 CF*

Total Volume Control Credit (dry well) **enter in Table 10***:* *165* CF

NOTE: Applicants are required to utilize the manufacturer's recommendations for sizing proprietary stormwater infiltration systems, and to submit supporting documentation for meeting the required control volume and maintenance requirements.

Dry Well (stone filled) Construction:



Excavate a drywell at least 10’ from foundation

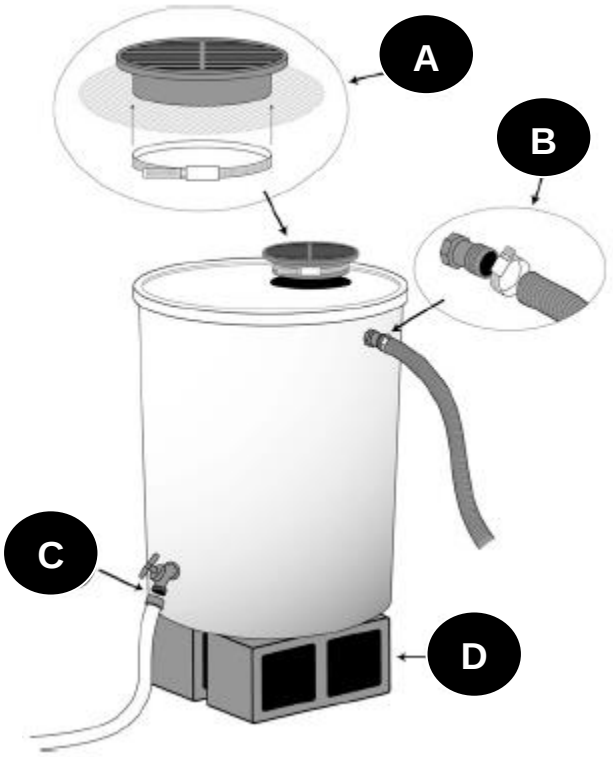
Separate stone fill from soil with straw layers or fabric

4. Alternative BMP Capture and Re-Use (rain barrel / cistern)

Rain barrels and cisterns are above or below ground containers used for temporary storage of rainwater, to be used for landscape irrigation and other similar uses after the rain has ended. A rain barrel or cistern **cannot be used** as a volume control because infiltration is not guaranteed after a storm event, but they are viable alternative method to capture and reuse stormwater.

Considerations:

- Rain barrels and cisterns should be directly connected to a downspout with a mosquito screen
- There should be a means to release the water after a storm event to provide storm volume for the next event
- An overflow, near the top of the container should direct water to a vegetated area away from any structures
- Barrels can be connected in series to provide more volume collection



ANATOMY OF A RAIN BARREL

A – hole in top for downspout connection, with screen for mosquitoes

B – hole on side near top for overflow hose

C – hole on side near

Step 6: Determining BMP Volume Control

TABLE 10: Structural BMP Volume Control Summary:

Structural BMP	**Storage Volume (CF)**
Infiltration Trench	CF
Rain Garden	*202* CF
Dry Well	CF
TOTAL (enter in Table 2)	***202*** **CF**

Use Small Project Stormwater Management Worksheet

Step 7: Post-Installation Operation and Maintenance Requirements

It is the property owner's responsibility to properly maintain any stormwater facilities and BMPs in accordance with the minimum maintenance requirements listed in this Appendix. The property owner shall submit a signed [acknowledgment] [agreement], [and declaration of easement] to the [Municipality] for installation, and maintenance of any proposed stormwater management facilities and BMPs. It is also the property owner's responsibility to inform any future owners of the function, operation and maintenance needed for any BMPs on the property prior to the purchase of the property.

Refer to Sample(s) Appendix B

SMALL PROJECT STORMWATER MANAGEMENT WORKSHEET
For [Municipality]

Project Name: _____Date:_____.
Location:_____.

TABLE 1: Determination of Control Volume Requirements:

New Impervious Surface	Area in SF	[1"] [2"] storm Multiplier (0.083) (0.167)	Required Control Volume [1"] [2"] in CF
	SF		CF
	SF		CF
	SF		CF
	SF		CF
	SF		CF
	SF		CF

Total Required Control Volume (enter in Table 2): _____ CF

TABLE 2: Determination of Volume Controlled:

Required Control Volume (Table 1)	**CF**
Non-structural BMP Credit (Table 6)	- CF
Adjusted Required Control Volume (after credits) (Table 1 – Table 6)	**CF**
Structural BMP Control Volume (Table 10)	CF
TOTAL Volume Controlled (Table 6 + Table 10)	**CF**

NOTE: Total Volume Controlled shall be **greater than or equal to** Required Control Volume**.**

Determining Non-Structural BMP Credit:

TABLE 3: New Tree(s)

New Trees	Volume Control Multiplier	Tree Quantity	Volume Controlled (CF)
Deciduous	6 CF		CF
Evergreen	10 CF		CF

Total Volume Control Credit (new trees) **enter in Table 6**: _____ CF

TABLE 4: Existing Tree Canopy

Existing Tree Canopy (SF)	Distance of Impervious to Canopy (FT)	Volume Control Multiplier	Volume Controlled (CF)
SF	0 FT to 20 FT	0.0833	CF
SF	20 FT to 100 FT	0.0416	CF

Total Volume Control Credit (ex. trees) **enter in Table 6**: _____ CF

TABLE 5: Minimize Soil Compaction

Type of stabilization	Area of minimal compaction (SF)	Volume Control Multiplier	Volume Controlled (CF)
Meadow	SF	0.0275	CF
Lawn	SF	0.0208	CF

Total Volume Control Credit (min. compaction) **enter in Table 6**:_____ CF

TABLE 6: Non-Structural BMP Credit Summary:

Non- structural BMP	**Storage Volume Credit (CF)**
New Tree	CF
Existing Tree Canopy	CF
Minimized Soil Compaction	CF
TOTAL (enter in Table 2)	**CF**

Sizing of Structural BMPs:

TABLE 7: Infiltration Trench (stone filled)

Required Control Volume (CF)	Storage Volume Divider	Trench Volume (CF)	Trench Depth (FT)	Trench Width (FT)	Trench Length (FT)	Volume Controlled
CF	0.4	CF	FT	FT	FT	CF

Total Volume Control Credit (Inf. trench) **enter in Table 10***:* _____ CF

TABLE 8: Rain Garden (surface & soil storage volume should be greater than or equal to required control vol.

Required Control Volume (CF)	Ponding Depth (0.5 FT to 1.0 FT) Divider	Rain Garden Surface Area (SF)	Rain Garden Width (FT)	Rain Garden Length (FT)	Soil Mix Depth (1 FT to 3 FT) Multiplier	Soil Storage Volume Multi-plier	Soil Storage Volume (<= RCV)	Volume Controlled (soil)
CF	FT	SF	FT	FT	FT	0.3	CF	CF

Total Volume Control Credit (rain garden) **enter in Table 10***:* _____ CF

TABLE 9: Dry Well (stone filled)

Required Control Volume (CF)	Storage Volume Divider	Dry Well Volume (CF)	Dry Well Depth (FT)	Dry Well Width (FT)	Dry Well Length (FT)	Volume Controlled (CF)
CF	0.4	CF	FT	FT	FT	CF

Total Volume Control Credit (dry well) **enter in Table 10***:* _____ CF

TABLE 10: Structural BMP Volume Control Summary:

Structural BMP	**Volume Controlled (CF)**
Infiltration Trench	CF
Rain Garden	CF
Dry Well	CF
TOTAL (enter in Table 2)	**CF**

Westmoreland County Model Stormwater Management Ordinance
APPENDIX D
[Municipality]
Stormwater Management Plan Checklist
See [Municipal] Stormwater Ordinance for complete requirements

Project Name:_____ Date:_____

Location:_____ Performance District:_____.

Type of Plan:___ Residential, ___Commercial, ___Institutional, ___Industrial, ___Recreational, __Other

Owner: _____ Contact Information:_____.

Plan Preparer:_____ Contact Information:_____.

Submission Requirements

- Checklist
- Application
- Fees and
- Location map (USGS)
- [x] sets completed plans, narrative
- E&S plan, as submitted for approval
- Operation and maintenance agreement
- Municipal notification(s)
- Financial guarantees, maintenance fund

General Requirements

Narrative:

- Project description, including Watershed Performance District, existing and proposed features and improvements, soils and limitations, landform, land cover, drainage areas, utilities, proposed SWM facilities and BMPs, easements and other information required by the [Municipality] stormwater ordinance
- Stormwater calculations
- Project schedule
- Construction sequence, including phases if applicable
- Justification for SWM facilities and/or BMPs
- Operation and Maintenance requirements and responsible party(s)

Plan:

- Location map (USGS)
- Watershed Performance District
- Existing natural features
- Soils; and limitations
- Landform; existing and proposed contours at 2’ intervals, or 5’ intervals for slopes >15%
- Land cover; existing and proposed improvements
- Drainage areas; existing and proposed
- Utilities; existing and proposed
- SWM facilities and BMPs; existing and proposed
- Easements, including offsite easements for drainage
- Stormwater construction details and sections (as applicable)
- Stormwater construction notes and sequence
- Operation and Maintenance requirements and responsible party(s)

Westmoreland County Model Stormwater Management Ordinance

[APPENDIX E]

[FEES, FINANCIAL GUARANTEES]

[to be completed by municipality]

APPENDIX C

Decision Making Flowchart Tool

The entire flowchart tool may be found at

https://www.westmorelandstormwater.org/integrated-water-resource-plan-iwrp/flowchart-tool/

DECISION MAKING FLOWCHART TOOL

The Integrated Water Resources Plan (IWRP) Flowchart Tool has been designed with the assumption that ALL land use decision makers will be the primary users. **The Flowchart Tool can be found at http://www.paiwrp.com/**

During the development of the flowchart, it became apparent that the Tool could be useful for all County stakeholders, including planners, assessors, utilities, educators, and local, state, regional, national regulators, property owners, developers, designers, and even and tailored and adopted by other counties.

The IWRP Flowchart is the instrument by which the user will be led through a logical process of questions and recommendations which will ensure the user considers not only what is related to water resource management in the county, but also how the user's project(s) and/or actions will affect these resources, what regulations are to be met and what tools are available for use.

Integrated Water Resources Plan (IWRP) Flowchart Tool

The Integrated Water Resources Plan (IWRP) Flowchart includes decisions, actions and recommendations which give more detail and definition to each process step of the flowchart. When thinking of how everything related to water interacts and ties together, the vision becomes very complex. The flowchart, and accompanying recommendations, is the County's attempt to tie everything related to water resources together in an understandable manner, and incorporating the processes, studies, reports, agencies, regulations and policies which already exist.

Flowchart

The flowchart itself is the instrument by which the user will be led through a logical process of questions and suggestions which will ensure the user considers not only what is related to water resource management in the County, but also how the user's project(s) and/or actions will affect these resources. In essence, the flowchart will tie everything related to water resources together in a process that will hopefully be beneficial for County stakeholders, as well as for County water resources.

In an effort to be user friendly, the flowchart begins with one leg that takes users through considerations that all land use decisions makers should consider, then it is divided into four (4) segments or "legs." This includes the Infrastructure and Utility Leg, the Agriculture Leg, the Land Development Leg, and the Resource Extraction Leg. A graphic representation of the flowchart is provided in a series of pages following this summary.

The goal of the flowchart is to pull together what already exists, make stakeholders aware of what exists, explain enough about what exists to allow the user to determine if it is pertinent to a particular project, and provide contact information should more detailed information be desired. An inherent value of the flowchart is that it is applicable to all municipalities in the County and could easily be adapted for use by other counties in Pennsylvania.

Flowchart Instructions

The instructions for using the flowchart, as set forth below, define and explain the symbols used in the flowchart. They also briefly describe the process flow path.

Arrow Symbol
The arrow shows the direction of flow to be taken by the process of working through the flowchart

Decision Diamond Symbol
The diamond is used where a decision is needed in order to determine which flowchart path will be followed

Action Rectangle
The rectangle contains action steps or tasks to be completed in the flowchart process.

Connection Symbols (to & from)
The paired connection symbols direct users to another section (leg) of the flowchart by looking for the matching symbol in order to avoid redundant/excessive lines in the flowchart.

Process (symbol) label - Each component of the flowchart has a unique identifying label which identifies the flowchart leg. The flowchart legs/sub-legs are identified as follows:

PROJQ – Preliminary Project Questions that all land-use decisions makers should consider

IU – Infrastructure and Utility: Any project dealing with support facilities such as transportation, water, sewer, communication, oil and gas and any other utility conveyance is considered Infrastructure and utility and should follow the Infrastructure and Utility leg.

A – Agriculture: Any project dealing with agriculture, agricultural structures and facilities and/or agricultural activity associated with streams and waterways such as streambank fencing, stream crossings, riparian buffers, ponds etc. is considered to be agriculture, and should follow the Agriculture leg.

LD – Land Development : Any project dealing with land development under the jurisdiction of municipal land regulations such as buildings, structures, paving, earth disturbance, subdivision of land, etc. is considered land development and should follow the Land Development leg.

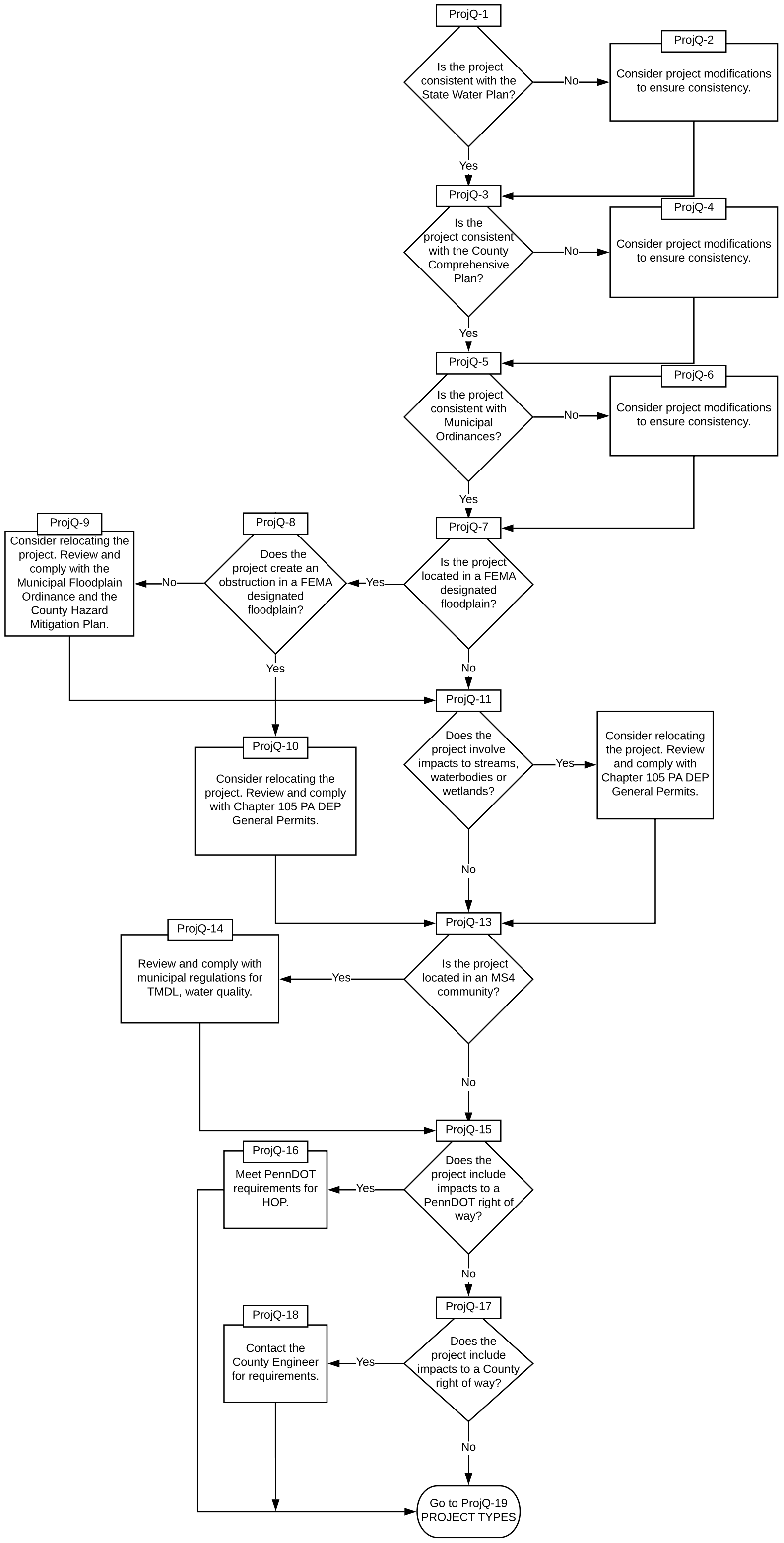
RE – Resource Extraction : Any project dealing with the removal or development of natural resources such as timber, rock, soil, coal, oil and gas, etc is considered resource extraction and should follow the Resource Extraction leg.

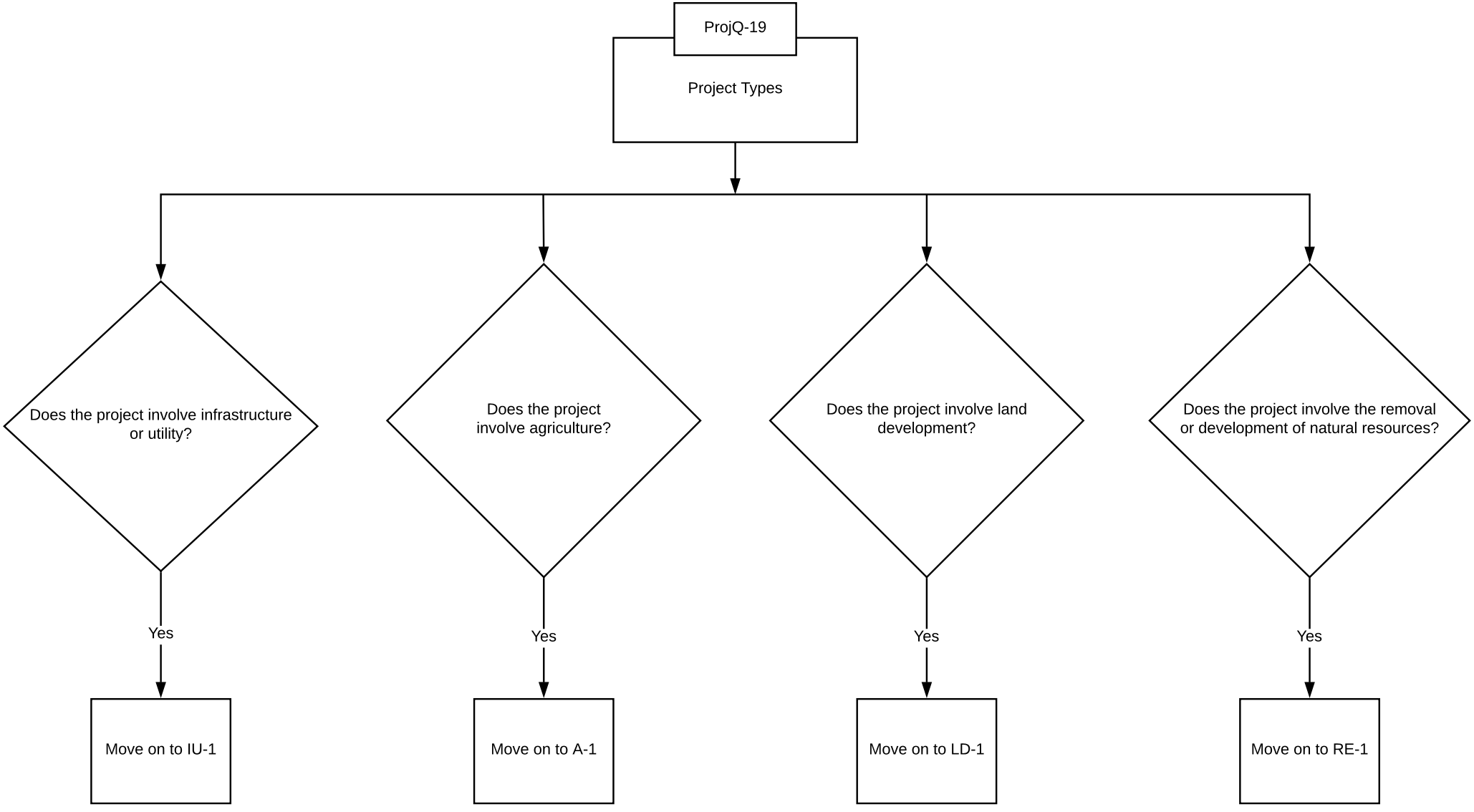
In addition, the flowchart process steps are identified by an unique individual number which follows the flowchart leg letter. For example, the first process step of the Agriculture Leg is A1.

Flowchart Recommendations

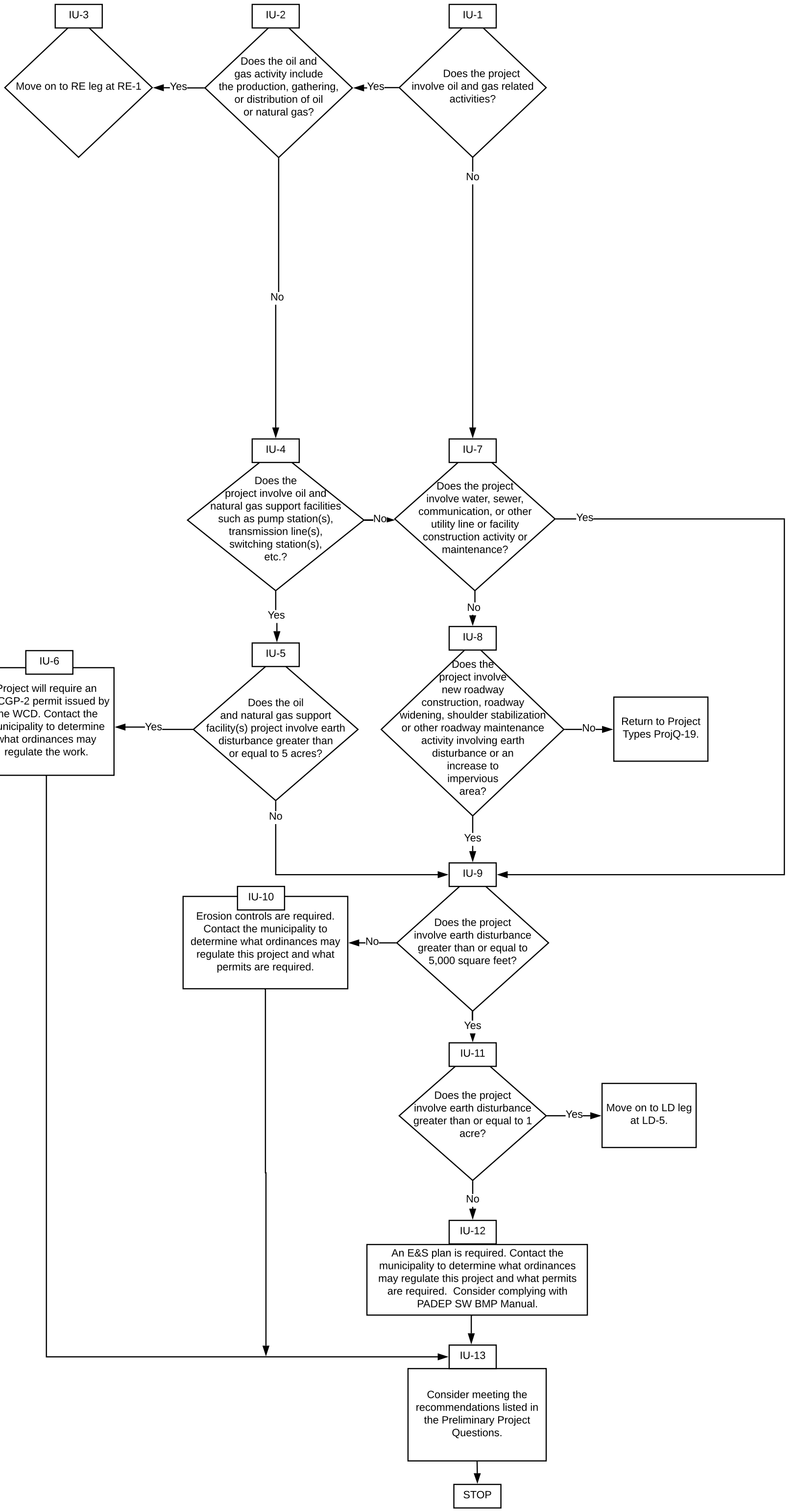
The flowchart recommendations, which are inserted after the flowchart, provide a brief description, definition, and/or explanation for each uniquely identified flowchart step. The recommendations will be most beneficial to stakeholders who are not familiar with water resources programs, policies, regulations, planning, design and development. Many users will find the flowchart to be most helpful when used in conjunction with the recommendations. **The Flowchart Tool can be found at** http://www.paiwrp.com/ . A graphic representation of the Flowchart Tool is on the following pages.

Westmoreland County IWRP - Preliminary Project Questions

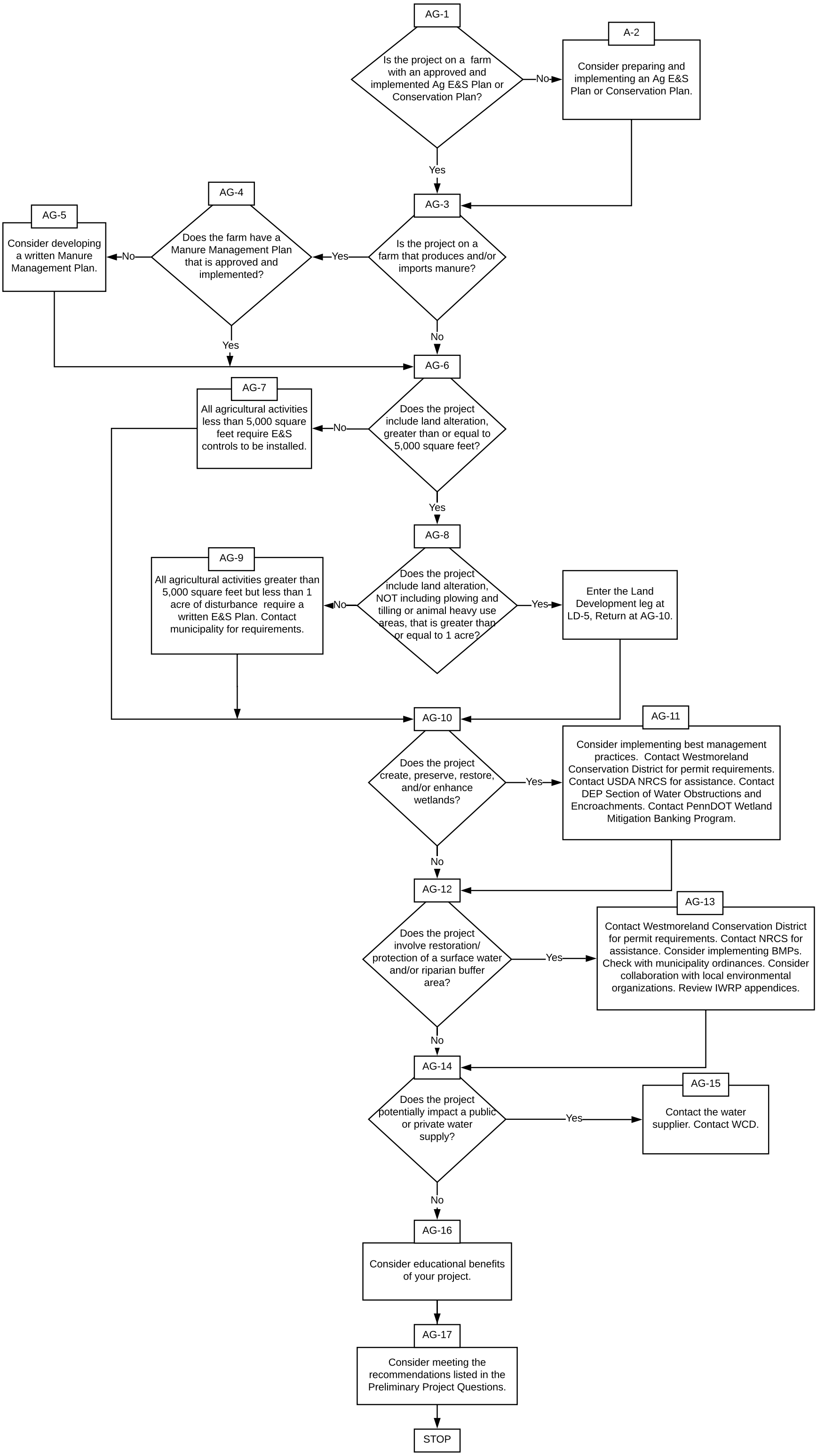



ProjQ-19
Project Types
Does the project involve infrastructure or utility?
Does the project involve agriculture?
Does the project involve land development?
Does the project involve the removal or development of natural resources?
Yes
Yes
Yes
Yes
Move on to IU-1
Move on to A-1
Move on to LD-1
Move on to RE-1

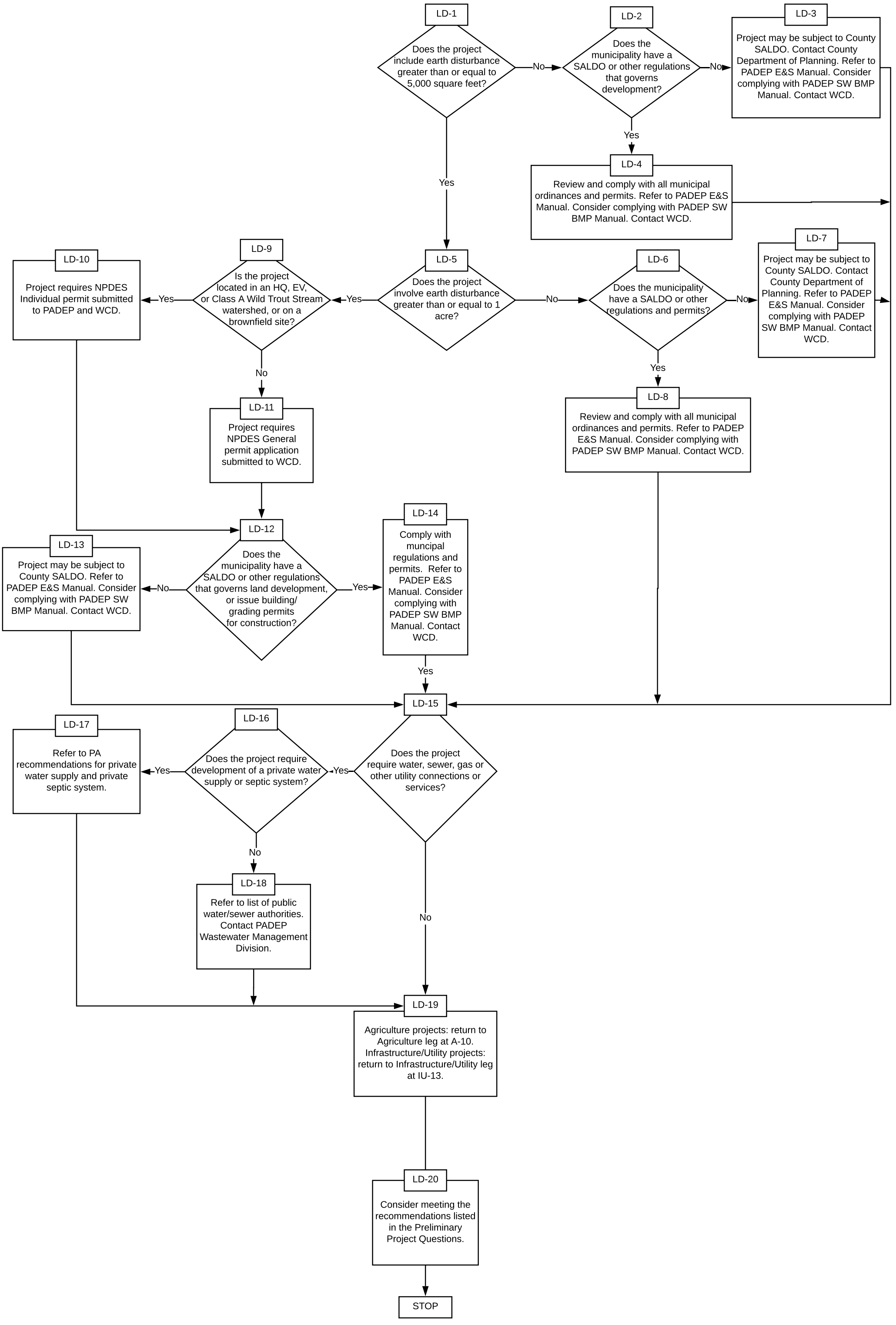
Infrastructure and Utility (IU)



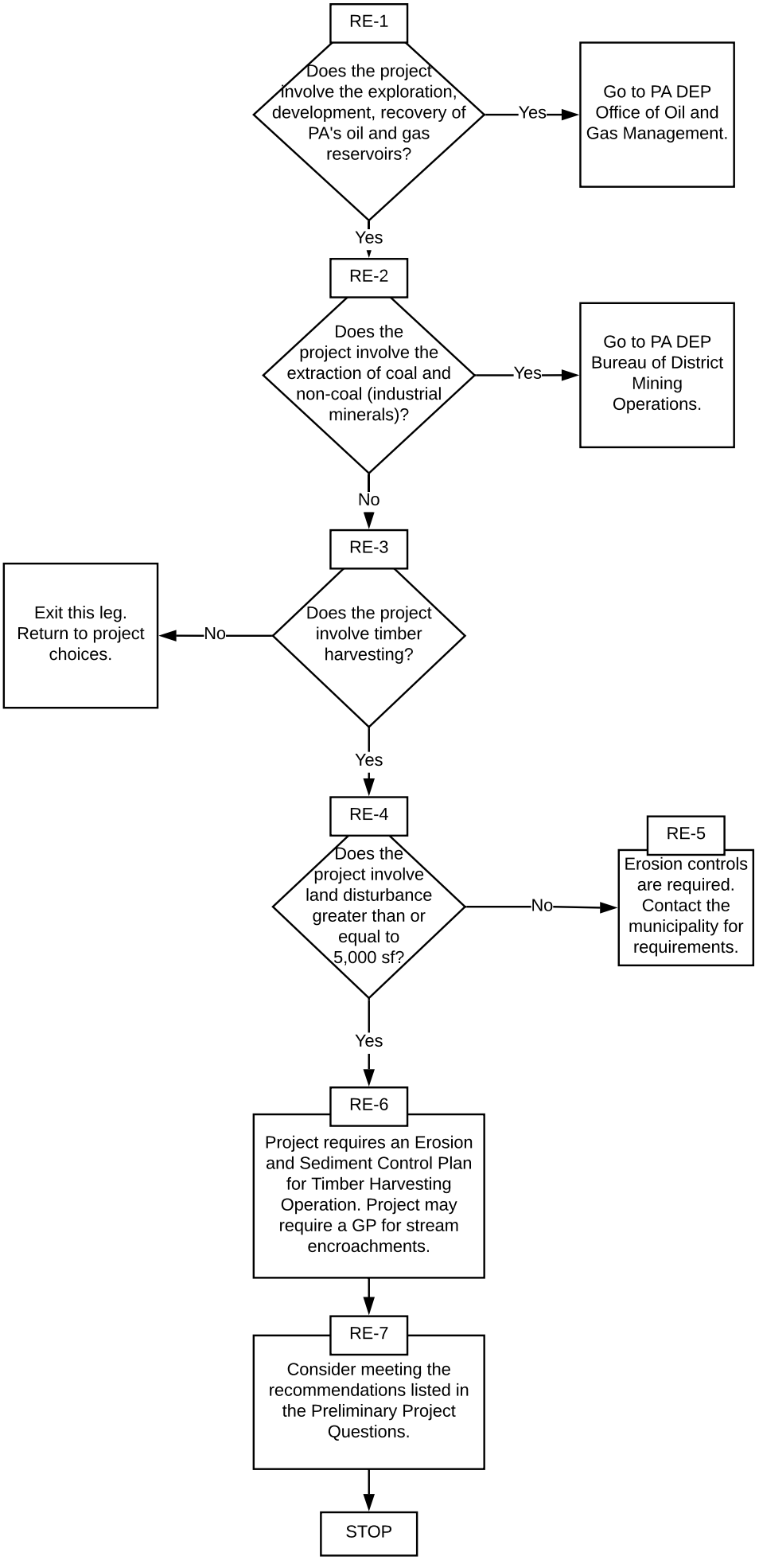
Agriculture (AG)



Land Development (LD)



Resource Extraction (RE)



APPENDIX D

BMP Portfolio & Maintenance Guidelines

The entire set may be found at

https://www.wcdpa.com

APPENDIX E

Homeowner's Guide to Stormwater Management/Toolkit

The entire set may be found at

https://www.wcdpa.com

APPENDIX F

Resource Library

The entire resource library may be found at

https://www.westmorelandstormwater.org/resource-library/

Library: a summary of resources and links available for reference

Regulatory

PA DEP Stormwater Regulations, Act 167
http://www.dep.pa.gov/Business/Water/CleanWater/StormwaterMgmt/Pages/Act-167.aspx

PA DEP NPDES Program
http://www.dep.pa.gov/Business/Water/CleanWater/WastewaterMgmt/Pages/NPDESWQM.aspx

EPA NPDES Program
https://www.epa.gov/npdes

PA DEP MS4 Online Mapping Tool
http://www.depgis.state.pa.us/MS4/index.html

PA DEP Library
http://www.depgreenport.state.pa.us/elibrary/?aspxerrorpath=/elibraryredirect/dsweb/HomePage

Research

Villanova Urban Stormwater Partnership
http://www1.villanova.edu/villanova/engineering/research/centers/vcase/vusp1.html

Center for Watershed Protection
https://www.cwp.org/

University of New Hampshire Stormwater Center
https://www.unh.edu/unhsc/

Penn State Center for Dirt and Gravel Road Studies
https://www.dirtandgravel.psu.edu/

Interlocking Concrete Pavement Institute
https://www.icpi.org/paving-systems/permeable-pavers

Permeable Concrete, National Ready Mixed Concrete Association
http://www.perviouspavement.org/

Water Use and Water Rights in Pennsylvania
http://www.perviouspavement.org/

Design

PA DEP Erosion and Sediment Control Manual
http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=7700&DocName=363-2134-008.pdf

PA DEP Stormwater BMP Manual
http://www.dep.state.pa.us/dep/subject/advcoun/stormwater/manual_draftjan05/section06-structuralbmps-part1.pdf

PennDOT Drainage Manual
https://www.dot.state.pa.us/public/pubsforms/Publications/PUB%20584.pdf

NRCS Conservation Catalog
https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1101559.pdf

EPA Online Training in Watershed Management
https://www.epa.gov/watershedacademy/online-training-watershed-management

Local Organizations

Allegheny County Sanitary Authority
http://www.alcosan.org/

Pittsburgh Water and Sewer Authority
http://www.pgh2o.com/

3 Rivers Wet Weather
http://www.3riverswetweather.org/#

Turtle Creek Watershed Association
http://www.turtlecreekwatershed.org/home.html

Sewickley Creek Watershed Association
http://www.sewickleycreek.com/

Loyalhanna Watershed Association
https://www.loyalhannawatershed.org/

Mountain Watershed Association
http://www.mtwatershed.com/

Nine Mile Run Watershed Association
https://ninemilerun.org/

APPENDIX G

Watershed Plans

Westmoreland Watershed Plans
As of 2/2016

Allegheny River

- Allegheny River Conservation Plan, 2005

http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_001726.pdf

- Allegheny River Watershed Stewardship and Resource Guide
  - A supplement to the Allegheny River Conservation Plan, 2005

Conemaugh River/ Kiskiminitas River

- Kiski- Conemaugh River Conservation Plan, 2017
  - Kiski-Conemaugh Stream Team in process of updating plan.

http://www.dcnr.state.pa.us/cs/groups/public/documents/document/D_001868.pdf

- Tubmill Creek Coldwater Conservation Plan, 2009

http://www.coldwaterheritage.org/docs/2007-grantees/tubmill-creek.pdf?sfvrsn=2

Loyalhanna Creek

- Loyalhanna Creek Watershed Assessment and Restoration Plan, 2002-2003

http://www2.datashed.org/sites/default/files/lwa_plan_part_1_resized.pdf

Indian Creek

- Upper Indian Creek Watershed Assessment Report, 2004
  - Upper Indian Creek Watershed (the headwater sub basin to the Indian Creek Watershed.)

Jacobs Creek

- Jacobs Creek Watershed Implementation and Restoration Plan, 2009

http://www.jacobscreekwatershed.org/articles-reports/

Monongehela River

- Monongahela River Watershed Initial Watershed Assessment September 2011 (Revised February 2012)

http://www.lrp.usace.army.mil/Portals/72/docs/HotProjects/signed%20IWA_final_revised%20FEB12%20public%20comments%20incorporated.pdf

Pucketa Creek

- Pucketa and Chartiers Watershed Assessment and Restoration Plan, 2005

Sewickley Creek

- Sewickley Creek Watershed Conservation Plan, 2003

http://waterlandlife.org/assets/Sewickley%20Creek%20Final%20WCP%20compressed.pdf

- Donohoe Creek Watershed Protection and Restoration Plan, 2003
  - A sub basin to Sewickley Creek Watershed

Turtle Creek

- Turtle Creek Watershed River Conservation Plan, 2002

http://www.dcnr.state.pa.us/cs/groups/public/documents/document/D_001514.pdf

- Turtle Creek Watershed Act 167 Stormwater Management Plan

http://www.wcdpa.com/bmp/TCWAct167SWMPlan.pdf

Youghiogheny River

- River Conservation Plan of the Middle Youghiogheny River Corridor, 2000?

http://www.dcnr.state.pa.us/cs/groups/public/documents/document/D_001888.pdf

APPENDIX H

Water Supply and Wastewater Treatment

- Water Authorities
- Sewage Authorities
- All About Private Water Supplies
- All About Private Septic Systems

Water Authorities Serving
Westmoreland County

Drinking Water Providers	General Service Area	Source of Water	Location of Filtration Plant(s)	Number of Customers	Gallons of Water Treated/day
MAWC	Westmoreland County	Beaver Run Resevoir & Youghiogheny River	Bell Township South Connellsville (Indian Creek)	50,000	24,000,000 40,000,000
Highridge (Blairsville)	Northern Westmoreland County	Mountain springs near Seward and New Florence	Blairsville	5,209	1,771,013
Latrobe Municipal Authority	Greater Latrobe Area	H.A. Stewart Reservoir	Latrobe	9,500	6,000,000
Derry Boro Municipal Authority	Derry Township, Borough	McGee Run Reservoir and Ethel Springs Reservoir	Derry Township, Borough	2,500	600,000
Ligonier Township Water Authority	Ligonier Township	Reservoir above Waterford (South Branch Creek)	Ligonier Township	2,070	375,000
Municipal Authority of New Kensington	Greater New Kensington Area	Allegheny River	New Kensington	47,800	8,000,000
Youngstown Borough Municipal Authority	Youngstown Borough	Latrobe Municipal Authority	N/A (Latrobe)	850	N/A
Indian Creek Valley Water Authority	Donegal, Mount Pleasant and Donegal Borough	Pritts Spring, Grimm Spring & Neal Run Well	Indian Head	7,000	411,032
Borough of Charleroi Authority	Rostraver Township & Monessen	Monongahela River	Charleroi	11,196	6,000,000
Wilkinsburg Penn Joint Water Authority	Western Westmoreland County	Allegheny River	Pittsburgh	40,000	22,000,000

Sewage Authorities Serving
Westmoreland County

Sewage Authority	Sewage Treatment Plant (STP)	General Service Area	Location of STP	Number of Customers	Hydraulic Capacity (Gallon/Day)
	Hempfield Park Sewage Treatment	Hempfield Park	Greensburg	1	5,000
	I-70 Industrial Park Sewage Treatment Plant	Industrial Park in Smithton	Smithton	11	50,000
	Sewickley STP	Sewickley Twp	Irwin	1,210	440,000
	Avonmore Borough Sewage Treatment Plant	Avonmore Boro	Avonmore	437	190,000
	Youngwood Borough Sewage (MAWC)	Youngwood Boro, Hempfield Twp	Youngwood - bought by MAWC	1,429	500,000
	Ligonier WPCP	Ligonier Boro, Ligonier Twp	Ligonier	1,678	900,000
	Darragh Sewage Treatment Plant	Hempfield Twp, Arona Boro, etc	Darragh	2,257	1,120,000
	Jeannette WWTP	Jeannette, Penn Boro, Penn Twp, Hempfield Twp	Penn	5,694	3,300,000
	Hutchinson STP	Hutchinson	Hutchinson	147	44,000
Municipal Authority of Westmoreland County (MAWC)	New Stanton Sewage Treatment Plant	Hempfield Twp and surrounding areas	Hunker	9,722	7,200,000
Municipal Authority of the Borough of Smithton	Municipal Authority of the Borough of Smithton	Smithton	Smithton	188	32,500
Ligonier Township Municipal Authority	Ligonier Township Municipal Authority	Ligonier Township	Darlington	360	50,000
Tri-Community Sewage	Tri-Community Sewage	Bolivar Area		660	50,000-100,000
Derry Township Municipal Sewage Authority 694-2513	Derry Township Municipal Sewage Authority 694-2513	Derry Township	Rt. 217/ New Alexandria and Millwood, New Alexandria	Millwood, New Alexandria: 4,300	Millwood, New Alexandria: 80,000
Borough of Mount Pleasant Sewage	Borough of Mount Pleasant Sewage	Mount Pleasant Borough area	Mount Pleasant Borough	2,200	100,000
East Huntingdon Township Wastewater	East Huntingdon Township Wastewater	East Huntingdon	Iron Bridge		100,000
Municipal Authority of Belle Vernon	Municipal Authority of Belle Vernon	Belle Vernon	Belle Vernon	1,500	285,000
Derry Borough Sewer Authority	Derry Borough Sewer Authority	Derry Borough	Derry	1,150	600,000
Rostraver Township Sewage Authority	Rostraver Township Sewage Authority	Rostraver Township	West Newton	4,159	700,000
Westmoreland/Fayette Municipal Sewage Authority	Westmoreland/Fayette Municipal Sewage Authority	Scottdale, Everson and East Huntingdon	Scottdale	2,500	1,600,000
North Huntingdon Township Municipal Authority	North Huntingdon Township Municipal Authority	North Huntingdon Township	North Huntingdon (Turner Valley)		3,310,000
Western Westmoreland Municipal Authority	Western Westmoreland Municipal Authority	Irwin, Manor, North Irwin	North Huntingdon	38,800	4,040,000
Franklin Township Municpal Sanitary Authority	Franklin Township Municpal Sanitary Authority	Murrysville, Export, Delmont area	Meadowbrook Road - Murrsyville	9,730	4,900,000
Mon Valley Sewage Authority	Mon Valley Sewage Authority	Monossen & Donora	Donora		4,960,000
Latrobe Municipal Authority	Latrobe Municipal Authority	Greater Latrobe	Latrobe	10,000	5,000,000
Municipal Sanitary Authority of New Kensington	Municipal Sanitary Authority of New Kensington	New Kensington, Lower Burrell area, Arnold	Logans Ferry Road - New Kensington	13,000	6,000,000
GGSA	GGSA	Greater Greensburg Area	Greensburg	9,800	6,750,000
Kiski Valley Water Pollution Control Authority	Kiski Valley Water Pollution Control Authority	Kiski River Valley	near Leechburg, Allegheny Township	12,500	7,000,000
Unity Township Municipal Authority	Unity Township Municipal Authority	Unity Township	Pleasant Unity	7,000	7,000,000
Lower Burrell Municipal Authority (MSANK)	Lower Burrell Municipal Authority (MSANK)	Lower Burrell	(MSANK)		
Manor Borough Sewage Committee (WWMA)	Manor Borough Sewage Committee (WWMA)	Manor Borough	(WWMA)		
Mount Pleasant Township Municipal Authority	Mount Pleasant Township Municipal Authority	Mount Pleasant Township - Norvelt, Calumet, Hecla, United	Mount Pleasant Township - Brinkerton		
Municipal Authority of Allegheny Township	Municipal Authority of Allegheny Township	Allegheny Township	Leechburg		
Municipal Authority of Washington Township	Municipal Authority of Washington Township	Washington Heights	(Kiski)	1,500	
New Florence/St. Clair Township Sanitary Authority	New Florence/St. Clair Township Sanitary Authority	New Florence and St. Clair Township			
North Irwin Borough Municipal Authority	North Irwin Borough Municipal Authority	North Irwin	North Irwin		
Penn Township Sewage Authority	Penn Township Sewage Authority	Penn Township	Contracted to WWMA, Alcosan & Jeannette	5,724	
Seward/St. Clair Township Sanitary Authority	Seward/St. Clair Township Sanitary Authority	Seward and St. Clair Township		505	

Private Water Supply concerns…

Private water wells are not regulated by PA DEP or the EPA. There are no statewide construction or siting standards for private well water. It is the responsibility of the homeowner to maintain the safety of the water in their well.

Water Well Basics

PA DEP's website contains a lot of information that may answer homeowner's questions:

- Descriptions of microbiological and chemical contaminants with links to different treatment options. http://www.dep.pa.gov/Citizens/My-Water/PrivateWells/Pages/Well-Contaminants-.aspx
- Recommendations for getting your well tested. http://www.dep.pa.gov/Citizens/My-Water/PrivateWells/Pages/Water-Testing.aspx
- Clearinghouse of sites with information about well construction. http://www.dep.pa.gov/Citizens/My-Water/PrivateWells/Pages/Well-Construction.aspx
- Construction and maintenance information for drilling bedrock water wells. http://www.docs.dcnr.pa.gov/cs/groups/public/documents/document/dcnr_006800.pdf
- Disinfection of wells. http://www.dep.pa.gov/Citizens/My-Water/PrivateWells/Pages/Flooding-Resources.aspx

The National Groundwater Association has videos and factsheets on water well basics, well construction, types of drilling methods, annual maintenance, water quality issues and testing, and hiring a water well contractor. http://wellowner.org/

The Shale Alliance for Energy Research developed a water well handbook to educate homeowners about their water supply is sited, how it functions, and how it should be maintained to protect water quality. https://www.saferpa.org/Documents/Reports/PA-Water-Well-Handbook-01-15-2014_WebOptimized_FINAL.pdf

Penn State Extension has a list of frequently asked questions about private water wells. https://extension.psu.edu/private-water-systems-faqs

Finding a Well Driller

Pennsylvania law requires that well drillers have a license, but that does not mean that the driller has knowledge of proper drilling or well construction practices. PA DCNR keeps a list of all licensed water well drillers. http://www.dcnr.pa.gov/Business/WaterWellDrillersLicensing/LicensedWaterWellDrillers/Pages/default.aspx

The National Groundwater Association has a voluntary certification program for well drillers. It requires that the well driller pass technical exams and have 24 months of groundwater contracting experience. They also must obtain continuing education credits annually. (Note that a lack of certification does not mean that a driller cannot properly drill and construct a well.) The National Groundwater Association keeps a list of certified professionals. http://wellowner.org/finding-a-contractor/certified-ground-water-contractors/

Drilling Your Well

Penn State Extension offers a guide on drilling a new well. It covers siting your well location, selecting a driller, and what you need to have in your contract with the driller. It lists what information you need to know before buying a home with a well and describes the components of a properly constructed well. https://extension.psu.edu/drilling-a-new-well

Penn State Extension also has a booklet called *A Guide to Private Water Systems in Pennsylvania – A Manual for Rural Homeowners on the Proper Construction and Maintenance of Private Wells, Springs, and Cisterns*, available for order for $10. The booklet covers water system planning, proper construction and management of private water wells, wellhead protection, water testing and interpretation, and options for solving your water quality problems. https://extension.psu.edu/a-guide-to-private-water-systems-in-pennsylvania

Protecting Your Well from Contaminants

Annual water well inspections by a water well professional are important for the proper maintenance of the well. The Groundwater Association provides a list of things that a homeowner can inspect on their own. http://wellowner.org/water-well-maintenance/annual-checkup/

The Pennsylvania Water Resources Education Network (WREN), a project of the League of Women Voters of Pennsylvania Citizen Education Fund, operates a clearinghouse of information on source water protection. Well protection information can be found here. www.sourcewaterPA.org

Statistics

More than 1 million private wells exist in PA and about 20,000 new wells are drilled each year. (Penn State Extension)

The total withdrawal of ground and surface water in PA is nearly 10 billion gallons per day (Penn State Extension).

Private Septic System concerns…..

Septic systems that are improperly sited, poorly constructed, and not adequately maintained can contaminate both public and private drinking water wells. Therefore, it is recommended that you hire a professional soil scientist to determine what type of onlot system your property can support. Then, you can work with your local Sewage Enforcement Officer (SEO) to get the necessary permits.

Background Information

For background information about how septic systems work, where to site them, how to properly operate and maintain them, as well as what signs to look for in a failing system, visit: www.sourcewaterPA.org/?_id=2632

PA DEP's Onlot System Operation and Maintenance (Homeowner's Guide) describes how a septic system functions, signs that indicate the system is in trouble, what to do to prevent malfunctions, and suggests frequency of pumping your system tank. It also suggests tips for conserving water to lessen the burden on your system. http://www.dep.pa.gov/Citizens/My-Water/SepticSystems/Pages/default.aspx or http://www.dep.state.pa.us/dep/deputate/watermgt/wqp/wqp_wm/facts/pa1608.htm

Pennsylvania's Onlot Disposal Program, known as the Act 537 program, requires proper planning of sewage facilities, uniform standards for designing septic systems, and permitting of those facilities. Information about the Act 537 program is described here: (Note some bad links on this page).
http://www.dep.pa.gov/Business/Water/CleanWater/WastewaterMgmt/Act537/OnlotDisposal/Pages/default.aspx

All municipalities must develop and implement comprehensive official plans related to their current and future sewage disposal needs, known as an Act 537 Plan. The status of each municipal plan in Westmoreland County can be found here:
http://files.dep.state.pa.us/Water/BPNPSM/WastewaterManagement/Act537/PlanStatusMaps/SWRO_PlanAges.pdf

When a new land development project is proposed, municipalities are required to revise their plans. Planning forms to make those revisions are found here:
http://www.dep.pa.gov/Business/Water/CleanWater/WastewaterMgmt/Act537/Pages/Sewage-Facilities-Planning.aspx

Sewage Enforcement Officer

A sewage enforcement officer is an individual who works for a local agency (municipality, multi-municipal organization, or county), but is trained by DEP and certified by the State Board of Certification of Sewage Enforcement Officers. The local SEO can determine what onlot system is appropriate for a site, issues permits for an onlot system, and investigates complaints.

The powers and duties of an SEO are described here:
http://www.pacode.com/secure/data/025/chapter72/s72.41.html

The administration of the sewage facilities program, including PA Code Chapters 71, 72, and 73, is described here:
http://www.dep.pa.gov/Business/Water/CleanWater/WastewaterMgmt/Act537/Pages/SewageFacilities.aspx

Buyer/Builder Information

PA DEP provides helpful information to the home buyer/builder in their Onlot Sewage Program (Home Buyer's/Builders Guide) Factsheet (per Act 537 of 1966). Here, you will read what to look for in a property before you buy it, how to work with your local sewage enforcement officer, and what steps are needed to getting your permit. It lists the types of onlot systems, and provides a list of alternate systems to consider if your lot does not qualify for a conventional system. Note that you will need to hire a professional soil scientist to evaluate your site to determine which alternate system you can use.
http://www.dep.state.pa.us/dep/deputate/watermgt/wqp/wqp_wm/FACTS/pa1607.htm

PA Chapter 73 Standards for Onlot Sewage Treatment Facilities outlines the location and absorption requirements, the standards for septic tanks, specifications for building sewers, the dosing and distribution requirements, construction of absorption areas, standards for holding tanks, criteria for experimental and alternate systems, requirements for a bonded disposal system, and standards for individual spray irrigations systems.
http://www.pacode.com/secure/data/025/chapter73/s73.161.html

When a site cannot support a traditional septic system, a small flow treatment facility may be an option. PA DEP's Small Flow Treatment Facilities Manual (TECHNICAL GUIDANCE NUMBER 362-0300-002, dated 2006) provides information on the design, permitting, installation, operation, and maintenance of small flow facilities that may serve single-family residences, duplexes, and small commercial establishments that generate 2,000 gallons per day or less of domestic wastewater. This type of system will require an NPDES permit issued by DEP.
http://www.elibrary.dep.state.pa.us/dsweb/Get/Document-108252/362-0300.002.pdf

Seller Information

There are no state regulations concerning the sale of a house with an onlot system. However, some municipalities and some mortgage companies require testing the system at the point of sale. Contact your local municipality to see if they have any requirements.

Problems with a Neighbors' Faulty System

If a neighbor's faulty onlot system is causing you problems, contact the local municipality. Each municipality has an SEO as well as a back-up SEO who can investigate the complaint.

APPENDIX I

Chapter 5. Watershed and Pollutant Modeling Methodology

Prepared by Ethos Collaborative LLC
(http://www.ethoscollaborative.com/) for

Westmoreland Conservation District

- Methods and Data Analysis
- Soil Key Descriptions
- Streamstats Data for Modeled Areas of Interest (AOI)
- Watershed and Pollutant Modeling Task Matrix (prepared by WCD)

Appendix: Methods and Data Analysis

Westmoreland County Areas of Interest Modeling Methodology

The following Areas of Interest (AOI's) in the county were selected for focused studies (Figure 1). These areas were previously identified in the IWRP Phase 1 plan as regions of interest because of their high potential for future growth that would impact stormwater planning, known flooding issues, ongoing rapid growth, or inadequate infrastructure.

1. Turtle Creek- Watershed draining to the USGS gauge in Wilmerding
2. Kiskiminetas – Beaver Run watershed draining to the Beaver Run Reservoir
3. Monongahela – Watershed drained by Speer's Run
4. Sewickley Creek – Watershed
5. Loyalhanna Creek – Watershed draining to creek above the junction with Union Run Below Latrobe
6. Conemaugh – McGee Run watershed, to the confluence with Harbridge Run

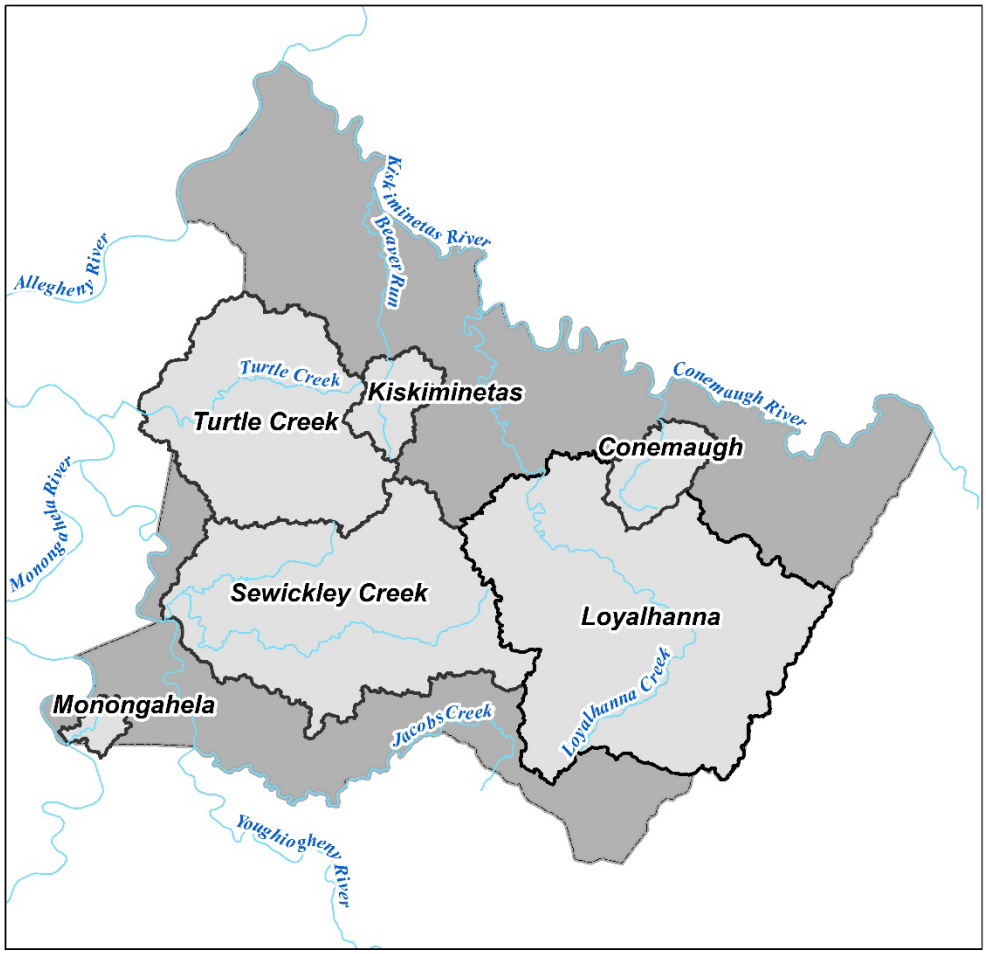


Figure 1: Westmoreland County with the major rivers and modeled Areas of Interest highlighted.

Environmental Data: CN's, Soil, Stream Discharge, and Rainfall

CN, or Curve Numbers were calculated using the Land Cover NLCD and the Hydrologic Soil Group county GIS layers. To generate the CNs, each Land Cover class was matched with a NRCS (1986) classification (Table 1). This classification was then spatially matched to specific soil data downloaded from the Pennsylvania Spatial Data Access (PASDA) website managed by Penn State (Pennsylvania State University, n.d.). Soil data was downloaded for Westmoreland County, Allegheny County, and Fayette County, as some of the modeled regions extended outside of the county boundary. Each watershed was sub-divided to an appropriate level for modeling efforts, usually creating an area between 0.5-3 miles. Other identified areas in Phase I were not modeled because they were not single drainages and/or had significant area outside of Westmoreland County.

For Turtle Creek, Kiskiminetas, Sewickley, Monongahela, and Conemaugh AOI's, we conducted detailed hydrological/numerical modeling to calculate release rates. The results of the numerical modeling were used to provide information on the impact of land development on rainfall-runoff response, from the watershed uplands to the lower reaches. For all of the above watersheds, we conducted modeling that estimated the potential export of Suspended Sediment, Nitrate, and Phosphorus. This modeling process took into account the distributed landscape-based contributions of pollution on downstream communities.

Hydrologic modeling: Technical Approach

We performed hydrologic modeling for specific areas of interest identified by the Westmoreland County Conservation District in order to meet the requirements of the ACT 167 planning effort. Hydrologic models were developed based on a commonly and widely applied approach using the unit hydrograph theory and the SCS Curve number described in the USDA TR-55 (Soil Conservation Service, Conservation Services Division 1986, 55) and the USDA National Engineering Handbook (Soil Conservation Service 1985). The numerical modeling was performed using HEC-HMS, the U.S. Army Corps of Engineers (USACE) Hydrologic Modeling System (US ACE 2016). GEO-HMS (a GIS extension that allows for the manipulation of spatial data and direct import/export to HEC-HMS) was used in conjunction with HEC-HMS (US ACE, n.d.).

Watershed Data – Land-use, Slopes, Elevations

All spatial watershed data used in the models was downloaded from Pennsylvania Spatial Data Access (PASDA), the Pennsylvania Geospatial Data Clearinghouse (www.pasda.psu.edu), except for the parcel data obtained from Westmoreland County. Land-use data was obtained from the National Land Cover Database, years 2001, 2006, and 2011(Fry et al. 2011; Homer et al. 2007, 2011). We used Digital Elevation Model (DEM) data from the PAMAP collection of high-resolution digital aerial photographs and LIDAR data (PA DCNR 2003). Slopes, sub-watersheds and stream reaches were developed from the DEM using tools and analysis available through ARC-GIS.

ide the boundaries of Westmorland County (Soil Survey Staff, Natural Resources Conservation Service n.d.). Slopes and other parameters specific to each sub-basin were calculated using tools in ARC-GIS.

Table 1: National Land Cover Database (2001) classifications, matching corresponding Natural Resources Conservation Service (NRCS) classification, and assigned CN based on the Hydrological Soil Group (HSG) classification of the soil.

NLCD (2001) Land Use	***NRCS (1986) Classification***	***A***	***B***	***C***	***D***
Open Water	Water, Assumed To Be Effectively Impervious	100	100	100	100
Developed, Open Space, <20% Impervious	Residential districts by average lot size, 1 Acre	51	68	79	84
Developed, Low Intensity, 20-49% Impervious	Residential districts by average lot size, 1/2 Acre	54	70	80	85
Developed, Medium Intensity, 50-79% Impervious	Residential districts by average lot size, 1/4 Acre	61	75	83	87
Developed, High Intensity, 80-100% impervious	Impervious Areas, Paved parking lots, etc., Streets and roads	98	98	98	98
Barren Land (Rock/Sand/Clay)	Fallow, Bare Soil	77	86	91	94
Deciduous Forest	Woods; Good Condition	32	58	72	79
Evergreen Forest	Woods; Good Condition	32	58	72	79
Mixed Forest	Woods; Good Condition	32	58	72	79
Grassland/Herbaceous	Meadow	30	58	71	78
Pasture / Hay	Pasture, Grassland; Good Condition	39	61	74	80
Cultivated Crops	Small Grain; Contoured (C); Good Condition	61	73	81	84
Woody Wetlands	Woods; Fair Condition	36	60	73	79
Emergent Herbaceous Wetland	Water, Assumed To Be Effectively Impervious	100	100	100	100

Stream Discharge data was actively measured in three places in the watershed: USGS Gage 03084698, located on Turtle Creek in Wilmerding, PA; a Westmoreland Conservation District-installed gage located on Loyalhanna Creek in Ligionier, and a Westmoreland Conservation District-installed gage on Sewickley

Creek. In the Turtle Creek watershed, we first used the USGS gage data to validate and calibrate the HEC-HMS model. We then compared the results from the HEC-HMS model to StreamStats for different stream reaches (Figure 2). StreamStats, a Web application that provides access to an assortment of Geographic Information Systems (GIS) analytical tools, predicts the hydrological response of a watershed draining to a user-chosen Point of Interest (USGS, n.d.). Comparing StreamStats models to the actual discharge data measured in Turtle Creek allowed us to determine the feasibility of using StreamStats discharge data, in the absence of gages throughout the watershed. This was particularly important in watersheds without stream gages installed in them.

Figure 2: Calibration sites in the Turtle Creek watershed where StreamStats discharge data and Modeled discharge data were compared for the 2, 5, 10, 50, and 100 year storms

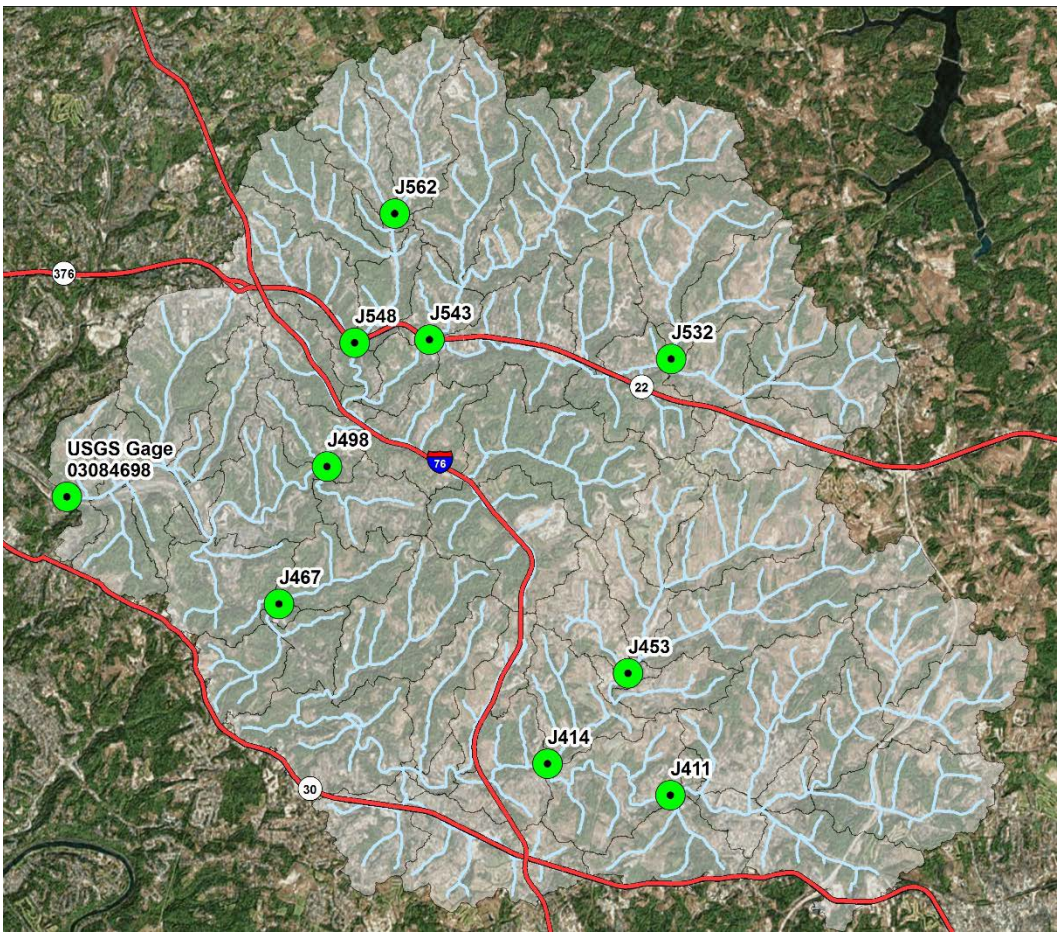


Figure 3 below compares StreamStats and the hydrological model discharge results at selected sites in the Turtle Creek Area of Interest for the 2, 5, 10, 50, and 100 year storms. There is a good correlation between model results and Streams Stats data, which suggests this is a reasonable approach mitigate to the lack of discharge data in other watersheds.

Figure 3: Modeled versus StreamStats discharge data for selected sites.

Rainfall

Rainfall data used in this study includes the following: i) spatially variable gridded hourly rainfall depths datasets for historical events, and ii) Design storms 24-hour rainfall depth estimates for return periods between 2 and 100-years provided by NOAA Atlas 14 (NOAA National Weather Service, n.d.).

Hydrologic Model Parameters and Calibration

The following main parameters were included in the hydrologic models: subwatershed area, CN number, time of concentration (Tc), reach lengths and slopes, reach cross-sectional dimensions, and rainfall depths.

Gridded precipitation data obtained from NOAA allowed us to build a model that was spatially distributed across the landscape and utilized HEC-GeoHMS. The gridded precipitation model used the following methods: i) loss: Gridded SCS Curve Number, ii) Transform: ModClark, iii) Baseflow: Recession, iv) Routing: Muskingum-Cunge. A list of the parameters associated with each one of these methods is presented below.

Table 2: HEC-HMS modeling method parameters

Method Parameters	
Loss: Gridded SCS Curve Number	***CN, Initial Abstraction Ratio, S Factor***
Transform: ModClark	***Time of Concentration, Storage Coefficient***
Routing: Muskingum-Cunge	***Manning's Roughness Coefficient (n) for channel, right bank and left bank***
Baseflow: Recession	***Discharge per unit area, Recession Constant, Ratio to peak discharge***

When appropriate, model parameters used to calibrate for Loss: Gridded Curve Number and Transform: ModClark methods were defined seasonally, with different values selected for summer (May to October) and winter (November to April) conditions. These parameters include: the Initial Abstraction Coefficient, the S-multiplication factor, and Storage Time. The Storage Time was defined as a function of the Time to concentration (Tc) and the area of the watershed covered by ponds and lakes.

Numerical models prepared for each watershed simulated both existing conditions and future scenarios. The future scenarios were developed based on predicted land development to occur over the next 25 years. The models were initially calibrated and validated for historical storms, in the case of watersheds where water discharge data was available. The models were also used to run SCS 24-hour Type II synthetic storms under both existing and future land cover conditions

Table 3: Design Storm Recurrence Intervals and Associated Rainfall Depths

Design Storm (years)	***Type II, 24-hr Rainfall Depth (in)***
2	***2.39***
10	***3.35***
25	***3.96***
50	***4.46***
100	***4.99***

Hydrologic Model Calibration and Validation

We calibrated and validated the HEC-HMS modeling process with data gathered from the Turtle Creek watershed. This watershed, which contains an operating USGS discharge gauge (located in Wilmerding), provided solid data to calibrate and validate the HEC-HMS models. Below, modeled versus measured discharge (CFS) for 2, 5, 10, 25, 50, and 100 year storm events offer evidence that the model estimates large flows well, when compared to measured large flows. Calibration parameters obtained while running the Turtle Creek model provided the starting point necessary to model the remaining watersheds. Calibration data for individual Areas of Interest is available in the focus chapter for each of these.

Statistical Comparison: Model Results versus Gauge Results for Specific Storm Events

Statistical evaluation of individual storms allowed us to quantify the degree of difference between model results and measured data for large storm events in the Turtle Creek watershed.

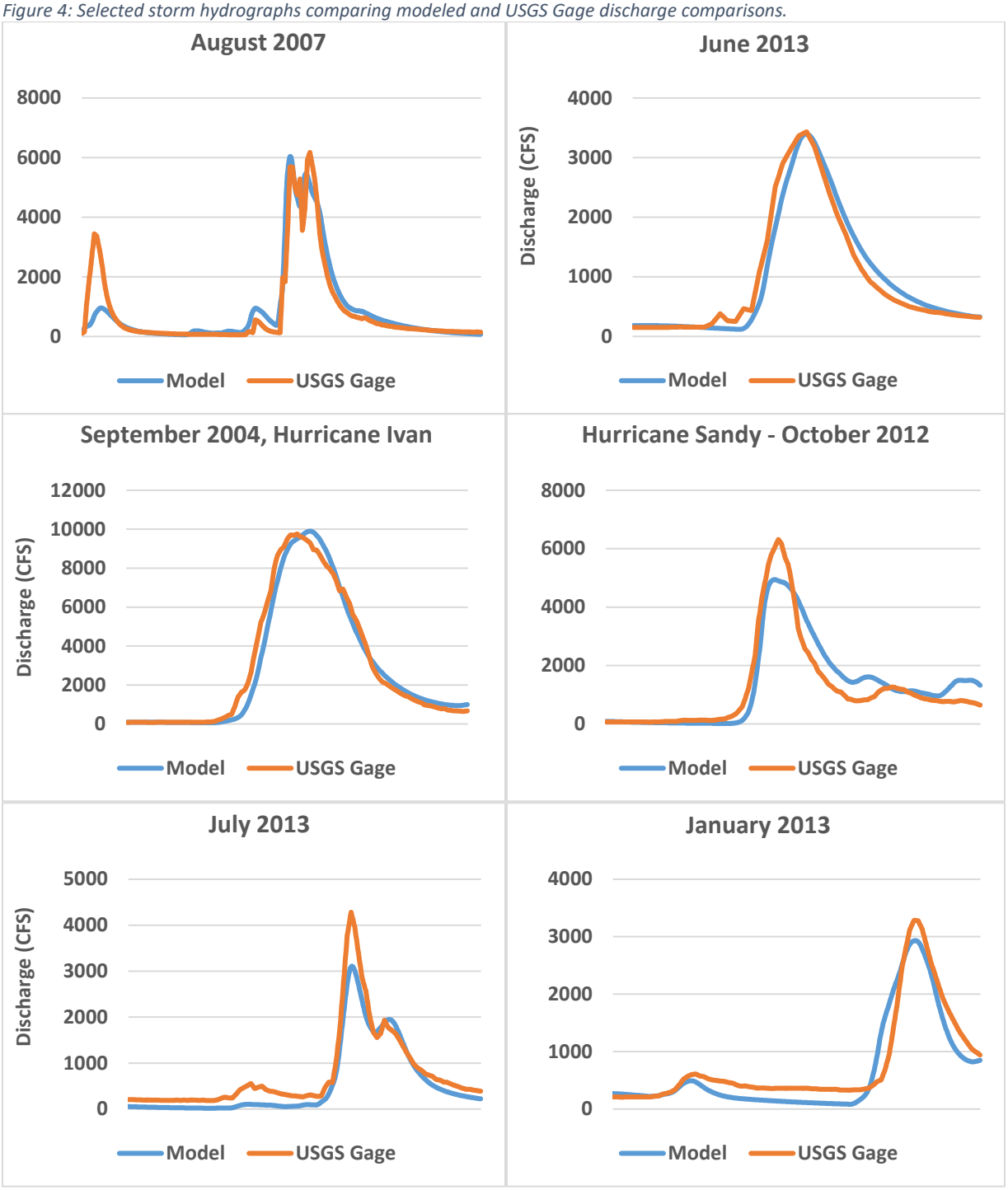
- ***Pearson's Correlation Coefficient (r)*** measures the strength of a relationship between two variables. The "r" values shown below indicate a very strong positive relationship between modeled and measured discharge values.
- ***Percent Bias (PBIAS)*** calculates the difference between the mean (average) of the model versus the gage data. In general, it provides an estimate of how the model over or under predicts the actual data.
- ***Nash-Sutcliffe efficiency (NSE)***, assess model accuracy, where the closer the NSE is to 1, the closer the model is to actual data. In the chart below, the calculated NSE ranges from 0.97 to 0.40.

Table 4: Statistical analysis of modeled versus measured discharge for individual storm events in Turtle Creek

Event	*Pearson's Correlation Coefficient (r)*	*Percent Bias (PBIAS)*	*Nash-Sutcliffe efficiency (NSE)*
Ivan 2004	**0.99**	**-4%**	**0.97**
June 2013	**0.98**	**0%**	**0.95**
July 2013	**0.97**	**-28%**	**0.88**
Sandy 2012	**0.93**	**8%**	**0.87**
August 2007	**0.93**	**3%**	**0.85**
January 2005	**0.99**	**0%**	**0.98**
January 2013	**0.95**	**-15%**	**0.88**

When combined with the actual storm hydrographs, these statistical parameters help to define the degree to which HEC-HMS over or under-predicts the data. For example, the hydrograph for the July 2013 storm (Figure 2) shows that the blue modeled data line is largely under the red gage line. The "r" value for this storm (Table 4) indicates good correlation between the data. The Percent Bias of -28% indicates that the model is under predicting, and the NSE is 0.88, again suggesting overall that the model achieves a good degree of accuracy.

Figure 4: Selected storm hydrographs comparing modeled and USGS Gage discharge comparisons.



USGS StreamStats Regression Analysis flow estimates were used to finalize the calibration of the models. The USGS online Web application StreamStats provides access to Geographic Information Systems (GIS) analytical tools, spatial data, and modeling that can be used in water-resources planning applications, among others. This web application was used to delineate drainage areas for selected sites in the watershed, determine relevant basin characteristics, and estimate flow statistics. Data produced

by StreamStats (Version 4.2.0) was used as a comparison to modeled hydrological results, first in Turtle Creek as a comparison against the measured and modeled discharge data, then in each Area of Interest (Roland, M.A., and Stuckey, M.H. 2008) . This approach allowed us to calibrate hydrological models in the absence of multiple stream gage locations in the watershed (Stuckey, M.H. 2006; Roland, M.A., and Stuckey, M.H. 2008). Additional data can be found in Appendix A: StreamStats data for each area of interest

Release Rate Calculation

Once the model for each watershed is developed, calibrated, and examined, the model is used to run and analyze runoff scenarios. These scenarios are meant to determine the runoff contribution of each sub-watershed to the peak discharge of the watershed as a whole. This process allows us to determine where, and by how much, the runoff from a particular area must be reduced in order to minimize the effect of development in the future. The concept of controlling the impact of discharged from a subwatershed contributing to the hydrologic response at a POI (point of interest) is quantified by release rates. For comprehensive stormwater management, outlet of every subwatershed should be treated as a POI.

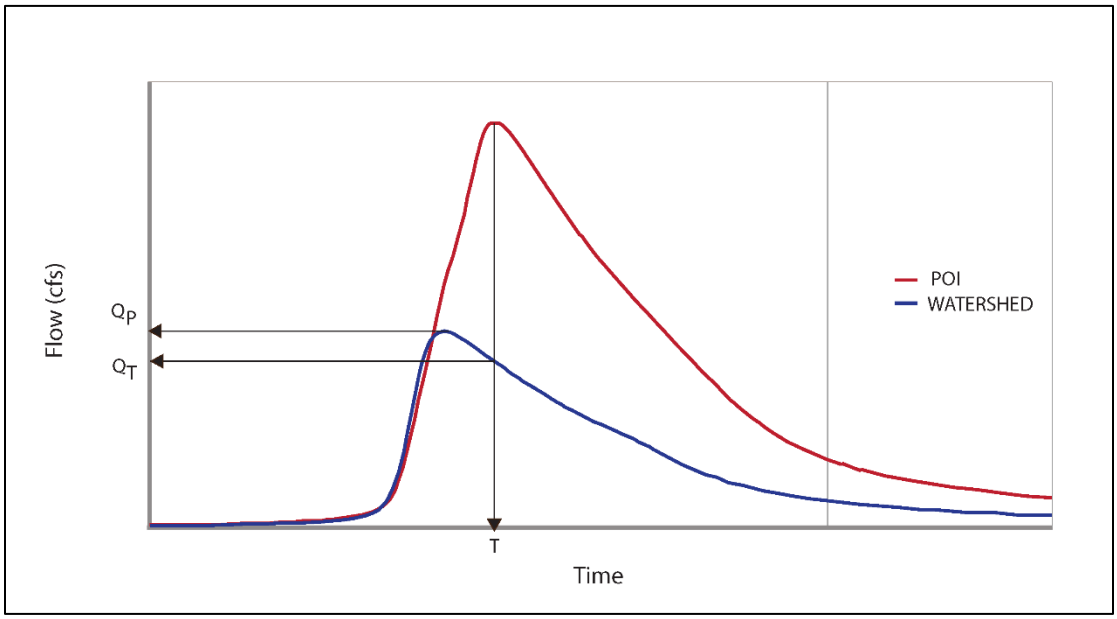
Release rates were calculated using the methodology as described in Watersheds, *Processes, Assessments, and Management* (DeBarry 2004). Hydrographs produced through HEC-HMS models were used to extract inputs for release rate calculations. Release rates are calculated as the ratio of the watershed's flow at the time that POI experiences peak flow, Q_T and watershed's peak flow, Q_P (Figure 5).

Using this methodology, each subwatershed would have a QT for each POI they contribute to. Using this matrix, lowest calculated value is used as the release rate. This process is repeated for 1-, 2-, 5-, 10-, 25-, 50- ,and 100- year storms.

Three things about the release rate calculations that are worth noting:

(1) A subwatershed's release rate to its own POI should be 1 (100%).
(2) Subwatersheds that peak after the POI does not require release rate calculations as they do not contribute to the POI peak.
(3) Literature suggests three options to deal with release rates below 0.5 (50%): (1) assume no detention, (2) use a 50% release rate, (3) use the calculated release rate. While subwatersheds that require no detention can be identified easily, the determination of assigning 50% or assigning the actual values lower than 50% depends on economic feasibility. Values lower than 50% would require very stringent stormwater control measures. Therefore, for this analysis we chose option 2, and assumed that any subwatershed with a calculated release rate below 50% should be assigned a 50% release rate.

Figure 5: Release rate methodology using unit hydrographs



$$Release\ Rate = \frac{Subwatershed\ predevelopment\ contribution\ to\ point - of - interest\ peak}{Subwatershed\ predevelopment\ peak\ flow}$$

TSS and Nutrient Modeling Methodology

Estimates for total suspended solids (TSS), total phosphorus (TP), and Nitrate (NO_3^-) were generated using a modification of the Curve Number method and analyzed spatially/mapped using ArcGIS. It should be emphasized that this process was developed in order to relatively quickly, with a minimum of inputs, assess the potential flow paths and estimated accumulated contributions of Sediment, Phosphorus, and Nitrate from different land covers based on individual conditions within the watersheds.

The process estimated runoff for each pixel (approximate size 3 meters x 3 meters) based on a one inch rainstorm using the distributed runoff curve numbers (CN's) generated as part of the HEC-HMS modeling process (Soil Conservation Service, Conservation Services Division 1986).
The runoff (Q) is estimated by the following equation:

$$Q = \frac{(P - (0.2 * S))^2}{(P + (0.8 * S))}$$

Where:

Q is runoff
P is rainfall/precipitation
S is the potential maximum soil retention after runoff begins

The factor S, or the potential maximum retention is related to the dimensionless parameter CN in the range of 0 <= CN <= 100 by the following equation:

$$S = (1000/CN) - 10$$

Using the CN for each grid square/pixel calculated as part of the HEC-HMS process, we were able to estimate runoff, or "Q" for each pixel using ARC GIS analyst and calculator tools. We accumulated this runoff to represent an average year of rainfall (42 inches), then converted runoff depth to the expected yearly runoff volume from each pixel.

We then used ARC GIS spatial analysis to develop a grid of expected pollution concentrations based on the National Land Cover Database for 2011 (Homer et al. 2011). We resampled the NLCD 2011 data set to the same grid size as the runoff grid. We assigned an event mean concentration (EMC) to each landcover type in milligrams per liter for Nitrate, Total Phosphorus, and TSS by correlating the NLCD cover type with expected Event Mean Concentrations of pollutants (EMC's) from each landcover based on the data found in the TR-55 document and the National Research Council Report, Urban Stormwater Preliminary Data Summary (National Research Council Committee on Reducing Stormwater Discharge

Contributions to Water Pollution 2008; Soil Conservation Service, Conservation Services Division 1986). The grid containing the expected concentration of pollutants from each landcover type was multiplied by the grid containing the expected runoff to obtain an estimated weight (converted to lbs) of pollution exported by each pixel on a yearly basis. The concentrations (in mg/L) assigned to each landcover are shown in Table 5 below.

Table 5: NLCD Landcover, Corresponding TR-55 Description, and assigned estimates (event mean concentrations, in mg/L) of pollution concentration in runoff.

NLCD 2001 Description	***TR-55 Description***	***Total Suspended Sediment (mg/L)***	***Total Phosphorus (mg/L)***	***Total Nitrate (mg/L)***
Open Water	Water, Assumed To Be Effectively Impervious	0	0	0
Developed, Open Space, <20% Impervious	Residential districts by average lot size, 1 Acre	167	0.94	0.78
Developed, Low Intensity, 20-49% Impervious	Residential districts by average lot size, 1/2 Acre	147	0.82	0.77
Developed, Medium Intensity, 50-79% impervious	Residential districts by average lot size, 1/4 Acre	147	0.82	0.77
Developed, High Intensity, 80-100% impervious	Impervious Areas, Paved parking lots, etc., Streets and roads	261	0.4	0.83
Barren Land (Rock/Sand/Clay)	Fallow, Bare Soil	305	0.4	0.33
Deciduous Forest	Woods; Good Condition	39	0.15	0.17
Evergreen Forest	Woods; Good Condition	39	0.15	0.17
Mixed Forest	Woods; Good Condition	39	0.15	0.17
Grassland/Herbaceous	Meadow	47	0.19	0.3
Pasture / Hay	Pasture, Grassland; Good Condition	47	0.19	0.3
Cultivated Crops	Small Grain; Contoured (C); Good Condition	55	1.34	0.73
Woody Wetlands	Woods; Fair Condition	39	0.15	0.17
Emergent Herbaceous Wetland	Water, Assumed To Be Effectively Impervious	47	0.19	0.3

The resulting GIS data layers were used to model both accumulation and de-accumulation of waterborne pollutants as they moved across the landscape. Accumulation and decay modeling was done through the use of ARCGIS and the "TAUDEM" toolset developed by David Tarboton at Utah State

University with support from the Army Corps of Engineers (David Tarboton 2015). This Spatially-based tool set contains a suite of tools that determines hydrologic information from DEMs. Inputs include topographic information in the form of a digital elevation model, weighted raster grids representing pollution inputs, and landscape-based weighted decay grids. The decay grid was developed from NLCD datasets. Natural land cover such as grasslands or forests were assigned a pollution reduction value, under the assumption that these landcover types would act as pollution and water sinks. We assumed that pollutants would be reduced by 75% in these landcover types, based on the reduction values for various Best Management Practices evaluated as part of the PA DEP's Best Management Practices Manual (Department of Environmental Protection, Bureau of Watershed Management 2006).

The TAUDEM tools accumulated and reduced the pollution as the water moves across the landscape. The resulting data can be viewed as "pollution streamlines" across the landscape, or the pounds per acre can be calculated for each sub-watershed. This process allows for the quick identification of "hotspots" of pollution in the landscape, regions of significant export, and can help to pinpoint regions where BMP's may be particularly effective. Further, the data can be matched with vacant properties, park lands, and other publically-owned parcels in order to identify lands where BMP's may be more easily implemented.

We also evaluated the percent tree canopy in riparian buffers. We downloaded data detailing the amount of tree canopy across the landscape (Homer et al. 2011) and used spatial analysis tools from ESRI in the ARCGIS software to determine the percent tree canopy in the riparian buffer within either side of the stream corridors. This allowed use to quickly pinpoint the regions where tree canopy was sparse. These regions could then be evaluated as focus regions for restoration and/or tree planting efforts.

Caveats/Limitations to these tools:

Although this modeling effort provides useful data about landscape-wide Non-Point Source pollution loadings, the data should be used with some caveats in mind.

The data is limited by the spatial information available to obtain results. Spatial data often cannot recognize and correctly account for each landscape feature. For example, in Figure 2 the modeling produced stream buffers that run right through the middle of a building and parking lot. Available modeling methods cannot pinpoint regions where the stream is clearly culverted; in this situation the question of tree canopy in riparian buffers in clearly moot. Similarly, Figure 5 shows the flow lines draining into a stream network from the roads. However, it is highly likely that in this area the flow is actually captured by the storm sewer network, and may not be routed to the stream in this location. These examples highlight the limitations of the modeling process, and clearly illustrate that the methods described above should be used in conjunction with aerial photos and on-site observations, when necessary.

Figure 6: Example of Riparian Buffer analysis that highlights stream course through parking lot. Yellow line indicates the likely stream course through culverts underground.

It should be emphasized that this modeling method estimates the magnitude of pollutant loading, but accompanying field studies to validate these results have not been conducted. These methods do not calculate an exact lbs-per-year quantity. Rather, this process allowed us build data enough to understand the accumulation of pollutants and how the landscape can attenuate that accumulation. Therefore, this data should be used with this purpose, and the accompanying limitations, in mind. That being said, however, these final approximations of basin export and landscape export are within the range of estimates expected based on landcover type, as detailed in the EPA Urban Stormwater Preliminary Data Summary (National Research Council Committee on Reducing Stormwater Discharge Contributions to Water Pollution 2008).

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Appendix: Soil Key Descriptions

Soil map symbols referenced in the text are listed below. The specific soil description accompanies each map symbol.

Soil data for Westmoreland and relevant regions of Allegheny and Fayette Counties was downloaded from the Web Soil Survey, published online by the Natural Resources Conservation Service of the United States Department of Agriculture.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at the following link: https://websoilsurvey.sc.egov.usda.gov/. Accessed 12/29/2017.

Map Symbol	***Soil Name and Description***	***HSG Classification***
AlB	Albrights silt loam, 0 to 8 percent slopes, very stony	D
AlD	Albrights silt loam, 8 to 25 percent slopes, very stony	D
At	Atkins silt loam, 0 to 3 percent slopes, frequently flooded	B
BeB	Bethesda very channery silt loam, 0 to 8 percent slopes	D
BeD	Bethesda very channery silt loam, 8 to 25 percent slopes	D
BeF	Bethesda very channery silt loam, 25 to 75 percent slopes	D
BkA	Brinkerton silt loam, 0 to 3 percent slopes	C
BkB	Brinkerton silt loam, 3 to 8 percent slopes	C
BrB	Brinkerton silt loam, 2 to 8 percent slopes	C
BuB	Buchanan loam, 0 to 8 percent slopes, extremely stony	D
BuD	Buchanan loam, 8 to 25 percent slopes, extremely stony	D
CaB	Cavode silt loam, 3 to 8 percent slopes	C
CaC	Cavode silt loam, 8 to 15 percent slopes	C
CeB	Cavode silt loam, 0 to 8 percent slopes, very stony	C
CeD	Cavode silt loam, 8 to 25 percent slopes, very stony	C
ChA	Chavies fine sandy loam, 0 to 2 percent slopes	A
CkC	Clarksburg silt loam, 8 to 15 percent slopes	C
ClB	Clarksburg silt loam, 3 to 8 percent slopes	C
ClC	Clarksburg silt loam, 8 to 15 percent slopes	C
CmB	Clymer silt loam, 3 to 8 percent slopes	B
CmC	Clymer silt loam, 8 to 15 percent slopes	C
CmD	Clymer silt loam, 15 to 25 percent slopes	B
CoB	Cookport loam, 0 to 8 percent slopes, very stony	C
CoD	Cookport loam, 8 to 25 percent slopes, very stony	C
CrB	Craigsville-Buchanan complex, 0 to 8 percent slopes, extremely stony	A
CuB	Culleoka channery silt loam, 3 to 8 percent slopes	B
CuC	Culleoka channery silt loam, 8 to 15 percent slopes	B

CuD	Culleoka channery silt loam, 15 to 25 percent slopes	B
CwB	Culleoka-Weikert shaly silt loams, 3 to 8 percent slopes	B
CwC	Culleoka-Weikert shaly silt loams, 8 to 15 percent slopes	B
CwD	Culleoka-Weikert shaly silt loams, 15 to 25 percent slopes	B
DAM	Dam	D
DeB	Dekalb-Hazleton channery sandy loams, 0 to 8 percent slopes, extremely stony	A
DeD	Dekalb-Hazleton channery sandy loams, 8 to 25 percent slopes, extremely stony	A
DoB	Dormont silt loam, 3 to 8 percent slopes	D
DoC	Dormont silt loam, 8 to 15 percent slopes	D
DoD	Dormont silt loam, 15 to 25 percent slopes	D
DoE	Dormont silt loam, 25 to 35 percent slopes	D
DrD	Dormont-Culleoka complex, 15 to 25 percent slopes	D
DrE	Dormont-Culleoka complex, 25 to 50 percent slopes	D
Du	Dumps, coal wastes	D
ErB	Ernest silt loam, 3 to 8 percent slopes	C
ErC	Ernest silt loam, 8 to 15 percent slopes	C
ErD	Ernest silt loam, 15 to 25 percent slopes	C
EvB	Ernest-Vandergrift silt loams, 3 to 8 percent slopes	C
EvC	Ernest-Vandergrift silt loams, 8 to 15 percent slopes	C
EvD	Ernest-Vandergrift silt loams, 15 to 25 percent slopes	C
FaB	Fairpoint very channery silt loam, 0 to 8 percent slopes	C
FaC	Fairpoint very channery silt loam, 8 to 15 percent slopes	C
FaD	Fairpoint very channery silt loam, 15 to 25 percent slopes	C
FaF	Fairpoint very channery silt loam, 25 to 70 percent slopes	D
GcB	Gilpin channery silt loam, 3 to 8 percent slopes	C
GcC	Gilpin channery silt loam, 8 to 15 percent slopes	C
GcD	Gilpin channery silt loam, 15 to 25 percent slopes	C
GlB	Gilpin silt loam, 3 to 8 percent slopes	C
GlC	Gilpin silt loam, 8 to 15 percent slopes	C
GlD	Gilpin silt loam, 15 to 25 percent slopes	C
GoF	Gilpin-Rock outcrop complex, 45 to 100 percent slopes	C
GpB	Gilpin-Upshur complex, 3 to 8 percent slopes	C
GpC	Gilpin-Upshur complex, 8 to 15 percent slopes	C
GpD	Gilpin-Upshur complex, 15 to 25 percent slopes	C
GQF	Gilpin-Upshur complex, very steep	C
GrE	Gilpin-Vandergrift silt loams, slumped, 15 to 35 percent slopes	C
GSF	Gilpin, Weikert, Culleoka channery silt loams and 25 to 80 percent slopes	C
GuB	Gilpin-Upshur complex, 3 to 8 percent slopes	C
GuB	Guernsey silt loam, 3 to 8 percent slopes	C
GuC	Gilpin-Upshur complex, 8 to 15 percent slopes	C

GuC	Guernsey silt loam, 8 to 15 percent slopes	C
GuD	Gilpin-Upshur complex, 15 to 25 percent slopes	C
GuD	Guernsey silt loam, 15 to 25 percent slopes	C
GuF	Gilpin-Upshur complex, 25 to 75 percent slopes	C
GvB	Guernsey-Vandergrift silt loams, 3 to 8 percent slopes	C
GvC	Guernsey-Vandergrift silt loams, 8 to 15 percent slopes	C
GvD	Guernsey-Vandergrift silt loams, 15 to 25 percent slopes	C
GwB	Gilpin-Weikert channery silt loams, 3 to 8 percent slopes	C
GwC	Gilpin-Weikert channery silt loams, 8 to 15 percent slopes	C
GwD	Gilpin-Weikert channery silt loams, 15 to 25 percent slopes	C
GwF	Gilpin-Weikert channery silt loams, 25 to 70 percent slopes	C
GxA	Ginat silt loam, 0 to 2 percent slopes	D
GyB	Guernsey silt loam, 3 to 8 percent slopes	C
GyC	Guernsey silt loam, 8 to 15 percent slopes	C
GyD	Guernsey silt loam, 15 to 25 percent slopes	C
HaB	Hazleton loam, 3 to 8 percent slopes	A
HaC	Hazleton loam, 8 to 15 percent slopes	A
HaD	Hazleton loam, 15 to 25 percent slopes	A
HcB	Hazleton-Clymer complex, 0 to 8 percent slopes, extremely stony	A
HcD	Hazleton-Clymer complex, 8 to 25 percent slopes, extremely stony	A
Ho	Holly silt loam, 0 to 2 percent slopes	B
HTE	Hazleton loam, steep	A
ItB	Itmann extremely channery loam, 0 to 8 percent slopes	A
ItD	Itmann extremely channery loam, 8 to 25 percent slopes	A
IxF	Itmann extremely channery loam, 25 to 70 percent slopes	A
LaB	Laidig gravelly loam, 0 to 8 percent slopes, extremely stony	C
LaD	Laidig gravelly loam, 8 to 25 percent slopes, extremely stony	C
LaE	Laidig gravelly loam, 25 to 35 percent slopes, extremely stony	C
LbB	Library silty clay loam, 3 to 8 percent slopes	C
LbC	Library silty clay loam, 8 to 15 percent slopes	C
LbD	Library silty clay loam, 15 to 25 percent slopes	C
LbF	Laidig-Hazleton complex, 35 to 80 percent slopes, extremely bouldery	C
Ld	Land fill	D
LeB	Leck Kill channery silt loam, 3 to 8 percent slopes	A
LeC	Leck Kill channery silt loam, 8 to 15 percent slopes	A
LkB	Leck Kill channery silt loam, 0 to 8 percent slopes, extremely stony	A
LkD	Leck Kill channery silt loam, 8 to 25 percent slopes, extremely stony	A
LlB	Library silt loam, 0 to 8 percent slopes	C
LlC	Library silt loam, 8 to 15 percent slopes	C
Ln	Lindside silt loam, 0 to 3 percent slopes, occasionally flooded	B
Lo	Lobdell silt loam, 0 to 3 percent slopes, occasionally flooded	B

LwB	Lowell silty clay loam, 3 to 8 percent slopes	C
LwC	Lowell silty clay loam, 8 to 15 percent slopes, eroded	C
LwD	Lowell silty clay loam, 15 to 25 percent slopes, eroded	C
LxF	Lowell-Culleoka complex, 25 to 80 percent slopes, very rocky	C
MaF	Macove-Gilpin channery silt loams, 35 to 70 percent slopes, extremely stony	A
MeB	Matewan channery loam, 3 to 8 percent slopes	A
MeC	Matewan channery loam, 8 to 15 percent slopes	A
MeD	Matewan channery loam, 15 to 25 percent slopes	A
MeF	Matewan channery loam, 25 to 50 percent slopes	A
MkD	Meckesville channery silt loam, 8 to 25 percent slopes, extremely stony	C
MkF	Meckesville channery silt loam, 25 to 70 percent slopes, extremely stony	C
Mn	Melvin and Newark silt loams, 0 to 2 percent slopes	B
MoA	Monongahela silt loam, 0 to 3 percent slopes	D
MoB	Monongahela silt loam, 3 to 8 percent slopes	D
MoC	Monongahela silt loam, 8 to 15 percent slopes	D
Ne	Newark silt loam, 0 to 3 percent slopes, frequently flooded	B
NoB	Nolo loam, 0 to 8 percent slopes, very stony	C
Pa	Palms muck, 0 to 3 percent slopes	B
Ph	Philo silt loam, 0 to 3 percent slopes, occasionally flooded	B
Ph	Philo loam, 0 to 3 percent slopes, occasionally flooded	B
Pu	Purdy silt loam, 0 to 2 percent slopes	C
Qu	Quarries	D
RaA	Rainsboro silt loam, 0 to 3 percent slopes	C
RgB	Rayne channery silt loam, 0 to 8 percent slopes, very stony	B
RgD	Rayne channery silt loam, 8 to 25 percent slopes, very stony	B
ScB	Sciotoville silt loam, 2 to 6 percent slopes	C
ScC	Sciotoville silt loam, 6 to 12 percent slopes	C
ShF	Shelocta-Gilpin channery silt loams, 25 to 75 percent slopes	B
SmB	Strip mines, 0 to 8 percent slopes	C
SmD	Strip mines, 8 to 25 percent slopes	C
SmF	Strip mines, 25 to 75 percent slopes	C
SxF	Shelocta-Gilpin channery silt loams, 25 to 75 percent slopes, very stony	B
ThA	Thorndale silt loam, 0 to 3 percent slopes	C
ThB	Thorndale silt loam, 3 to 8 percent slopes	C
TyA	Tyler silt loam, 0 to 2 percent slopes	D
UaB	Udorthents, 0 to 8 percent slopes	C
UaB	Upshur silty clay loam, 3 to 8 percent slopes	C
UaC	Upshur silty clay loam, 8 to 15 percent slopes	C
UaD	Udorthents, 8 to 25 percent slopes	C
UaF	Udorthents, 25 to 75 percent slopes	C
UbB	Urban Land, 0 to 8 percent slopes	C

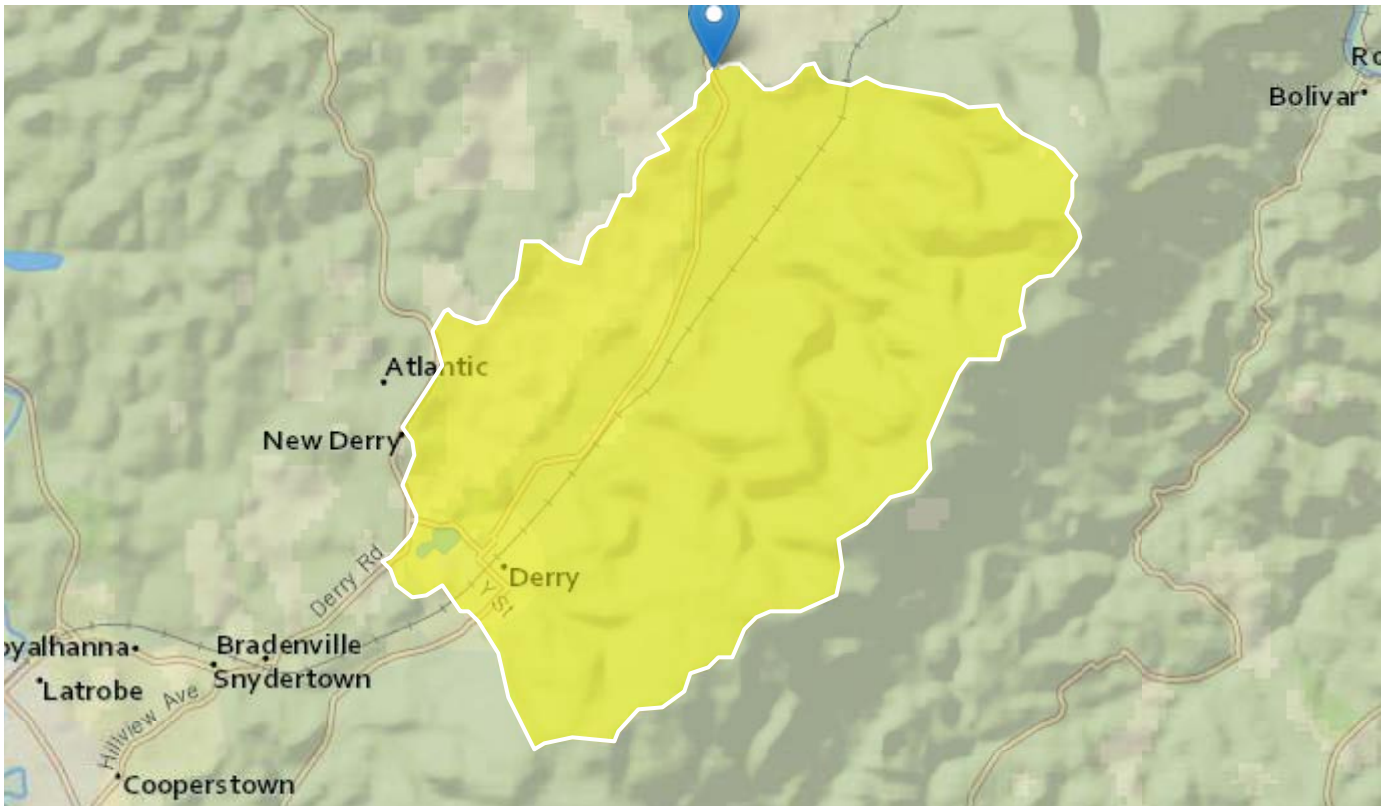
UCB	Urban land-Culleoka complex, gently sloping	C
UcB	Upshur silty clay loam, 3 to 8 percent slopes	C
UcC	Upshur silty clay loam, 8 to 15 percent slopes	C
UCD	Urban land-Culleoka complex, moderately steep	C
UCE	Urban land-Culleoka complex, steep	C
UdA	Urban land, 0 to 3 percent slopes	C
UdB	Urban land, 3 to 8 percent slopes	C
UdC	Urban land, 8 to 15 percent slopes	C
UeB	Urban land-Culleoka complex, 0 to 8 percent slopes	C
UeD	Urban land-Culleoka complex, 8 to 25 percent slopes	C
UgB	Urban land-Gilpin complex, 0 to 8 percent slopes	C
UGB	Urban land-Guernsey complex, gently sloping	C
UgD	Urban land-Gilpin complex, 8 to 25 percent slopes	C
UGD	Urban land-Guernsey complex, moderately steep	C
UhB	Urban land-Guernsey complex, 0 to 8 percent slopes	C
UhD	Urban land-Guernsey complex, 8 to 25 percent slopes	C
UmB	Urban land-Monongahela complex, 0 to 8 percent slopes	C
URB	Urban land-Rainsboro complex, gently sloping	C
UuB	Urban land-Upshur complex, 0 to 8 percent slopes	C
UuD	Urban land-Upshur complex, 8 to 25 percent slopes	C
UwB	Urban land-Wharton complex, 0 to 8 percent slopes	C
UWB	Urban land-Wharton complex, gently sloping	C
UwD	Urban land-Wharton complex, 8 to 25 percent slopes	C
UWD	Urban land-Wharton complex, moderately steep	C
VaB	Vandergrift silt loam, 3 to 8 percent slopes	C
VaC	Vandergrift silt loam, 8 to 15 percent slopes	C
VaD	Vandergrift silt loam, 15 to 25 percent slopes	C
W	Water	D
WeA	Weinbach silt loam, 0 to 2 percent slopes	C
WhB	Wharton silt loam, 3 to 8 percent slopes	C
WhC	Wharton silt loam, 8 to 15 percent slopes	C
WhD	Wharton silt loam, 15 to 25 percent slopes	C
WrB	Wharton silt loam, 3 to 8 percent slopes	C
WrC	Wharton silt loam, 8 to 15 percent slopes	C
WrD	Wharton silt loam, 15 to 25 percent slopes	C
WsB	Wharton silt loam, 0 to 8 percent slopes, very stony	C
WsD	Wharton silt loam, 8 to 25 percent slopes, very stony	C

Appendix: StreamStats data for each modeled Area of Interest

Data produced by the USGS online Web application StreamStats (Version 4.2.0) was used as a comparison to modeled hydrological results in each area of interest (Roland, M.A., and Stuckey, M.H. 2008) . StreamStats provides access to Geographic Information Systems (GIS) analytical tools, spatial data, and modeling that can be used in water-resources planning applications, among others. This web application was used to delineate drainage areas for selected sites in the watershed, determine relevant basin characteristics, and estimate flow statistics. This approach allowed us to calibrate hydrological models in the absence of multiple stream gage locations in the watershed (Stuckey, M.H. 2006; Roland, M.A., and Stuckey, M.H. 2008). Stream Stats for individual Areas of Interest follow.

StreamStats Report - Conemaugh Area of Interest

Region ID: PA
Workspace ID: PA20171129210006272000
Clicked Point (Latitude, Longitude): 40.39838, -79.26314
Time: 2017-11-29 16:00:30 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
BSLOPD	Mean basin slope measured in degrees	8.4	degrees
BSLOPDRAW	Unadjusted basin slope, in degrees	8.66	
CARBON	Percentage of area of carbonate rock	0	percent
CENTROXA83	X coordinate of the centroid, in NAD_1983_Albers, meters	-107203.2	
CENTROYA83	Basin centroid horizontal (y) location in NAD 1983 Albers	151452.5	
DRN	Drainage quality index from STATSGO	3.4	
DRNAREA	Area that drains to a point on a stream	22.3	square miles
ELEV	Mean Basin Elevation	1556.1	feet
FOREST	Percentage of area covered by forest	76	percent
GLACIATED	Percentage of basin area that was historically covered by glaciers	0	percent
IMPNLCD01	Percentage of impervious area determined from NLCD 2001 impervious dataset	3	percent

Parameter Code	Parameter Description	Value	Unit
LC01DEV	Percentage of land-use from NLCD 2001 classes 21-24	11	percent
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	10.9	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	2.93	percent
LONG_OUT	Longitude of Basin Outlet	-79.26319	degrees
MAXTEMP	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid	58	degrees F
OUTLETXA83	X coordinate of the outlet, in NAD_1983_Albers,meters	-107225	
OUTLETYA83	Y coordinate of the outlet, in NAD_1983_Albers, meters	156015	
PRECIP	Mean Annual Precipitation	44	inches
ROCKDEP	Depth to rock	4.5	feet
STORAGE	Percentage of area of storage (lakes ponds reservoirs wetlands)	0	percent
STRDEN	Stream Density -- total length of streams divided by drainage area	2.11	miles per square mile
STRMTOT	total length of all mapped streams (1:24,000-scale) in the basin	47.24	miles
URBAN	Percentage of basin with urban development	6	percent

Low-Flow Statistics Parameters [Low Flow Region 3]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	22.3	square miles	2.33	1720
ELEV	Mean Basin Elevation	1556.1	feet	898	2700
PRECIP	Mean Annual Precipitation	44	inches	38.7	47.9

Low-Flow Statistics Flow Report [Low Flow Region 3]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp
7 Day 2 Year Low Flow	2.52	ft^3/s	43	43
30 Day 2 Year Low Flow	3.57	ft^3/s	38	38
7 Day 10 Year Low Flow	1.2	ft^3/s	54	54
30 Day 10 Year Low Flow	1.63	ft^3/s	49	49
90 Day 10 Year Low Flow	2.36	ft^3/s	41	41

Low-Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Peak-Flow Statistics Parameters [Peak Flow Region 4]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	22.3	square miles	0.92	1720

Peak-Flow Statistics Flow Report [Peak Flow Region 4]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp	Equiv. Yrs.
2 Year Peak Flood	917	ft^3/s	28	28	4
5 Year Peak Flood	1550	ft^3/s	26	26	7
10 Year Peak Flood	2060	ft^3/s	28	28	10
50 Year Peak Flood	3460	ft^3/s	33	33	13
100 Year Peak Flood	4190	ft^3/s	38	38	13
500 Year Peak Flood	6260	ft^3/s	49	49	12

Peak-Flow Statistics Citations

Roland, M.A., and Stuckey, M.H.,2008, Regression equations for estimating flood flows at selected recurrence intervals for ungaged streams in Pennsylvania: U.S. Geological Survey Scientific Investigations Report 2008-5102, 57p. (http://pubs.usgs.gov/sir/2008/5102/)

Annual Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	22.3	square miles	2.26	1720
ELEV	Mean Basin Elevation	1556.1	feet	130	2700
PRECIP	Mean Annual Precipitation	44	inches	33.1	50.4
FOREST	Percent Forest	76	percent	5.1	100
URBAN	Percent Urban	6	percent	0	89

Annual Flow Statistics Flow Report [Statewide Mean and Base Flow]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp
Mean Annual Flow	39.3	ft^3/s	12	12

Annual Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

General Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	22.3	square miles	2.26	1720

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
PRECIP	Mean Annual Precipitation	44	inches	33.1	50.4
CARBON	Percent Carbonate	0	percent	0	99
FOREST	Percent Forest	76	percent	5.1	100
URBAN	Percent Urban	6	percent	0	89

General Flow Statistics Flow Report [Statewide Mean and Base Flow]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp
Harmonic Mean Streamflow	9.61	ft^3/s	38	38

General Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Base Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	22.3	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	44	inches	33.1	50.4
CARBON	Percent Carbonate	0	percent	0	99
FOREST	Percent Forest	76	percent	5.1	100
URBAN	Percent Urban	6	percent	0	89

Base Flow Statistics Flow Report [Statewide Mean and Base Flow]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

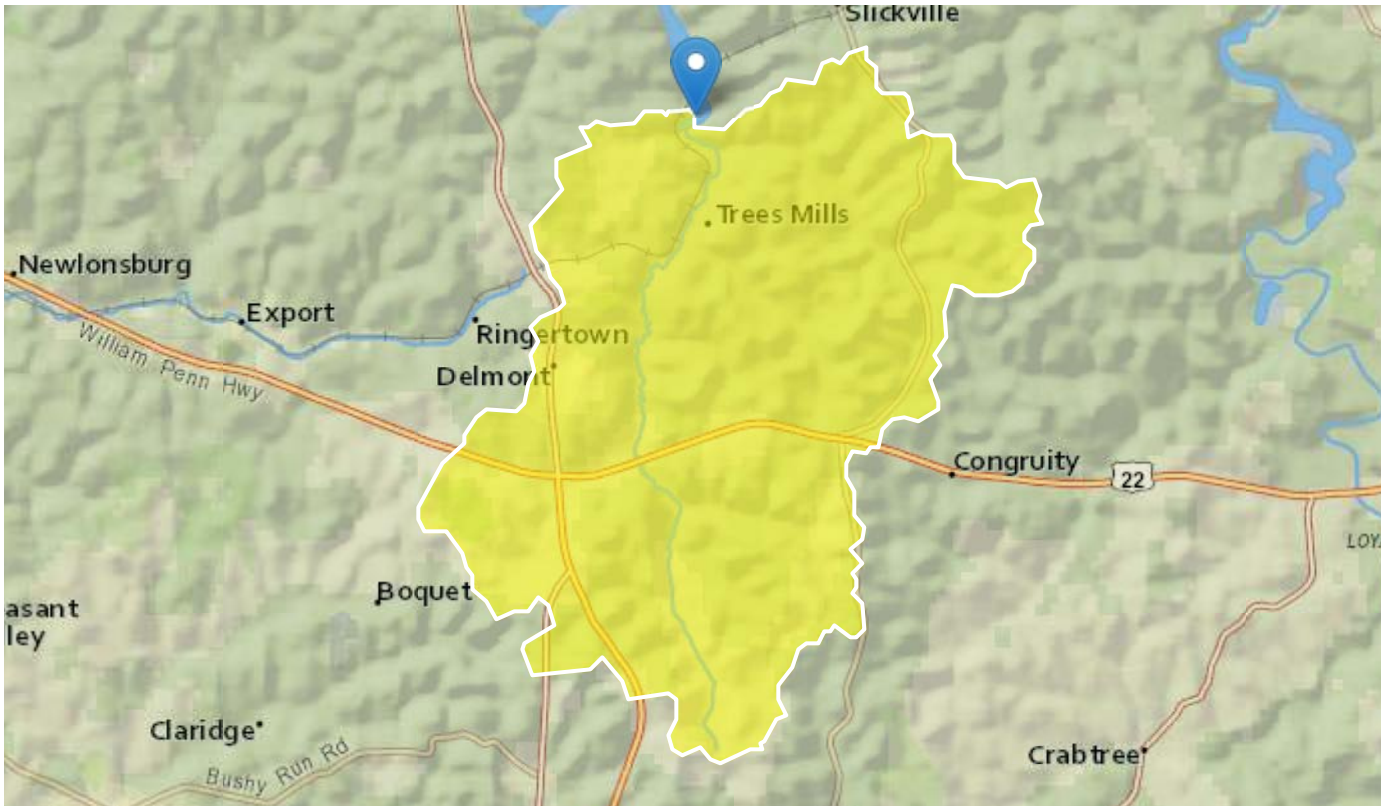
Statistic	Value	Unit	SE	SEp
Base Flow 10 Year Recurrence Interval	15.3	ft^3/s	21	21
Base Flow 25 Year Recurrence Interval	13.6	ft^3/s	21	21
Base Flow 50 Year Recurrence Interval	12.7	ft^3/s	23	23

Base Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

StreamStats Report Kiski AOI

Region ID: PA
Workspace ID: PA20171004152955343000
Clicked Point (Latitude, Longitude): 40.44474, -79.54797
Time: 2017-10-04 11:30:18 -0400



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	19.6	square miles
ELEV	Mean Basin Elevation	1254.3	feet
PRECIP	Mean Annual Precipitation	41	inches
FOREST	Percentage of area covered by forest	49	percent
URBAN	Percentage of basin with urban development	6	percent
CARBON	Percentage of area of carbonate rock	0	percent

Low-Flow Statistics Parameters [100 Percent (19.6 square miles) Low Flow Region 3]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	19.6	square miles	2.33	1720

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
ELEV	Mean Basin Elevation	1254.3	feet	898	2700
PRECIP	Mean Annual Precipitation	41	inches	38.7	47.9

Low-Flow Statistics Flow Report [100 Percent (19.6 square miles) Low Flow Region 3]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp
7 Day 2 Year Low Flow	1.59	ft^3/s	43	43
30 Day 2 Year Low Flow	2.25	ft^3/s	38	38
7 Day 10 Year Low Flow	0.669	ft^3/s	54	54
30 Day 10 Year Low Flow	0.969	ft^3/s	49	49
90 Day 10 Year Low Flow	1.44	ft^3/s	41	41

Low-Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Peak-Flow Statistics Parameters [Peak Flow Region 4]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	19.6	square miles	0.92	1720

Peak-Flow Statistics Flow Report [Peak Flow Region 4]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp	Equiv. Yrs.
2 Year Peak Flood	822	ft^3/s	28	28	4
5 Year Peak Flood	1390	ft^3/s	26	26	7
10 Year Peak Flood	1860	ft^3/s	28	28	10
50 Year Peak Flood	3140	ft^3/s	33	33	13
100 Year Peak Flood	3800	ft^3/s	38	38	13
500 Year Peak Flood	5690	ft^3/s	49	49	12

Peak-Flow Statistics Citations

Roland, M.A., and Stuckey, M.H.,2008, Regression equations for estimating flood flows at selected recurrence intervals for ungaged streams in Pennsylvania: U.S. Geological Survey Scientific Investigations Report 2008-5102, 57p. (http://pubs.usgs.gov/sir/2008/5102/)

Annual Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	19.6	square miles	2.26	1720
ELEV	Mean Basin Elevation	1254.3	feet	130	2700
PRECIP	Mean Annual Precipitation	41	inches	33.1	50.4
FOREST	Percent Forest	49	percent	5.1	100
URBAN	Percent Urban	6	percent	0	89

Annual Flow Statistics Flow Report [Statewide Mean and Base Flow]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp
Mean Annual Flow	27.6	ft^3/s	12	12

Annual Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

General Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	19.6	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	41	inches	33.1	50.4
CARBON	Percent Carbonate	0	percent	0	99
FOREST	Percent Forest	49	percent	5.1	100
URBAN	Percent Urban	6	percent	0	89

General Flow Statistics Flow Report [Statewide Mean and Base Flow]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp
Harmonic Mean Streamflow	5.48	ft^3/s	38	38

General Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Base Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	19.6	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	41	inches	33.1	50.4
CARBON	Percent Carbonate	0	percent	0	99

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
FOREST	Percent Forest	49	percent	5.1	100
URBAN	Percent Urban	6	percent	0	89

Base Flow Statistics Flow Report [Statewide Mean and Base Flow]

PIl: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

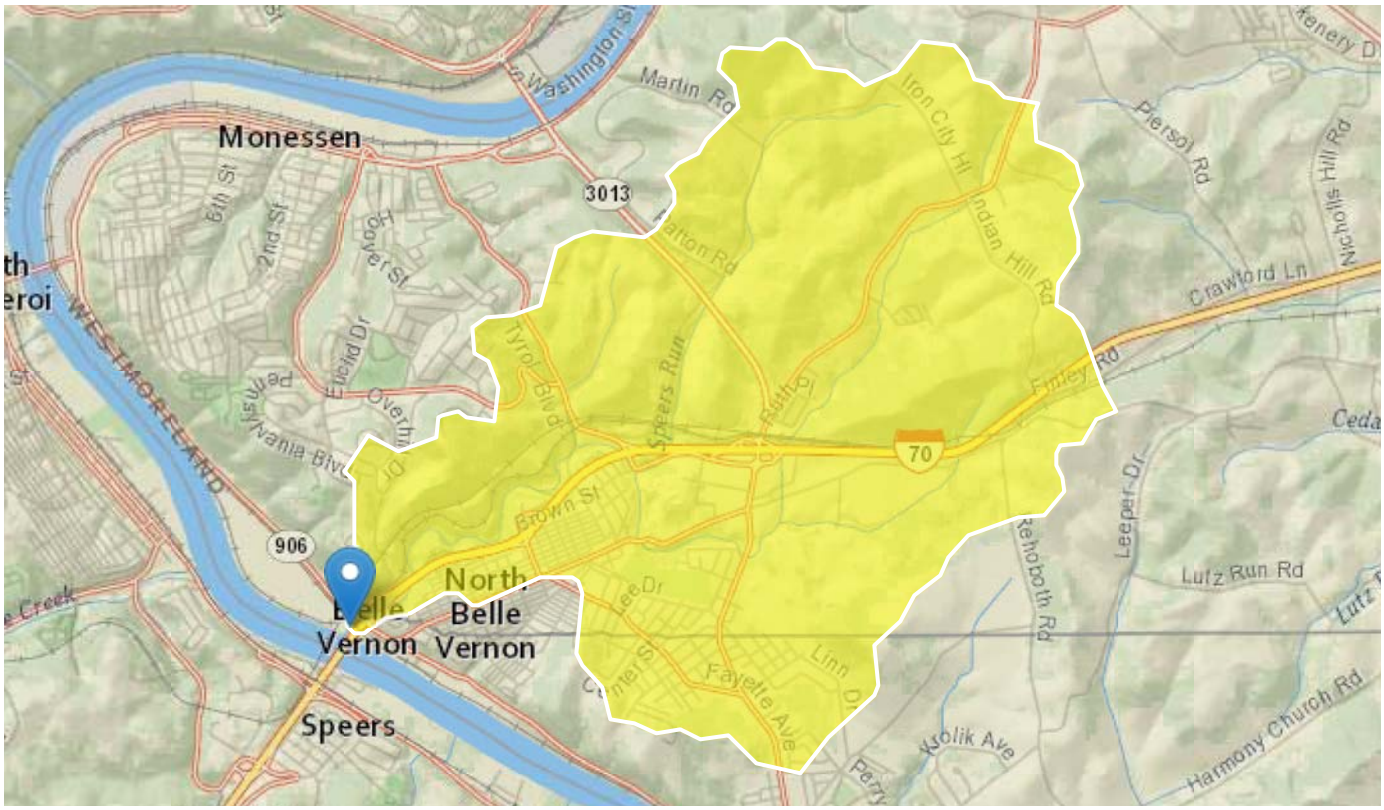
Statistic	Value	Unit	SE	SEp
Base Flow 10 Year Recurrence Interval	8.97	ft^3/s	21	21
Base Flow 25 Year Recurrence Interval	7.84	ft^3/s	21	21
Base Flow 50 Year Recurrence Interval	7.21	ft^3/s	23	23

Base Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

StreamStats Report for Monongahela Area of Interest

Region ID: PA
Workspace ID: PA20171229164929621000
Clicked Point (Latitude, Longitude): 40.12844, -79.87726
Time: 2017-12-29 11:49:50 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	6.65	square miles
ELEV	Mean Basin Elevation	1030.9	feet
PRECIP	Mean Annual Precipitation	37	inches
FOREST	Percentage of area covered by forest	49	percent
URBAN	Percentage of basin with urban development	22	percent
CARBON	Percentage of area of carbonate rock	0	percent
BSLOPD	Mean basin slope measured in degrees	7.7	degrees
BSLOPDRAW	Unadjusted basin slope, in degrees	7.94	
CENTROXA83	X coordinate of the centroid, in NAD_1983_Albers, meters	-156906.8	
CENTROYA83	Basin centroid horizontal (y) location in NAD 1983 Albers	128557.1	
DRN	Drainage quality index from STATSGO	3.7	

Parameter Code	Parameter Description	Value	Unit
GLACIATED	Percentage of basin area that was historically covered by glaciers	0	percent
IMPNLCD01	Percentage of impervious area determined from NLCD 2001 impervious dataset	15	percent
LC01DEV	Percentage of land-use from NLCD 2001 classes 21-24	36	percent
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	38	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	16.1	percent
LONG_OUT	Longitude of Basin Outlet	-79.87723	degrees
MAXTEMP	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid	61	degrees F
OUTLETXA83	X coordinate of the outlet, in NAD_1983_Albers,meters	-159985	
OUTLETYA83	Y coordinate of the outlet, in NAD_1983_Albers, meters	126985	
ROCKDEP	Depth to rock	4.4	feet
STORAGE	Percentage of area of storage (lakes ponds reservoirs wetlands)	0	percent
STRDEN	Stream Density -- total length of streams divided by drainage area	2.14	miles per square mile
STRMTOT	total length of all mapped streams (1:24,000-scale) in the basin	14.2	miles

Peak-Flow Statistics Parameters [Peak Flow Region 4]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	6.65	square miles	0.92	1720

Peak-Flow Statistics Flow Report [Peak Flow Region 4]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp	Equiv. Yrs.
2 Year Peak Flood	330	ft^3/s	28	28	4
5 Year Peak Flood	577	ft^3/s	26	26	7
10 Year Peak Flood	784	ft^3/s	28	28	10
50 Year Peak Flood	1360	ft^3/s	33	33	13
100 Year Peak Flood	1670	ft^3/s	38	38	13
500 Year Peak Flood	2530	ft^3/s	49	49	12

Peak-Flow Statistics Citations

Roland, M.A., and Stuckey, M.H.,2008, Regression equations for estimating flood flows at selected recurrence intervals for ungaged streams in Pennsylvania: U.S. Geological Survey Scientific Investigations Report 2008-5102, 57p. (http://pubs.usgs.gov/sir/2008/5102/)

Low-Flow Statistics Parameters [Low Flow Region 4]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	6.65	square miles	2.26	1400
ELEV	Mean Basin Elevation	1030.9	feet	1050	2580

Low-Flow Statistics Disclaimers [Low Flow Region 4]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors

Low-Flow Statistics Flow Report [Low Flow Region 4]

Statistic	Value	Unit
7 Day 2 Year Low Flow	0.214	ft^3/s
30 Day 2 Year Low Flow	0.375	ft^3/s
7 Day 10 Year Low Flow	0.078	ft^3/s
30 Day 10 Year Low Flow	0.143	ft^3/s
90 Day 10 Year Low Flow	0.258	ft^3/s

Low-Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Annual Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	6.65	square miles	2.26	1720
ELEV	Mean Basin Elevation	1030.9	feet	130	2700
PRECIP	Mean Annual Precipitation	37	inches	33.1	50.4
FOREST	Percent Forest	49	percent	5.1	100
URBAN	Percent Urban	22	percent	0	89

Annual Flow Statistics Flow Report [Statewide Mean and Base Flow]

PII: Prediction Interval-Lower, Plu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp
Mean Annual Flow	7.97	ft^3/s	12	12

Annual Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

General Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	6.65	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	37	inches	33.1	50.4
CARBON	Percent Carbonate	0	percent	0	99
FOREST	Percent Forest	49	percent	5.1	100
URBAN	Percent Urban	22	percent	0	89

General Flow Statistics Flow Report [Statewide Mean and Base Flow]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp
Harmonic Mean Streamflow	1.36	ft^3/s	38	38

General Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Base Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	6.65	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	37	inches	33.1	50.4
CARBON	Percent Carbonate	0	percent	0	99
FOREST	Percent Forest	49	percent	5.1	100
URBAN	Percent Urban	22	percent	0	89

Base Flow Statistics Flow Report [Statewide Mean and Base Flow]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp
Base Flow 10 Year Recurrence Interval	2.53	ft^3/s	21	21
Base Flow 25 Year Recurrence Interval	2.21	ft^3/s	21	21
Base Flow 50 Year Recurrence Interval	2.04	ft^3/s	23	23

Base Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

StreamStats Report Sewickley Creek

Region ID: PA
Workspace ID: PA20171229170515324000
Clicked Point (Latitude, Longitude): 40.23032, -79.77787
Time: 2017-12-29 12:05:35 -0500

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	168	square miles
ELEV	Mean Basin Elevation	1130.1	feet
PRECIP	Mean Annual Precipitation	41	inches
FOREST	Percentage of area covered by forest	43	percent
URBAN	Percentage of basin with urban development	14	percent
CARBON	Percentage of area of carbonate rock	0	percent
BSLOPD	Mean basin slope measured in degrees	6.7	degrees
BSLOPDRAW	Unadjusted basin slope, in degrees	6.96	
CENTROXA83	X coordinate of the centroid, in NAD_1983_Albers, meters	-135358.4	
CENTROYA83	Basin centroid horizontal (y) location in NAD 1983 Albers	139162.8	
DRN	Drainage quality index from STATSGO	3.6	

Parameter Code	Parameter Description	Value	Unit
GLACIATED	Percentage of basin area that was historically covered by glaciers	0	percent
IMPNLCD01	Percentage of impervious area determined from NLCD 2001 impervious dataset	6	percent
LC01DEV	Percentage of land-use from NLCD 2001 classes 21-24	20	percent
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	23.2	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	7.36	percent
LONG_OUT	Longitude of Basin Outlet	-79.77783	degrees
MAXTEMP	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid	60	degrees F
OUTLETXA83	X coordinate of the outlet, in NAD_1983_Albers,meters	-151285	
OUTLETYA83	Y coordinate of the outlet, in NAD_1983_Albers, meters	138115	
ROCKDEP	Depth to rock	4.4	feet
STORAGE	Percentage of area of storage (lakes ponds reservoirs wetlands)	0	percent
STRDEN	Stream Density -- total length of streams divided by drainage area	1.99	miles per square mile
STRMTOT	total length of all mapped streams (1:24,000-scale) in the basin	334.09	miles

Peak-Flow Statistics Parameters [Peak Flow Region 4]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	168	square miles	0.92	1720

Peak-Flow Statistics Flow Report [Peak Flow Region 4]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp	Equiv. Yrs.
2 Year Peak Flood	5050	ft^3/s	28	28	4
5 Year Peak Flood	7990	ft^3/s	26	26	7
10 Year Peak Flood	10300	ft^3/s	28	28	10
50 Year Peak Flood	16400	ft^3/s	33	33	13
100 Year Peak Flood	19600	ft^3/s	38	38	13
500 Year Peak Flood	28400	ft^3/s	49	49	12

Peak-Flow Statistics Citations

Roland, M.A., and Stuckey, M.H.,2008, Regression equations for estimating flood flows at selected recurrence intervals for ungaged streams in Pennsylvania: U.S. Geological Survey Scientific Investigations Report 2008-5102, 57p. (http://pubs.usgs.gov/sir/2008/5102/)

Low-Flow Statistics Parameters [100 Percent (168 square miles) Low Flow Region 4]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	168	square miles	2.26	1400
ELEV	Mean Basin Elevation	1130.1	feet	1050	2580

Low-Flow Statistics Flow Report [100 Percent (168 square miles) Low Flow Region 4]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp
7 Day 2 Year Low Flow	9.16	ft^3/s	43	43
30 Day 2 Year Low Flow	13.9	ft^3/s	38	38
7 Day 10 Year Low Flow	4.41	ft^3/s	66	66
30 Day 10 Year Low Flow	6.39	ft^3/s	54	54
90 Day 10 Year Low Flow	10	ft^3/s	41	41

Low-Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Annual Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	168	square miles	2.26	1720
ELEV	Mean Basin Elevation	1130.1	feet	130	2700
PRECIP	Mean Annual Precipitation	41	inches	33.1	50.4
FOREST	Percent Forest	43	percent	5.1	100
URBAN	Percent Urban	14	percent	0	89

Annual Flow Statistics Flow Report [Statewide Mean and Base Flow]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp
Mean Annual Flow	240	ft^3/s	12	12

Annual Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

General Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	168	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	41	inches	33.1	50.4

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CARBON	Percent Carbonate	0	percent	0	99
FOREST	Percent Forest	43	percent	5.1	100
URBAN	Percent Urban	14	percent	0	89

General Flow Statistics Flow Report [Statewide Mean and Base Flow]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp
Harmonic Mean Streamflow	57.3	ft^3/s	38	38

General Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Base Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	168	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	41	inches	33.1	50.4
CARBON	Percent Carbonate	0	percent	0	99
FOREST	Percent Forest	43	percent	5.1	100
URBAN	Percent Urban	14	percent	0	89

Base Flow Statistics Flow Report [Statewide Mean and Base Flow]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

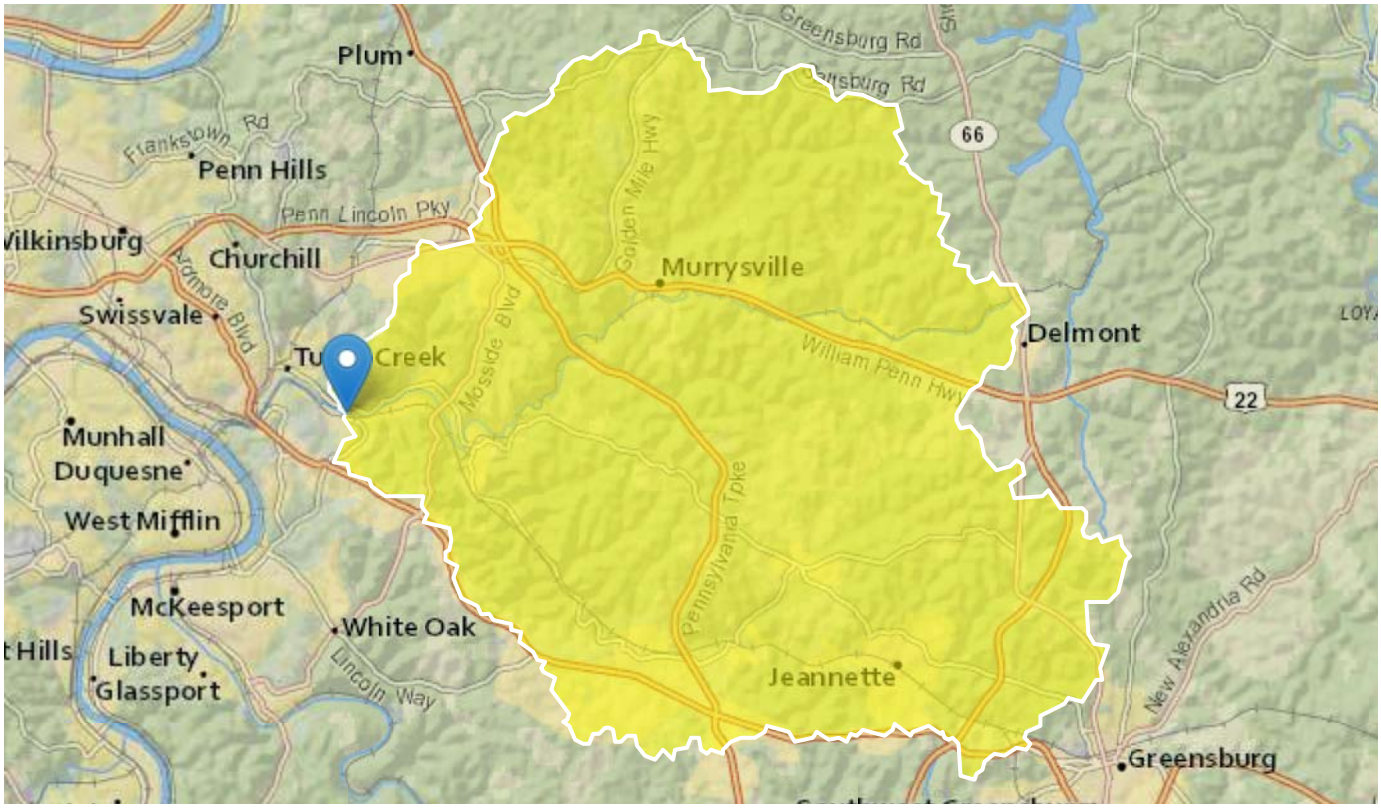
Statistic	Value	Unit	SE	SEp
Base Flow 10 Year Recurrence Interval	75.3	ft^3/s	21	21
Base Flow 25 Year Recurrence Interval	66.1	ft^3/s	21	21
Base Flow 50 Year Recurrence Interval	60.8	ft^3/s	23	23

Base Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

StreamStats Report Turtle Creek Basin to Wilmerding

Region ID: PA
Workspace ID: PA20171229165653079000
Clicked Point (Latitude, Longitude): 40.39433, -79.80570
Time: 2017-12-29 11:57:13 -0500



Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
DRNAREA	Area that drains to a point on a stream	123	square miles
ELEV	Mean Basin Elevation	1123.7	feet
PRECIP	Mean Annual Precipitation	39	inches
FOREST	Percentage of area covered by forest	52	percent
URBAN	Percentage of basin with urban development	26	percent
CARBON	Percentage of area of carbonate rock	0	percent
BSLOPD	Mean basin slope measured in degrees	8.1	degrees
BSLOPDRAW	Unadjusted basin slope, in degrees	8.27	
CENTROXA83	X coordinate of the centroid, in NAD_1983_Albers, meters	-142120.2	
CENTROYA83	Basin centroid horizontal (y) location in NAD 1983 Albers	155799.4	
DRN	Drainage quality index from STATSGO	3.5	

Parameter Code	Parameter Description	Value	Unit
GLACIATED	Percentage of basin area that was historically covered by glaciers	0	percent
IMPNLCD01	Percentage of impervious area determined from NLCD 2001 impervious dataset	12	percent
LC01DEV	Percentage of land-use from NLCD 2001 classes 21-24	35	percent
LC11DEV	Percentage of developed (urban) land from NLCD 2011 classes 21-24	39.5	percent
LC11IMP	Average percentage of impervious area determined from NLCD 2011 impervious dataset	13.7	percent
LONG_OUT	Longitude of Basin Outlet	-79.80565	degrees
MAXTEMP	Mean annual maximum air temperature over basin area from PRISM 1971-2000 800-m grid	60	degrees F
OUTLETXA83	X coordinate of the outlet, in NAD_1983_Albers,meters	-153275	
OUTLETYA83	Y coordinate of the outlet, in NAD_1983_Albers, meters	156375	
ROCKDEP	Depth to rock	4	feet
STORAGE	Percentage of area of storage (lakes ponds reservoirs wetlands)	0	percent
STRDEN	Stream Density -- total length of streams divided by drainage area	2.1	miles per square mile
STRMTOT	total length of all mapped streams (1:24,000-scale) in the basin	257.39	miles

Peak-Flow Statistics Parameters [Peak Flow Region 4]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	123	square miles	0.92	1720

Peak-Flow Statistics Flow Report [Peak Flow Region 4]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp	Equiv. Yrs.
2 Year Peak Flood	3880	ft^3/s	28	28	4
5 Year Peak Flood	6200	ft^3/s	26	26	7
10 Year Peak Flood	8020	ft^3/s	28	28	10
50 Year Peak Flood	12900	ft^3/s	33	33	13
100 Year Peak Flood	15400	ft^3/s	38	38	13
500 Year Peak Flood	22500	ft^3/s	49	49	12

Peak-Flow Statistics Citations

Roland, M.A., and Stuckey, M.H.,2008, Regression equations for estimating flood flows at selected recurrence intervals for ungaged streams in Pennsylvania: U.S. Geological Survey Scientific Investigations Report 2008-5102, 57p. (http://pubs.usgs.gov/sir/2008/5102/)

Low-Flow Statistics Parameters [100 Percent (123 square miles) Low Flow Region 4]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	123	square miles	2.26	1400
ELEV	Mean Basin Elevation	1123.7	feet	1050	2580

Low-Flow Statistics Flow Report [100 Percent (123 square miles) Low Flow Region 4]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp
7 Day 2 Year Low Flow	6.39	ft^3/s	43	43
30 Day 2 Year Low Flow	9.81	ft^3/s	38	38
7 Day 10 Year Low Flow	2.99	ft^3/s	66	66
30 Day 10 Year Low Flow	4.44	ft^3/s	54	54
90 Day 10 Year Low Flow	7.07	ft^3/s	41	41

Low-Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Annual Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	123	square miles	2.26	1720
ELEV	Mean Basin Elevation	1123.7	feet	130	2700
PRECIP	Mean Annual Precipitation	39	inches	33.1	50.4
FOREST	Percent Forest	52	percent	5.1	100
URBAN	Percent Urban	26	percent	0	89

Annual Flow Statistics Flow Report [Statewide Mean and Base Flow]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp
Mean Annual Flow	171	ft^3/s	12	12

Annual Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

General Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	123	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	39	inches	33.1	50.4

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CARBON	Percent Carbonate	0	percent	0	99
FOREST	Percent Forest	52	percent	5.1	100
URBAN	Percent Urban	26	percent	0	89

General Flow Statistics Flow Report [Statewide Mean and Base Flow]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp
Harmonic Mean Streamflow	40	ft^3/s	38	38

General Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Base Flow Statistics Parameters [Statewide Mean and Base Flow]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
DRNAREA	Drainage Area	123	square miles	2.26	1720
PRECIP	Mean Annual Precipitation	39	inches	33.1	50.4
CARBON	Percent Carbonate	0	percent	0	99
FOREST	Percent Forest	52	percent	5.1	100
URBAN	Percent Urban	26	percent	0	89

Base Flow Statistics Flow Report [Statewide Mean and Base Flow]

PII: Prediction Interval-Lower, PIu: Prediction Interval-Upper, SEp: Standard Error of Prediction, SE: Standard Error (other -- see report)

Statistic	Value	Unit	SE	SEp
Base Flow 10 Year Recurrence Interval	55.6	ft^3/s	21	21
Base Flow 25 Year Recurrence Interval	49.3	ft^3/s	21	21
Base Flow 50 Year Recurrence Interval	45.6	ft^3/s	23	23

Base Flow Statistics Citations

Stuckey, M.H.,2006, Low-flow, base-flow, and mean-flow regression equations for Pennsylvania streams: U.S. Geological Survey Scientific Investigations Report 2006-5130, 84 p. (http://pubs.usgs.gov/sir/2006/5130/)

Westmoreland County Integrated Water Resources Plan

APPENDIX J

NPDES for MS4 Stormwater Ordinance Checklist

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF CLEAN WATER

9.13.2019
WCD

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) STORMWATER DISCHARGES FROM SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS STORMWATER MANAGEMENT ORDINANCE CHECKLIST

The applicant: ☐ does ☒ does not have an enacted stormwater management ordinance.

MS4 CLIENT/OPERATOR INFORMATION

Organization Name or Registered Fictitious Name
Westmoreland County

Mailing Address Line 1 | Mailing Address Line 2

Address Last Line – City	State	ZIP+4	Country
Greensburg	**PA**	**15601**	**USA**

CHECKLIST

	Ordinance Provision	2013 Requirement	2022 Requirement
1.	**Article I – General Provisions**. Does the ordinance contain sections for Short Title, Statement of Findings, Purpose, Statutory Authority, Applicability, Repealer, Severability, Compatibility with Other Requirements, Erroneous Permit, or otherwise these concepts are addressed in the ordinance in a manner generally consistent with DEP's Model Stormwater Management Ordinance? ART I, § 101 to 109	☐	☒
	Does the ordinance contain a section for Waivers? ART. III § 305		☒
	Comments: **Waivers for sites <1ac that cannot achieve ordinance requirments and as approved by municipality**		
2.	**Article II – Definitions**. Does the ordinance include definitions for all critical terms used in the ordinance, including but not limited to Earth Disturbance Activity, Land Development, Stormwater, Best Management Practice, Municipality, and Waters of the Commonwealth? ART. II § 202	☐	☒
	Comments: **Additional definitions include demonstrated equivalency, regulated development activity, swm performance districts, among others**		
3.	**Article III – Stormwater Management Standards**. Does the ordinance require or include:		
a.	Preparation and implementation of a stormwater management site plan, unless exempted, and regulated activities may not commence until written approval is issued? ART. III § 302	☐	☒
b.	BMPs consistent with DEP's Chapter 102 and E&S Manual? ART. III § 310	☐	☒
c.	Notification of adjacent property owners when stormwater flows may be altered on adjacent property? ART. III § 307, B, 1, c	☐	☒
d.	Design standards directly or by reference, including the design storm volumes to be used in the analysis of peak flows. ART. III § 307, B, 1, a	☐	☒
e.	A standard earth disturbance area, no greater than one acre, for which E&S requirements including rate and volume controls consistent with Chapter 102 apply? ART. III § 306, A, B & C. and § 310	☐	☒
f.	Exemptions for certain activities and an explanation of the municipality's authority to deny or revoke exemptions? ART. III § 303, A & B	☐	☒
g.	Use of green infrastructure and low impact development practices?	☐	☒

ART. I § 102, H ; ART II § 202 ; ART. III § 305, D. 2. c ; § 306, E. 2 ; § 307, J ; § 309, A. 6. d ; ART. IV § 401, C

9.13.2019
WCD

Ordinance Provision	2013 Requirement	2022 Requirement
h. Acceptable methods to determine pre- and post-development runoff volumes? ART III. § 307.B.3	☐	☒
i. Specification of the post-development peak discharge rates for areas covered and not covered by a release rate map in an approved Act 167 Plan? ART. III § 308.D.	☐	☒
Comments: **Added reference to PA Floodplain Management Act 166 of 1978** ART. III § 311.E.		
4. Article IV – Stormwater Management Site Plan Requirements. Does the ordinance require or include:		
a. Specification of minimum requirements for a satisfactory stormwater management site plan consistent with DEP's Model Stormwater Management Ordinance? ART IV. § 401	☐	☒
b. Submission of an E&S control plan to the appropriate state or county approval authority? ART III § 310 ; ART IV § 401.F	☐	☒
c. The number of site plans needed and to whom the plans need to be submitted? ART V § 502.A	☐	☒
d. Procedures for municipal review of site plans, modifications of plans, and resubmission of disapproved plans? ART. V § 502.C	☐	☒
e. Specification of the term of approval for site plans? ART V § 503.B	☐	☒
f. Submission of as-built plans and certificates of completion for BMPs? ART V § 506	☐	☒
Comments: **Split into 2 Articles, IV- SWM Plan Requirements and V-SWM Plan Submission and Review Procedures**		
5. Article V – Operation and Maintenance. Does the ordinance require or include:		
a. Enumeration of stormwater BMPs as permanent real estate appurtenances that must be recorded as deed restrictions or conservation easements that run with the land? ART VI § 602.B & C	☐	☒
b. Recording of the O&M Plan as a restrictive deed covenant that runs with the land? ART VI § 603.B	☐	☒
c. Enforcement by the municipality for failure to perform O&M? ART VI § 602.D; ART VIII § 802.A	☐	☒
d. Prior to final approval of the Site Plan, the property owner must sign and record an O&M agreement? ART IV § 404.D ; ART VI § 602.B & C	☐	☒
e. If the owner fails to maintain the BMPs, the municipality may conduct the maintenance and charge the owner fees? ART VI § 602.D ; ART VII § 701, 703 ; ART VII § 802.4.7	☐	☒
f. A financial guarantee for timely installation and proper construction of BMPs or facilities specified in the Site Plan? ART VII § 701	☐	☒
Comments: **Referenced in Article IV - regarding plan requirements**		
6. Article VI – Fees and Expenses. Does the ordinance indicate that a review fee may be required for a Site Plan to include administrative costs, review costs, attendance at meetings and inspections? ART V § 502.G ; ART VII § 706.	☐	☒
Comments: **To be set by individual municipalities**		

9.13.2019
WCD

Ordinance Provision			2013 Requirement	2022 Requirement
7.	**Article VII – Prohibitions**. Does the ordinance require or include:			
	a.	A general prohibition on non-stormwater discharges from entering the municipal separate storm sewer system. ART I § 110.A	☐	☒
	b.	Authorized and Non-Authorized Stormwater Discharges:		
		Consistent with the PAG-13 General Permit effective on March 16, 2013 ("General Permit Coverage and Limitations")	☐	NA
		Consistent with the PAG-13 General Permit effective on March 16, 2018 ("Discharges Authorized by this General Permit") ART I § 110.A		☒
	c.	A statement that roof drains and sump pumps shall discharge to infiltration or vegetative BMPs wherever feasible? ART. I § 110.D	☐	☒
	d.	A prohibition on altering BMPs, facilities or structures that were installed under the ordinance without written approval of the municipality? ART. § 110.C.2; ART V § 504.B; ART VIII § 802	☐	☒
	Comments:	**Listed in total in Article I, Section 110 - Prohibitions**		
8.	**Article VIII – Enforcement and Penalties**. Does the ordinance require or include:			
	a.	A provision authorizing right-of-entry to inspect BMPs and facilities regulated by the ordinance? ART VIII § 801	☐	☒
	b.	A specification of inspection frequencies of BMPs and facilities regulated by the ordinance by the landowner, owner's designee or municipality? ART. VI § 601.E	☐	☒
	c.	Transmission of written reports concerning inspections to the municipality? ART. VI § 601.E		☒
	d.	A statement that it is unlawful for a person to undertake any regulated activity except as provided in an approved Site Plan or otherwise exempted? ART VII § 802	☐	☒
	e.	Identification of reasons for a municipality's suspension or revocation of any approval or permit, and procedures to reinstate a suspended approval? ART III § 803	☐	☒
	f.	Specification of penalties for violations of the ordinance? ART VIII § 805	☐	☒
	g.	Appeal procedures? ART. VII § 807	☐	☒
	Comments:	**Listed in Article VI - SWM Plan Submission and Review Procedures, and Article VIII - Enforcement and Penalties**		

If a stormwater management ordinance has not been enacted, by what date does the municipality anticipate that an ordinance will be enacted? **within 6 months of county model**

If a stormwater management ordinance has been enacted, and the answer to any question above is No, by what date does the municipality anticipate that revisions to the ordinance will be enacted?

Other Comments:

9.13-2019
WCD

CERTIFICATION

I certify under penalty of law and subject to the penalties of 18 Pa. C.S.A. Section 4904 (relating to unsworn falsification to authorities) that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Responsible Official:

Name (type or print legibly)

Official Title

Signature

Date Signed

Municipal Solicitor:

Solicitor Name

Official Title

Signature

Date Signed

APPENDIX K

Public Participation

- WPAC Members
- Meeting Log
- Newspaper Articles (select)

Technical Advisory Committee

First Name	Last Name	Organization
Andrew	Blenko PE, JD	North Huntingdon Township
Christopher	Bova	Latrobe Municipal Authority
Lucien	Bove	Bove Engineering Company
Emil	Bove PLS, EIT	Bove Engineering Company
Kevin	Brett PE	Lennon, Smith, Souleret Engineering, Inc.
John	Campfield Attorney	Campfield & Ferraro
Daniel	Carpenter	Westmoreland County Department of Planning and Development/WCIDC
John	Cenkner	Cenkner Engineering, Inc.
Robert	Cronauer	
Chris	Droste	
Kathy	Fritz	The Markosky Engineering Group, Inc.
Chelsea	Gross	
Andrea	Halfhill	
Kathryn	Hamilton PLA	
Donald	Hixson Jr.	Lennon, Smith, Souleret Engineering, Inc.
Greg	Holesh	DEP - Waterways & Wetlands Program - Permitting & Technical Services Section
Jessica	Kane	
Charles	Kubasik	
Brian	Lawrence	Westmoreland County Department of Planning and Development/WCIDC
Suzy	Meyer	Image Earth
Bill	Mihalco	TCWA
Daniel	Mikesic	PennVest
Kim	Miller	Wolf Lake, Inc.
Attorney Leslie	Mlakar	Avolio Law Group, LLC
Kenneth	Murin	DEP - Bureau of Watershed Mgt. - Waterways, Wetlands & Stormwater Mgt.
Jen	Novak	
Gregory	Phillips	Westmoreland Conservation District
James	Pillsbury MS, PE	
Anthony	Quadro Jr.	Westmoreland Woodlands Improvement Association
Jason	Rigone	Westmoreland County Department of Planning and Development/WCIDC
Bill	Roberts	Penn Township
Ronald	Rohall	
Christie	Sebek	Westmoreland Conservation District
Tom	Sierzega	
Doug	Siler PE	Gibson-Thomas Engineering Co., Inc.
Tamira	Spedaliere	Rostraver Township
Chelsea	Walker	Westmoreland Conservation District

WPAC MEMBERS

County Commissioners

Name	***Organization***
Commissioner Charles Anderson, Secretary	
Commissioner Gina Cerilli, Chairman	
Commissioner Ted Kopas, Vice-Chairman	

Environmental Organizations

Name	***Organization***
Jim Bonner	Audubon Society of Western Pennsylvania
Carol Petrosky	Botanical Society of Westmoreland County
Mike Burk	Conemaugh Valley Conservancy
Glenn Merlin	Ducks Unlimited
Pia van de Venne	Friends of Murrysville Parks
Angie Raitano	Greensburg Garden Center
Shannon Reiter	Keep Pennsylvania Beautiful
Betsy Aiken	Murrysville Trail Alliance
Brenda Shambaugh	PACD
Leah Smith	PASA
Davitt Woodwell	PEC
Marla Meyer Papernick	PEC
Doniele Russell	Penn's Corner Charitable Trust
Kevin Adams	Pheasants Forever
John Wenzel	Powdermill Nature Reserve
Leslie Pierce	Regional Trail Corporation
John Turack	Smart Growth Partnership
Scott Minster	Trout Unlimited
Andrew McAllister	WPCAMR
Thomas Saunders	Western PA Conservancy
Mike Kuzemchak	Western PA Conservancy
Jenifer Christman	Western PA Conservancy
Mark Killar	Western PA Conservancy
Rose Tillman	Westmoreland Bird and Nature Club
Ellen Keefe	Westmoreland Cleanways
Alan Halperin	Westmoreland Conservancy
Gretchen Winklosky	Westmoreland County Farm Bureau
Deb Harrison	Westmoreland County Sportsmen's League
Chuck Duritsa	Westmoreland Land Trust
Betsy Aiken	Westmoreland Land Trust
John Hilewick	WWIA
Beth Shoaf	Wildlife Works
Angela Belli	Winnie Palmer Nature Reserve
Jan Lauer	ACCD
Lew Villotti	SPC
Erin Kepple	SPC
Abby Stark	SPC
Kay Pierce	ACED - Planning Division
William McLain	ACED
Rebecca Zeyzus	ACCD - Allegheny Watershed Alliance
Monty Murty	Forbes Trail Trout Unlimited
Caryl Fish	Saint Vincent College

State Federal Agencies

Name	Organization
Kelly Heffner	DEP
Sid Freyermuth	DEP
Douglas Goodlander	DEP
Christopher Kriley	DEP
Alan Eichler	DEP
Deb McDonald	DEP
Tom McCaffrey	DEP
Abbey Owoc	DEP
Rita Coleman	DEP
William Plassio	DEP
Joseph Leone	DEP
Edward Ritzer	DEP
Ed Galovich	DEP
Charles Kubasik	DEP
Edward Callahan	Bureau of Forestry
Karl Brown	SCC
Kim Ansell	PennDOT District 12-0
Michael Barrick	PennDOT District 12-0
Matthew Kauffman	PA Fish & Boat Commission
Thomas Fazi	PA Game Commission
Jason Pontillo	FSA
Scott Hans	US Army Corps of Engineers
Josh Shaffer	US Army Corps of Engineers
Lisa Candelore	PA Dept. of Ag
Mike Hamilton	NRCS
Sara Woida	US Army Corps of Engineers

Watersheds

Name	***Organization***
Annie Quinn	Jacobs Creek Watershed Association
John Linkes	Kiskiminetas Watershed Association
Susan Huba	Loyalhanna Watershed Association
Beverly Braverman	Mountain Watershed Association
Tony Farina	Pucketa & Chartiers Creek Watershed Association
Thomas Keller	Sewickley Creek Watershed Association
Jim Brucker	Turtle Creek Watershed Association
Regis Synan	LWA Board Member

Name	***Organization***
Brain Lawrence	Westmoreland County Planning
Daniel Carpenter	Westmoreland County Planning
Jim Pillsbury	WCD
Kathy Hamilton	WCD
Matt Zambelli	WCD
Jim Smith	Economic Growth Connection of Westmoreland
Chris Kerr	MAWC
Mark Stoner	MAWC
Gary Sheppard	Penn State Cooperative Extension
April Kopas	Redevelopment Authority of Westmoreland County
April Kopas	Westmoreland County Land Bank
Betty Reefer	WCALP
Greg McCloskey	Westmoreland County Public Works
Malcolm Sias	Westmoreland County Bureau of Parks & Recreation
Anthony Pologruto	Westmoreland County Department of GIS
Chris Tantlinger	Westmoreland County Department of Public Safety
Roland Mertz	Westmoreland County Department of Public Safety
Gene Good	Westmoreland County Department of Public Safety
Jeff Richards	Westmoreland County Bureau of Parks & Recreation

Sewage Authorities

CONTACT 1	CONTACT 2	CONTACT 3	AUTHORITY
Norman Stout	Larry Hague		Borough of Mount Pleasant Sewage
Carol Henderson, Manager	Barry Brasili, Chairman	Ellen Keefe, Vice Chairman	Derry Township Sewage Authority
Howard Keefer			East Huntingdon Township Wastewater
Kevin Kaplan			Franklin Township Municipal Sanitary Authority
Les Mlakar	Doug Pike		Hempfield Township Municipal Authority
Rege Ranella			Hempfield Township Municipal Authority
James Broker, Chairman	Nicholas Masciantonia, Vice Chairman		Jeannette Municipal Authority
Dennis Duryea			Kiski Valley Water Pollution Control Authority
Tom Gray, Manager	Dr. Randall Cook, Chairman	Ellen Keefe, Vice Chairman	Latrobe Municipal Authority
Glenn Kalp, Chairman	Paul Knupp, Manager		Ligonier Township Municipal Authority
Kevin Lettrich, Chairman	Terry Anderson, Vice Chairman		Lower Burrell Municipal Authority
Mike Radokovich			Manor Borough Sewage Committee
Tom Saylack			Mon Valley Sewage Authority
Charles Naggy, Chairman	Stacy Hayes, Manager		Mount Pleasant Township Municipal Authority
Robert Polczynski, Chairman	Frank Paolo, Vice Chairman		Municipal Authority of Allegheny Township
Ronald Krepps			Municipal Authority of Belle Vernon
Michele Cathers			Municipal Authority of the Borough of Smithton
Julius Petrosky, Chairman	Jan Amoroso, Manager		Municipal Authority of Washington Township
Donald Rucitti	Curt Fontaine		Municipal Authority of Westmoreland County
Daniel Rowe, Manager	Delbert Brown, Chairman		Municipal Sanitary Authority of New Kensington
Carole Henderson			New Florence/St. Clair Township Sanitary Authority
Timothy Hondal, Chairman	Michael Branthoover, Manager		North Huntingdon Township Municipal Authority
Carolyn Neel			North Irwin Borough Municipal Authority
Randy Dreistadt			Penn Borough Sewage Authority
Edward Falta, Chairman	Stanley Caroline, Jr., Manager		Penn Township Sewage Authority
Dennis Manown, Chairman	Gary Dilmore, Vice Chairman		Rostraver Township Sewage Authority
Donald Shetler			Seward/St. Clair Township Sanitary Authority
Joe Sisitki			Tri-Community Sewage
Thomas Couch, Chairman	Lori Rodkey, Manager		Unity Township Municipal Authority
Robert Wayman, Chairman	Kevin Fisher, Manager		Western Westmoreland Municipal Authority
Thomas Seaman, Chairman	Marianne Zoracki, Manager		Westmoreland/Fayette Municipal Sewage Authority
Jim Yazvec			Youngstown Borough Water Authority
David Hixson, Chairman	Paula Mazurek		Youngwood Borough Sewage
Claude Petroy, Vice Chairman	Gino Rizzi, Manager		GGSA
Stan Caroline, Chair			WWMA
Stanley Gorski			WWMA
Mark Stoner			MAWC
Robert Swarmer			FTMSA

Municipalities

Contact	Municipality
Stephanie Capasso	Adamsburg Borough
Steve Kanas	Allegheny Township
Ren Steele	Allegheny Township
Kathy Starr	Allegheny Township
Attorney John Pallone	Arnold City
	Arona Borough
	Avonmore Borough
David Kerchner	Bankson Engineering
	Bell Township
Arch Dodson	Bolivar Borough
Barbara Ciampini	City of Greensburg
Susan Trout	City of Greensburg
Anne Powell	City of Latrobe
Richard Umbaugh	Cook Township
David Piper	Delmont Borough
Lori Latta	Derry Borough
Dave Slifka	Derry Township
Jim Prohaska	Derry Township
Vince Decario	Derry Township
	Donegal Borough
Thomas Stull Jr.	Donegal Township
Trudy Harckom	Donegal Township
Cindy Walthour	East Huntingdon Township
	East Vandergrift Borough
Barry Delissio	Export Borough
Vaughn Tantlinger	Fairfield Township
Andrew Walz	Hempfield Township
R. Douglas Weimer	Hempfield Township
Douglas Cisco	Hempfield Township
Gene Cline	Hunker Borough
	Hyde Park Borough
Mary Benko	Irwin Borough
Ed Antonacci	Jeannette City
Wayne Jones	Latrobe Borough
	Laurel Mountain Borough
Ormond Bellas	Ligonier Borough
Paul Fry	Ligonier Borough
Richard Bell	Ligonier Township
Terry Carcella	Ligonier Township
Richard Callender	Lower Burrell City
Chris Fabry	Lower Burrell City
	Loyalhanna Township
	Madison Borough
Joseph Lapia	Manor Borough
Lou Mavrakis	Monessen City
Gerald Lucia	Mount Pleasant Borough

Pamela Humenik	West Newton Borough
Matt Genchur	White Township
	Youngstown Borough
Diane Schaefer	Youngwood Borough
Joan Derco	Youngwood Borough
Gary Falatovich	

Companies

Name	***Organization***
Jeff Bradshaw	Hatch Mott MacDonald
Chris Henry	Hatch Mott MacDonald
Julie Martin	WEDIG
David Ivanek	Bankson Engineers
Dan Schmitt	Gibson-Thomas Engineering
Chuck Konkus	Scott Electric
Jason Baguet	SciTek
Robert Brooks	Wabtec
Damon Weiss	Ethos
Jay Pereira	Ethos
Barton Kirk	Ethos
Jayme Matkozich	J. A. Rutter Co.

Federal Legislators

Name	Organization
The Honorable Robert Casey Jr.	
The Honorable Mike Doyle	
The Honorable Timothy Murphy	
The Honorable Keith Rothfus	
The Honorable Bill Shuster	
The Honorable Pat Toomey	
Katelyn Lamm	Office of Pat Toomey
Jeremy Honhold	Office of Keith Rothfus

PA Legislators

Name	Organization
The Honorable James Brewster	
The Honorable Frank Dermody	
The Honorable George Dunbar	
The Honorable Eli Evankovich	
The Honorable R. Ted Harhai	
The Honorable Eric Nelson	
The Honorable Joseph Petrarca Jr.	
The Honorable Mike Reese	
The Honorable Patrick Stefano	
The Honorable Kim Ward	
The Honorable Ryan Warner	
The Honorable Donald White	

WCD Board and Associates

Name	Organization
Christopher Bova	Westmoreland County Department of Planning and Development/WCIDC
Emil Bove PLS, EIT	Bove Engineering Company
Bruce Corna	Bruce Construction LLC
Reid Crosby	
Theresa Gay Rohall	
Alexander Graziani SDG	Penn Township
Karen Jurkovic	
Larry Larese	
John Lohr	
Barbara McMillan	Stillwaters Farm
William Mihalco	TCWA
Robert Pore	
John Turack	Penn State Extension/Smart Growth/WEDIG
Keith Walters	
Albert Barnett	
Joseph Dietrick PE, PLS	The Markosky Engineering Group, Inc.
William Doney Sr.	Doney Farm
Conrad Donovan	
Charles Duritsa	
Commissioner Ted Kopas	Westmoreland County Commissioner
Kim Miller	Wolf Lake, Inc.
Ronald Rohall	
Paul Sarver	
Fred Slezak	Lone Maple Agricultural Services, Inc.

General Public

Name	Organization
Bob Komoroski	
Bob Shaffer	
Ginny Fitzner	
Michael Principe	
Stephanie Principe	
Frank Paolo	
Dave Gatty	
Virginia Oplinger	
Carol Striker	
James Dranzik	
Shirley Dranzik	
Joanne Caffrey	
Adam Jones	
Wayne Baughman	
Gary Homer	
Rob Upholster	
Paul Gauthier	
Bob Davidson	
Jake Blank	

Appendix K
IWRP Meeting Log

Group	Purpose	Date	Time	Location	Attendees
TAC*	IWRP organization	8/21/2015	9:00 AM	WCD	18
WC Commissioners	request for support	10/21/2015		WC Courthouse	12
WC Commissioners	resolution	11/19/2015	10:00 AM	WC Courthouse	~35
TAC	Planning	3/3/2016	9:00 AM	WCD	18
WPAC**	#1 public participation	4/19/2016	1:00 PM	WCD	22
WPAC	#1 public participation	4/19/2016	6:30 PM	Rostraver Twp Municipal Building	~5
WPAC	#1 public participation	4/21/2016	6:30 PM	Ligonier Twp Municipal Complex	5
WPAC	#1 public participation	4/28/2016	6:30 PM	Allegheny Twp Community Building	~15
TAC	Planning	10/6/2016	1:00 PM	WCD	13
WPAC	#2 public participation	10/6/2016	3:00 PM	WCD	31
TAC	Planning	1/27/2017	9:00 AM	WCD	~15
MUNI	update, input	2/24/2017	11:30 AM	WCD	30
WC Commissioners	update	3/2/2017	10:00 AM	WC Courthouse	12
ENG WS	update	3/23-24/2017	8:00 AM	Saint Vincent College, Latrobe	388
SouthWest DEP	update	5/19/2017	9:00 AM	WCD	50 +/-
TAC	Planning	8/29/2017	9:00 AM	WCD	23
TAC	Planning	11/14/2017	9:00 AM	WCD	19
WPAC	#3 public participation	11/30/2017	9:00 AM	WCD	34
MUNI	update, input	1/26/2018	11:30 AM	WCD	32
ENG WS	update	3/22-23/2018	8:00 AM	Saint Vincent College, Latrobe	391
SouthWest DEP	update	5/18/2018	9:00 AM	WCD	50 +/-
WPAC	#4 public participation	7/19/2018	9:00 AM	WCD	39
SouthWest DEP	update	11/2/2018	9:00 AM	WCD	50 +/-
MUNI	update, input	1/25/2019	11:30 AM	WCD	48
IWRP Q&A	Public participation	2/18/2019	6:00 PM	WCD	~5
IWRP Q&A	Public participation	2/19/2019	3:00 PM	WCD	4
IWRP Q&A	Public participation	2/19/2019	6:00 PM	WCD	7

IWRP Q&A	Public participation	2/20/2019	3:00 PM	WCD	13
Salem Township	update	2/20/2019	7:00 PM	Salem Twp Municipal Building	~20
ENG WS	update	3/21-22/2019	8:00 AM	Saint Vincent College, Latrobe	403
Public Hearing	Public participation	5/3/2019	10:30 AM	WC Courthouse	~50
IWRP/Salem Twp	Input	5/28/2019	11:00 AM	WC Courthouse (ST letter)	12
TAC	Planning	6/5/2019	10:00 AM	WCD	8
Public Hearing	Public participation	7/22/2019	11:15 AM	WC Courthouse	~35
WC Commissioners	adoption	7/25/2019	10:00 AM	WC Courthouse (IWRP adoption)	~50

*TAC - WCD Technical Advisory Committee
**WPAC Watershed Plan Advisory Committee

Stormwater runoff meetings to be held in Westmoreland

TRIB LIVE

TRIBUNE-REVIEW | Monday, April 11, 2016 4:06 p.m.

The Westmoreland Conservation District will host a series of meetings seeking to identify areas where stormwater runoff is causing problems.

Residents who know of such areas are encouraged to attend one of the following meetings:

• 1 p.m. April 19 at the Houston Conservation Center, 218 Donohoe Rd., Hempfield

• 6:30 p.m. April 19 at the Rostraver Township Municipal Building, 201 Municipal Drive

• 6:30 p.m. April 21 at the Ligonier Township Municipal Complex, 1 Municipal Park Drive

• 6:30 p.m. April 28 at the Allegheny Township Community Building, 136 Community Building Road

For more information, call 724-837-5271.

$350,000 grant to aid Westmoreland Conservation District's integrated water resource plan

PATRICK VARINE | Thursday, May 5, 2016 11:00 p.m.

SUBMITTED PHOTO

Above, a badly flooded intersection along Rimel Lane in Donegal. Westmoreland Conservation District officials are using part of a $350,000 grant to address flooding and other water-related issues in the county.

ERICA DIETZ | TRIBUNE-REVIEW

Cars struggle through a flooded roadway at the intersection of Stevenson Boulevard and Greensburg Road in New Kensington in April 2015. Westmoreland Conservation District officials are developing an integrated water resource plan to identify and find ways to address flooding, runoff and other water-related issues in the county.

A plan for managing stormwater runoff, flooding and other issues is being developed by the Westmoreland Conservation District with the help of a $350,000 grant from the Richard King Mellon Foundation.

The two-year process to develop the integrated water resource plan began with a series of meetings in April hosted by the district and attended by government officials and the public with a goal to start identifying areas throughout the county where storm water runoff and flooding issues consistently crop up.

Kathy Hamilton of the conservation district said more than 120 people attended the four meetings.

“We got a really good cross-section from municipal authorities, government and private citizens,” Hamilton said. “We’re currently populating a map with all of the comments we received so we can see the pinpoints and say, ‘We have a cluster of issues here or there.’ As we make our way through this plan, we’ll have some direction as to what areas need addressed.”

As the work progresses, members of the district’s development committee — which Hamilton said anyone is welcome to join — will begin looking at high-development watersheds where runoff issues occur.

“The county has identified this sort of growth triangle between New Kensington, Rostraver and Latrobe, where you have aging infrastructure, flooding issues and that type of thing, along with the most commercial, industrial and residential development,” Hamilton said.

The integrated water resource plan, when completed, will become part of the county’s update of its overall comprehensive plan, which sets out goals and serves as a vision for development and land use.

In Murrysville, municipal engineer Joe Dietrick already has stormwater runoff reduction in his sights, and the borough recently adopted his recommended regulations requiring developers to follow best management practices to curb the problem.

“Our old ordinance had encouraged the use of best management practices, but people weren’t using it,” Dietrick said. “They’d always come up with some reason (not to). But I’m an engineer. I do site development. I know you can do it, and I was able to convince council … to let’s not give them a choice.”

The regulations require the use of runoff-reducing elements, including pervious pavement that allows storm water to filter through it into the soil, rain gardens and plans for storm water re-use.

Dietrick is in the midst of a study on flood plains — naturally occurring areas that flood when a stream or river overflows — in Murrysville, which he will present this year at a national conference.

“If you look on a map, you can see Turtle Creek and all its little tributaries, and you can see these small floodplains, many of which have been filled in,” he said. “By themselves, they don’t result in that much flooding, but taken together, it really adds up: it works its way downstream and maybe floods out someone in Ohio or further down.”

Dietrick said business owners and developers need to look into over-retention of water to make up for the loss of some of these flood plains.

Hamilton said that is the type of information that could also be rolled into the integrated water resource plan, which she envisions as a guide to aid developers and those looking to address

runoff issues. The plan will help curb problems from runoff in places like the Gulf of Mexico or Chesapeake Bay, where Hamilton said Western Pennsylvania waters ultimately flow.

“We’re not going to be writing any new regulations, but anyone who’s doing any development will be able to look at this plan, and it will tell them who to go to, what organizations they can contact,” Hamilton said. “It will be a one-stop shop for folks who want to do development.”

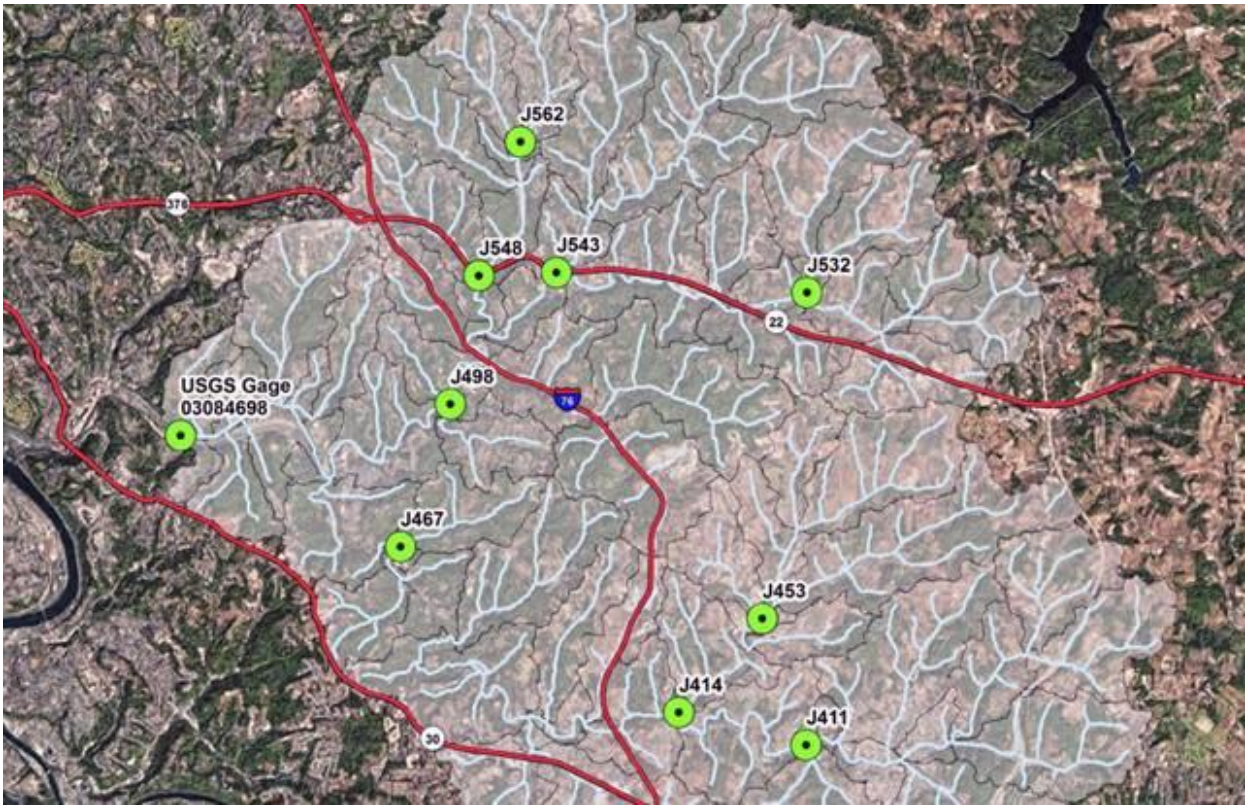
Patrick Varine is a staff writer for the Tribune-Review. He can be reached at 724-850-2862 or **pvarine@tribweb.com**.

Westmoreland Conservation District will host Q&A sessions Tuesday, Wednesday

PATRICK VARINE | Friday, February 15, 2019 5:40 p.m.

TRIBUNE-REVIEW

Maintenance worker Jacob Moyer of the Greensburg Parks & Recreation Department monitors the rising water at the at the Thomas Lynch Field Complex on Sept. 25, 2018. The heavy rain was the result of the remnants of Tropical Storm Gordon.



WCDPA.COM

Above, a map of the Turtle Creek Watershed, part of the Westmoreland Conservation District's Integrated Water Resource Plan.

DETAILS

If you go

What: Q&A sessions on the county's Integrated Water Resource Plan

When: 6 p.m., Tuesday; and 3 p.m., Wednesday

Where: J. Roy Houston Conservation Center, 218 Donohoe Road, Greensburg

For more: WCDPA.com

Last year, one of the Westmoreland Conservation District's rain gauges measured 72 inches of total rainfall — far above the typical 40 to 45 inches that the region sees annually.

"It really brought home the stormwater issues we have," said Kathy Hamilton, stormwater technician and landscape architect at the conservation district. "It made the bad issues worse, and in some places, it happened multiple times."

Conservation district officials will host two question-and-answer sessions Tuesday and Wednesday, Feb. 19 and 20, regarding the county's Integrated Water Resources Plan. The plan was developed over the past two years with an eye toward managing and mitigating Westmoreland's stormwater issues.

The plan will become part of the county's update of its overall comprehensive plan, which sets out goals and serves as a vision for development and land use.

The draft plan was completed late last year, and a printed copy was delivered to every municipality in the county for public review over the past month or so.

"The plan has to be accepted by the county, and then it has to go to the (state's Department of Environmental Protection) for approval to meet (state-mandated) stormwater requirements," Hamilton said.

A large part of the study, funded by a $350,000 grant from the Richard King Mellon Foundation, looked at heavily developed areas of the county where stormwater runoff is likely to carry more sediment and pollution into local waterways.

"We were able to identify some of the 'hot spots' in the county where projects can be targeted, and where we can try and find places to apply some of the grant funding we'll pursue," Hamilton said.

Examples of "hot spots" include places like Irwin, Jeannette and heavily developed parts of Murrysville, "places where you have a lot of development, and streams that are impacted by runoff from that development," Hamilton said.

Communities subject to the state's municipal separate stormsewer system, or MS4, regulations, are required to develop a stormwater ordinance.

"The plan sort of serves not only as a one-stop shop for anyone looking to do development in the county, but also as a model stormwater ordinance for municipalities," Hamilton said.

Some flexibility was built into the model ordinance so that more-urban areas like Greensburg and Jeannette can set parameters "that work for them, as opposed to a place like Bell Township which is more rural and won't have the same sorts of issues," Hamilton said.

The full plan is available online at WestmorelandStorm Water.org.

Question-and-answer sessions are set for 6 p.m., Tuesday, Feb. 19 and 3 p.m., Wednesday, Feb. 20, at the J. Roy Houston Conservation Center, 218 Donohoe Road, Hempfield.

[***NOTE***: A previous version of this story listed the Q&A dates incorrectly.]

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Patrick Varine is a Tribune-Review staff writer. You can contact Patrick at 724-850-2862, ***pvarine@tribweb.com*** *or via Twitter .*

Public hearing scheduled to discuss flood plan for Westmoreland County

RICH CHOLODOFSKY | Sunday, April 14, 2019 10:30 a.m.

Pleasant Hills arboretum board President Greg Smith and Vice President Drew Ratti discuss a stormwater management project.

A detailed blueprint to reduce flooding throughout Westmoreland County is expected to be approved next month by county commissioners.

A public hearing will be held at 10:30 a.m. May 3 at the courthouse to discuss the Integrated Water Resources Plan, a document that outlines a growing concern about flooding related to stormwater runoff.

“This plan will provide resources for homeowners and municipalities to solve our water problems,” said Jim Pillsbury, a hydraulic engineer with the Westmoreland County Conservation District, the agency tasked with compiling the document.

More than 2,300 miles of streams make up the county’s comprehensive inventory of water resources, including wetlands, groundwater and floodplains, officials said.

Pillsbury said 5% of county land is in the 100-year floodplain and nearly 9,200 residents — or about 2.5% of the county’s population — live in areas that could endure a catastrophic flood every century.

Remnants of Tropical Storm Gordon in September forced PennDOT to close as many as 50 roads across Westmoreland County. Heavy rains last June caused flooding issues in many areas of the county, particularly in communities bordering Loyalhanna Creek: Ligonier, Cook, Latrobe and Derry.

The proposed water resources plan identifies areas that are susceptible to flooding and includes interactive maps, resources and potential solutions, Pillsbury said.

The work was compiled by planners and conservation district staffers, an advisory committee of 40 to 50 members, engineers and other water resources experts. It was paid for from a portion of a $300,000 grant the conservation district received from the Richard King Mellon Foundation.

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Rich Cholodofsky is a Tribune-Review staff writer. You can contact Rich at 724-830-6293, ***rcholodofsky@tribweb.com*** *or via Twitter .*

Record rains cause concern for Westmoreland conservation group

STEPHEN HUBA | Wednesday, July 10, 2019 8:48 a.m.

Flood waters fill the low section of North Water Street near East Main Street as flooding continues along the Youghiogheny River in West Newton on Monday, Sept. 10, 2018.

Chunks of ice block the current of Tub Mill Creek along Creek Road in West Bolivar, forcing the waters to flood Creek Road and residents homes living along the roadway on Friday, February 21, 2014.

Youngwood Volunteer Fire Department Assistant Fire Chief Bob Coletta walks through flood waters along Depot Street in Youngwood where a car became stuck from the rising waters of Jack's Run on Monday, June 15, 2015. The operator of the vehicle escaped without injury.

A home along North Avenue in Ligonier remains isolated on the morning after a storm caused Mill Creek to flood on October 30, 2012.


Flood waters begin to surround homes along First Avenue as flooding continues along the Youghiogheny River in Sutersville on Monday, Sept. 10, 2018.


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EMAIL NEWSLETTERS

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Westmoreland County received 72 inches of precipitation in 2018 — nearly double the 40 inches the area normally receives.

What happens to all that water?

Some of it gets absorbed into the ground. Some of it evaporates with the help of plants and trees. And some of it just runs off.

Where the water goes is one of the major concerns of the Westmoreland Conservation District, which saw a record level of activity in 2018 and is expecting more of the same this year.

"We're seeing the same thing — lots of flooding, stream bank erosion and even delays in construction projects," said Gregory Phillips, district manager and CEO. "We're on pace to maybe not quite do the 72 inches, but it's going to be above normal."

Westmoreland County has had 32.4 inches of precipitation so far this year, although individual weather stations show local variations, according to the National Weather Service's Pittsburgh office in Moon.

The New Stanton station recorded 28.8 inches as of Wednesday, compared to 32.69 inches by the same date (July 10) last year. This year's rainfall has been 9.3 inches above average, according to NWS.

That has led to a host of water-related problems, including flooding, stormwater runoff, sedimentation buildup and streambank erosion, Phillips said.

"The rain impacted each and every one of our technical program areas, and our staff spent much of their time responding to the record number of phone calls from landowners who were experiencing problems," the WCD 2018 annual report said.

Among the annual report's findings:

• So much water collected underground in abandoned coal mines that it came shooting out in at least five places in Irwin.

• Linn Run exceeded its banks and damaged several buildings of the Valley School of Ligonier.

• A floodwall collapsed in South Greensburg.

• Farmers lost crops because the fields were too wet to harvest.

• Timber harvesters and commercial developers delayed their project schedules.

• The almost continuous presence of standing water increased mosquito populations in the county.

The Latrobe/Derry site of the Pennsylvania State Climatologist recorded 14 days when the amount of precipitation set a record in 2018.

The conservation district is tasked with reviewing plans so that new development does not exacerbate stormwater runoff. Two hundred such plans were reviewed in 2018.

“A developer is required to store runoff to ensure it doesn’t do damage downstream … through the use of retention ponds and storage tanks,” Phillips said.

The district reviews plans for projects exceeding one acre in size by comparing runoff levels before and after construction. Things such as buildings, roofs and parking lots can lead to higher runoff levels.

Now in its 70th year, the district has reviewed an estimated 10,000 stormwater plans over its lifespan, Phillips said.

About 5% of the land in Westmoreland County sits in a 100-year floodplain, meaning it will flood after extended periods of rain. Whether communities have floodplain management regulations can affect the availability of things such as flood insurance and home mortgages.

“Municipalities can protect their communities from flooding by adopting and enforcing regulations … that provide a standard for how the land in floodplain areas is used and developed,” according to the annual report.

Most stormwater controls are built to handle average amounts of rainfall, plus the occasional big storm. Because of Westmoreland County’s silty clay soil, only 10-12 inches of precipitation sinks into the ground. Another 20 inches is handled through “evapotranspiration” from trees and plants.

In 2018, that still left 40-plus inches with nowhere to go except to run off “down streets, across yards, into storm sewers and already swollen streams. Much of it found nowhere to go except places where it wasn’t wanted, like basements,” the report said.

The fact that Westmoreland County is still heavily agricultural and 50% forested helps reduce the incidence of flooding, Phillips said.

“Those forests are sponges — they absorb a lot more water. Without that, you’d see a lot more flooding,” he said. “I like to say that we’re 65 communities in Westmoreland County that are surrounded by forests and farmland. That helps us a lot.”

The conservation district is hoping that Westmoreland County commissioners will adopt its Integrated Water Resources Plan later this month. The plan assists in the management of the county's water resources and includes a model stormwater ordinance for municipalities.

Phillips noted that the district has had an "enormous" impact on excess runoff and flooding through the development of municipal stormwater ponds; residential rain gardens; permeable parking lots, plazas and sidewalks; vegetated buffers along streams; and gutters and downspouts on farms.

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Stephen Huba is a Tribune-Review staff writer. You can contact Stephen at 724-850-1280, ***shuba@tribweb.com*** *or via Twitter .*

Westmoreland commissioners set 2nd public hearing on plan to reduce flooding

RICH CHOLODOFSKY | Friday, July 19, 2019 1:19 p.m.

Route 381 north of Rector was closed on Thursday, July 11, 2019, because of flooding of a tributary to Loyalhanna Creek.

Westmoreland County Commissioners will hold a second public hearing Monday ahead of an expected vote on an updated plan designed to reduce flooding.

Officials are seeking comments about the new Integrated Water Resources Plan compiled by the Westmoreland County Conservation District and county planners. The public hearing will begin at 11:15 a.m. at the courthouse.

Commissioners in May conducted an initial hearing but minor revisions and an updated model ordinance that will be available for local municipalities to adopt necessitated a second public hearing, said Brian Lawrence an assistant director of the county's planning department.

Flooding has been a major issue throughout the county, including this month when heavy storms resulted in multiple, widespread incidents of flooding.

Officials said 5% of county land is in the 100-year floodplain and nearly 9,200 residents — or about 2.5% of the county's population — live in areas that could experience a catastrophic flood every century.

The proposed water resources plan identifies areas that are susceptible to flooding and includes interactive maps, resources and potential solutions.

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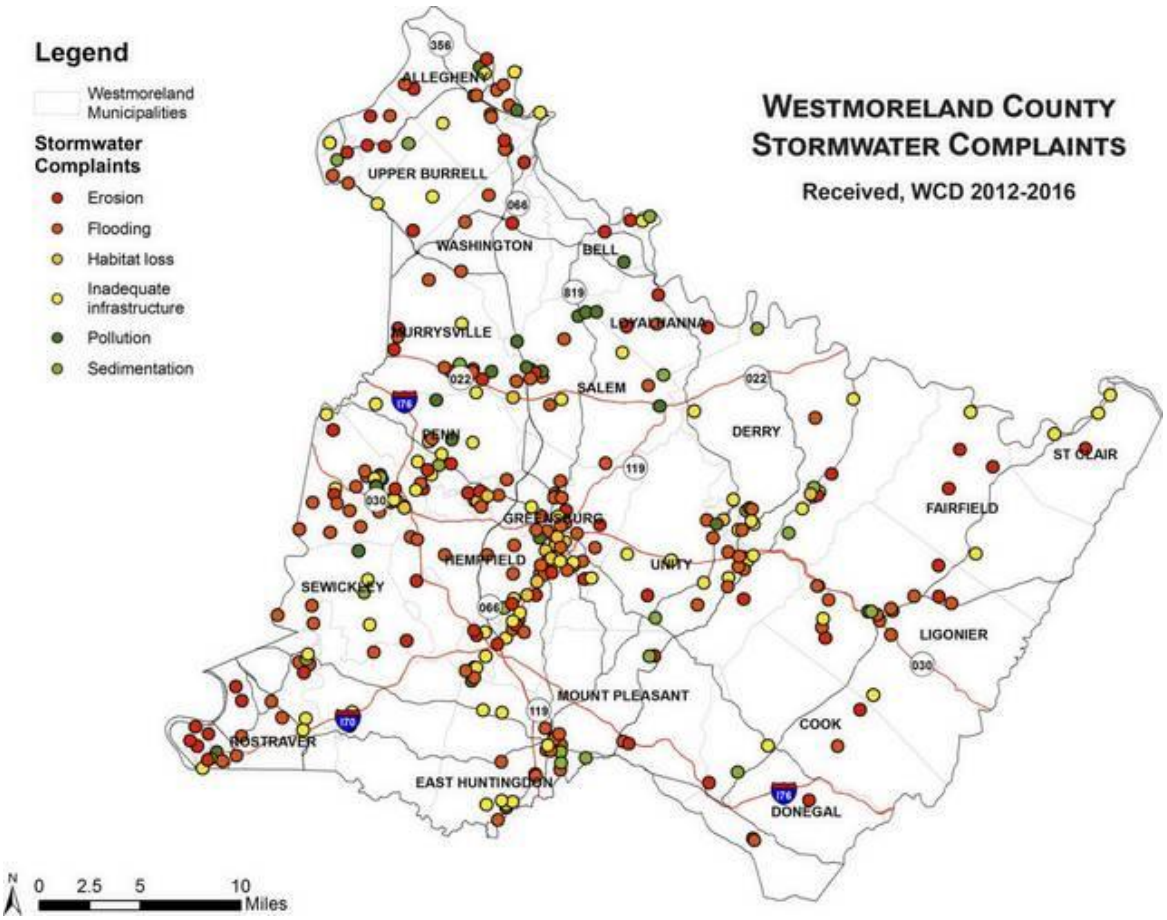
Rich Cholodofsky is a Tribune-Review staff writer. You can contact Rich at 724-830-6293, ***rcholodofsky@tribweb.com*** *or via Twitter .*

New flood plan close to passing in Westmoreland County

RICH CHOLODOFSKY | Monday, July 22, 2019 5:12 p.m.



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Alfred Crimboli of Arona said he knows what caused the flooding that closed at portion of Route 136 several weeks ago.

“Sewickley Creek is plugged up with trees. We get three floods a year there,” Crimboli said Monday during a public hearing for a proposed plan Westmoreland County officials said, once enacted, will help reduce storm water incursions that have caused rivers and streams to overflow their banks, consume roads and filter into homes.

County planners said they have a good idea what is responsible for the flooding near Crimboli’s home and, while cleanup of the clogged waterway is certainly necessary, more proactive measures are needed.

Those measures are outlined in a proposed Integrated Water Resources Plan, a 217-page document county commissioners are expected to approve this week.

The plan calls for a variety of solutions that include the purchase of properties in flood-prone areas, restoration of streams and waterways, installation of mechanisms to collect debris, enhancement of drainage systems and more basic suggestions, such as planting trees.

“Municipalities, watershed groups, homeowners all need to work together. This plan encourages that,” said Jim Pillsbury, an engineer with the Westmoreland County Conservation District, which formulated the proposal to reduce flooding.

Commissioners conducted an initial public hearing in May.

More than 200 flooding incidents have been reported to county public safety officials since 2012, a number that planners insist will keep rising. More than 9,000 county residents live in a flood plain putting their homes at risk, with a majority located in Hempfield, Unity and Ligonier townships and West Newton Borough, according to the plan.

The plan, which took more than two years to complete, identifies areas of flood risk as well as maps out the more than 2,300 square miles of waterways that run through Westmoreland County.

Pillsbury said decades of development have come at the expense of proper management of rain water that in many locations has no place to go. About half of county municipalities have inadequate requirements to address stormwater management, he said.

Once adopted by county commissioners and approved by the state Department of Environmental Protection, the plan will require all 65 municipalities to pass within six months a stormwater management ordinance that will put in place requirements for future development addressing issues related to flooding.

“We’re hoping by this time next year every municipality will have adequate ordinances that protects their neighbors,” said Kathy Hamilton, a landscape architect with the Westmoreland County Conservation District.

Pillsbury said the plan will enable the county, as well as local municipalities, to seek additional state funding to pay for some of the proposed actions identified.

“The solutions to all these problems is money,” he said.

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Rich Cholodofsky is a Tribune-Review staff writer. You can contact Rich at 724-830-6293, ***rcholodofsky@tribweb.com*** *or via Twitter .*

Westmoreland approves storm water management plan

RICH CHOLODOFSKY | Thursday, July 25, 2019 6:17 p.m.

A new stormwater management plan could soon be in place to hopefully help alleviate flooding in Westmoreland County.

The Integrated Water Resources Plan, a 217-page document, identifies areas that are at risk for floods and outlines potential efforts to keep water from overflowing waterways and encroaching on roads and homes.

“Hopefully, this will alleviate some of the floods in the future,” Commissioner Gina Cerilli said.

Officials with the county’s planning department and the Westmoreland Conservation District developed the plan over the past year. It still must be approved by the state’s Department of Environmental Protection. County commissioners voted to adopt it Thursday.

The plan calls for the county’s 65 municipalities to pass a stormwater management ordinance that will mandate controls to reduce the potential for flooding. Municipalities will have six months to approve an ordinance after the county’s water resources plan is approved by the state.

In addition to offering a sample ordinance for municipalities to adopt, the plan also proposes a variety of solutions such as buying properties in flood-prone areas, restoring streams and waterways, installing mechanisms to collect debris, enhancing drainage systems and planting trees.

Officials said there have been as many as 200 flooding incidents in the county since 2012. About 5% of county residents live in a flood plain and more than 9,000 people reside in areas that could experience a catastrophic flood event every century.

The county has more than 2,300 miles of waterways, including wetlands, groundwater and floodplains.

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Rich Cholodofsky is a Tribune-Review staff writer. You can contact Rich at 724-830-6293, ***rcholodofsky@tribweb.com*** *or via Twitter*

APPENDIX L

Comments and Responses

- WPAC
- Falatovich Memo
- DEP

APPENDIX L				
RESPONSE to Comments by PA DEP on IWRP, Appendix + Model Stormwater Mgmt Ordinance - Updated 1/7/2020				
Reviewer	**Comment #**	**Section**	**Comment**	**Response**
PADEP	1	SWMO, Appendix J	Appendix A "Meeting the Act 167 Plan" outlinesthe required contents of the Plan and provides the location in the Plan where each of the required contecnts can be found. Please provide a similarly formatted outline that gives the location of those Plan contents required for MS4s. Refer to the Department's document 3800-PM-BCW0100g dated 5/16 and titled "NPDES Stormwater Management Ordinance Checklist". All items on this checklist should be addressed in the Plan.	The MS4 SWMO Checklist has been completed, and added to the Appendix as Appendix J. It includes references to specific locations within the model ordinance on where to find each line item. Revisions have been made to the SWMO as well, and are noted in RED in the 1-7-2020 revised document.
PADEP	2	IWRP Chapter 3: Water Resources p39. Chapter 6: Action Plan p199, 202.	Please include in Chapter 3. Regulations section, information on the requirments of the Pennsylvania Flood Management Act and the National Flood Insurance Program.	A description of the Flood Plain Management Act 166 has been added to the Regulations section of Chapter 3 p.39. A description of the FEMA, PEMA and NFIP has been included in Chapter 6 Federal and State Initiatives p.199 and p.202.
PADEP	3	Appendix K	Please provide information about the amount and types of public input and involvement with developing the Plan, i.e., public meeting dates/locations, meeting attendance, submission of written comments, contributing organizations, etc.	A list of WPAC members, and a list of meeting dates with purpose and number of attendees, and select newspaper articles has been included in the Appendix as Appendix K.
PADEP	4	Appendix L	Please include a comment and response section in the Plan	A comprehensive list of comments and responses has been added to the Appendix as Appendix L
PADEP	5	IWRP Chapter 5: Issues and Challenges p.192, p.195. SWMO Section 307.	Please provide further elaboration on the use and potential benefits of LID methods and green infrastructure in the Plan, particularly in how it relates to the ordinance.	Elaboration of the use of innovative environmentally sensitive approaches like low impact development and green infrastructure has been added to Chapter 5 - Issues and Challenges - Conceptual Projects and Costs p.192 and p.195, and Model Stormwater Ordinance Section 307.
PADEP	6	SWMO Article I Section 110.A.2.m.	Section 110.A.2.m of the Ordinance stsates that de-chlorinated pool water is a permissible discharge. However, the MS4 permit does not authorize swimming pool discharges. Please re-evaluate Section 110 and its inclusion of swimming pool water as a permissible discharge.	Wording in the Ordinance has been revised to eliminate any pool discharges from the permissible list.
PADEP	7	SWMO Article I Section 110. A.2.	Section A.2. of the Ordinance is not clear as to whether or not "permissible discharges" can go to a separate storm sewer system, or if said discharges are only allowed to vegetated areas or infiltration BMP. Please clarify.	Wording in the Ordinance has been revised to include permissible discharges to a stream or vegetated area.
PADEP	8	SWMO Article I Section 110.A.2.m.	Section 110 A.2.m. of the stormwater ordiancne uses the term "splash pad". Please add a definition of "splash pad" in section 202.	Splash pad has been defined within the section 110 where it is mentioned as a recreational water play patio with no surface reservoir.
PADEP	9	SWMO Article III Section 307.B.a. and 309.B.1.	Section 309 of the Ordinance, and possibly other sections as well, requires managing the peak runoff rate for the 25 years frequency storm. The 2010 revised Chapter 102 regulations no longer require managing the 25-year storm frequency runoff rate. Please revise the Ordinance to be consistent with Chapter 102.	The inclusion of the 25 year storm calculations has been changed to be optional for the municipality adopting the ordinance.
PADEP	10	IWRP Chapter 3: Water Resources p42, SWMO Article II, Definitions and Article III Section 307.B.4	Please include information in the Plan regarding Pollution Reduction Credits as they are related to MS4 permits and to MS4 remediation efforts. Definitions of both should be included in the Definitions Section 202 of the Ordinance.	PRPs are listed in Chapter 3 under the heading MS4 communities, but has been elaborated on to include credits. PRP has been defined in the definitions section 202 of the SWMO and referred to in Article III, Section 307.B.4 General Standards.

PADEP	11	SWMO Article III Section 309.E.	Please include a section in the Plan describing the qualifying criteria for stream restoration projects to be eligible for MS4 load reduction credits. Use the May 2018 PADEP Guidance Document "Consideration of Stream Restoration Projects in Pennsylvania For Eligibility as an MS4 Best Management Practice" as a template for this information.	Item E has been added to Section 309 describing [MS4] qualifying criteria for stream restoration projects.
PADEP	12	IWRP Executive Summary p.6, Appendix A, J	In the Executive Summary, please reference how the 167 Plan meets the requirements of the MS4 Program. Reference the Act 167 and MS4 outlines/checklist found in Appendix A and covered in comment#1	Both Act 167 and MS4 permit requirements are added to the executive summary, and both checklists can be found in the Appendix A and J
PADEP	13	SWMO Article IV Section 402.A	Section 402.A.2. references that acceptable computation methodologies table found in Section III. There is no Section III in the Ordinance. It is Article III. The acceptable computation methodologies table is found in Article III, Section 307. Please revise accordingly.	Section III has been changed to read as Article III Section 307.
PADEP	14	SWMO Article IV, Section 404, Article VI, Sections 601/602/603	Sections 404, 601, 602, and 603 all refer to Operation and Maintenance. Please check to make sure there are no inconsitencies or contradictions between the Sections.	Both Sections 404 and 601-602-603 have been revised to read parallel. Section 404 refers to the descriptions set in sections 601-602-603
PADEP	15	IWRP Executive Summary p.6 and Chapter 6: Action Plan p.212	Please emphasize potential actions if a municipality does not adopt a stormwater ordinance. Please add wording from Section 12 of the Act 167 regarding failure of municipalities to adopt a stormwater ordinance to the Action Plan and Executive Summary.	Act 167 Section 12 has been paraphrased and the wording added to the IWRP Executive Summary on page 6 with Implementation Strategies AND in Chapter 6:Action Plan on page 212 explaining adoption of the SWMO.
PADEP	16	IWRP Chapter 6: Action Plan p.212-213	Please outline and describe any Westmoreland County initiatives or in-place remedies to be used if a municipality fails to adopt the ordinance within 6 months of the Department's approval of the Plan.	In Chapter 6: Action Plan of the IWRP the state can withhold funding if a municipality fails to adopt the SWMO. The County has no tools available to compel adoption, but the County Department of Planning and Development is committed to working with the District to communicate and educate municipalities about the adoption requirements and to guide them through the process. In Chapter 6:Action Plan, section on local initiatives spells out specific core objectives and the strategies common between the county comprehensive plan and the IWRP action plan that the WCD and WCDPD can partner on to achieve our objectives. WCDPD has been specifically listed in the IWRP goal (p.205) to advance sustainable water resources. The District and the Westmoreland County Department of Planning and Development are committed to maintaining the IWRP, updating it as necessary, helping municipalities through the ordinance adoption process, and pursing the Action Items by calling an annual WPAC meeting to discuss its effectiveness and to propose any changes.
PADEP	17	SWMO Article III Section 301	Please add a rationale for using the 80 percent release rate for areas not covered by a stormwater performance district in Section 301 [of the Ordinance].	A note has been added to Section 301 clarifying that in areas not covered by a Stormwater Performance District, an 80% release rate is recommended as a standard. This is to apply a “Factor of Safety” to stormwater calculations; to account for the many variables in site design and stormwater management; and to avoid a land development project inadvertently increasing runoff and causing harm downstream. This note has also been added to each watershed section of the IWRP Chapter 5 Issues and Challenges to explain areas not currently covered by a performance district.
PADEP	18	SWMO cover sheet, paragraph 4	In its public comment response document, Westmoreland county stated it had discretion to adjust standards and requirements. Please add that as a written statement to each of the Sections where that may apply, ie., 302, 304, 305, and 502. Also, add the caveat that the county adjustments must comply with state laws and regulations.	There is a written statement in paragraph 4 of the SWMO cover sheet explaining that [grey] items throughout the ordinance are to be set by the municipality to meet their individual requirements. A notation has been added in appropriate sections of the Ordinance to clarify that any parts of the ordinance must be in compliance with all state laws and regulations.

MEMO

TO: The Honorable Gina Cerilli, Ted Kopas & Charles Anderson
FROM: The Board of Supervisors of Salem Township & Gary A. Falatovich, Esquire
RE: Westmoreland County Model Stormwater Management Ordinance
DATE: May 24, 2019

Dear Commissioners Cerilli, Kopas & Anderson:

My office acts as Solicitor for Salem Township, Westmoreland County, Pennsylvania.

As you know, the Pennsylvania Department of Environmental Protection (DEP) mandates that each municipality enact ordinances providing storm water management controls to DEP standards and update their local ordinances to meet changes therein. Storm water management controls are traditionally handled by each municipality on a local level through their municipal engineers. This gives the municipal engineer and developers the ability to tailor storm water management controls to site specific needs.

The County Commissioners are now considering the approval of a County-wide Storm Water Management Plan and "Model Ordinance" (the "County Model") which would apply to all municipalities within the County. Although we understand the need for appropriate stormwater management controls, the County Model:

1. Goes far beyond the regulatory requirements of the DEP Model;

2. Is in conflict with the DEP Model;

3. Creates an overly cumbersome review process; and

4. Will increase costs and stall land development.

According to its preamble, the County Model is "based on the PaDEP 2022 Model Stormwater Management Ordinance (the "DEP Model). To more clearly illustrate the differences between the DEP Model and County Model, I am enclosing copies of both with this Memo. We are hopeful that the Commissioners will review the few of many issues we have with the County Model set forth hereafter, return both the Stormwater Management Plan and Model Ordinance to its drafters for review and revision and defer a decision on its implementation to a later date.

I. IMPLEMENTATION ISSUES:

As indicated on the first page of its transmission overview, the DEP prepared and published its Model Ordinance:

> "... to provide a model for counties to use in ***the development of Act 167 recommended ordinances***, and MS4's to meet regulatory requirements as implemented through NPDES Permits."

In leafing through the DEP and County Models, the County Model more than doubles the size of the DEP Model and mandates the implementation of the County Model in MS4[1] Communities. The preamble to the County Model provides:

> "If the municipality has a stormwater management ordinance, that municipality ***must review and amend their existing ordinance to conform with the plan including the model ordinance.***"

This is inconsistent with the DEP mandate to enact an ordinance compliant with Act 167. Consequently, even though a municipality has a stormwater management ordinance which complies with a Pennsylvania Act 167 Stormwater Management Plan, the municipality must still amend its ordinance to conform to the County's Model Ordinance. This is problematic because the County Model does not resemble the DEP Model, is in conflict with the DEP Model and does not consider its practical application.

II. DEFINITIONAL DIFFERENCES:

A. **Oil and Gas Well Activities.** The definition of what constitutes "Earth Disturbance Activity" in the County Model Ordinance includes:

> "road maintenance, land development, building construction, oil and gas activities, well drilling and mineral extraction"[2]

These activities are not included in the DEP version. We suspect this is because the Oil and Gas Act preempts and precludes municipalities from regulating on site activities of oil and gas well drilling operations through the implementation of local ordinances. This issue was addressed by the Pennsylvania Supreme Court in ***Range Resources v. The Salem Township Board of Supervisors, 964 A.2d 869 (Pa. 2009).*** In that case, Salem argued, among other things, that the Municipalities Planning Code and PA Stormwater Management Act gave the Township authority to enact local legislation regulating surface activities of oil and gas well drillers. ***The DEP intervened on the side of Range Resources***

[1] "Municipal Separate Storm Sewer System"
[2] See Pg. 13 of 54

asserting DEP had the sole and exclusive authority to regulate surface disturbance activities associated with oil and gas well drilling under the Oil and Gas Act and any attempts at local municipal regulation were preempted. The Supreme Court agreed. Accordingly, the addition of language applying local stormwater management requirements to "*oil and gas activities, drilling and mineral extraction*", would require municipalities to act in violation of the law of the Commonwealth of Pennsylvania.[3]

B. **Impervious Surfaces.** "Impervious surfaces" increase storm water runoff. The total area of impervious surface on a property determines the level of storm water management controls necessary to control storm water runoff. The County Model's definition of an "impervious surface" is more expansive, and at odds with, the DEP Model. The DEP Model Ordinance defines an "Impervious Surface (Impervious Area)" as:

> "A surface that prevents the infiltration of water into the ground. Impervious surfaces (or areas) shall include, but not be limited to: roofs, additional indoor living spaces, patios, garages, storage sheds and similar structures; and any new streets or sidewalks. ***Decks, parking areas and driveway areas are not counted as impervious areas as they do not prevent infiltration.***"[4]

Conversely, the County Model defines an "Impervious Surface" as:

> "A surface that prevents the infiltration of water into the ground. Impervious surface ***includes***, but is not limited to, any roof, ***parking or driveway areas*** and any new streets and sidewalks. ***Any surface areas designed to initially be gravel or crushed stone shall be assumed to be impervious surfaces, unless demonstrated otherwise, in an approved stormwater management plan. Any surface, gravel or otherwise used for permanent or temporary storage of vehicles***, containers, solar arrays, or other similar items ***shall be considered impervious surface or at a minimum, the impervious area shall be measured as a total impervious surface of the combined footprint of the vehicles,*** containers, solar arrays and other similar items ***based on a reasonable assumption of capacity at that site.***"[5]

Under the County Model, the area where someone parks their car at their home, or the area of a long gravel driveway extending from a public road to their house, or the area where people "temporarily park" during the course of a day, is counted as "Impervious Surface" even though they are specifically excluded, or simply not included, in the DEP Model.

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[3] The same preemption issue also applies to certain forms of mineral extraction. See Gibralter Rock v. New Hanover Township, 118 A.2d. 461 (Pa. Cmwlth. 2015)

[4] DEP Model, Pg. 7

[5] County Model, Pg. 15 of 54

Also, under the County Model, gravel driveways or other areas which were historically excluded or minimized as "Impervious Surfaces" are now presumed to be "impervious" unless "demonstrated otherwise in an approved stormwater management plan." This would ostensibly require a property owner to hire an engineer to physically prepare a stormwater management plan to show that an existing gravel driveway leading to their home is not an "Impervious Surface" for storm water management plan purposes if they were building a new home or adding a garage, barn or other large addition to their property. This is not required in the DEP Model.

Similarly, if a property owner in the country has an RV parked off to the side of their home, the area occupied by the RV would become, and be counted as, an impervious surface for stormwater management plan calculation purposes. This is likewise not required in the DEP Model.

III. SMALL SURFACE DISTURBANCE ACTIVITIES.

A. Section 302 of the County Model includes a Regulated Development Activity Table.[6] This table does not exist in the DEP Model Ordinance. The Table is vague in its construction and application. It appears to require municipalities to impose some form of stormwater management plan compliance reviews for all areas of disturbance less than 5000 square feet. This is inconsistent with Section 302 of the DEP Model Ordinance which permits municipalities to grant exemptions from certain compliance requirements for regulated activities that result in cumulated earth disturbances less than one (1) acre of ground. Inconsistent with the DEP Ordinance, the County Model Ordinance states that:

> "The above table is only applicable for projects with earth disturbance less than one acre and that have not had cumulative impacts, within five years preceding the permit application date, that are in excess of the square foot limits."

Accordingly, the County Model Ordinance would require the municipality to not only regulate earth disturbance activities on smaller parcels in a more detailed manner than required by the DEP Model Ordinance, it would also require each municipality to "look back" over a five (5) year history of development of the site to address "cumulative development".

B. Section 304 of the County Model enables a property owner to seek approval of a "no harm option". However, to qualify for a "no harm" approval the Applicant is required to submit calculations, drawings and details showing their project meets the above criteria for the "no harm approval". If you review the criteria necessary to qualify for a "no harm approval", the cost and expense of retaining an engineer to provide proof that your project

[6] County Model, Section 302, Pg. 21 of 54

does not require stormwater management controls will meet or exceed the cost of actually providing them.

We would also note that municipalities routinely exempt 5000 square feet or less of earth disturbance from any storm water modeling. Seeking a "no harm approval" is an entirely new concept that will add a new layer of cost, expense and review to small projects.

C. The provisions in Section 305 of the County Model relating to "Waivers, Modifications and Demonstrated Equivalencies" likewise do not appear anywhere in the DEP Model. Neither do any of the general standards set forth in Section 307 of the County Model.

D. The submission and notification requirements of Section 502 of the County Model do not appear in the DEP Model either and potentially require the involvement and coordination of more regulatory agencies than have been historically necessary to review the plan. For example, the County Model requires review by the local sanitary authority, the Conservation District, Westmoreland County Planning, and the local EMS coordinator "where applicable", but doesn't provide any criteria for use by the municipality in determining when such reviews ARE "applicable". Also, the requirement to notify other affected municipalities in Section 502.B of the County Model, provides an opportunity for entities **outside** the Geo-Political boundaries of a municipality to influence actions **inside** their community, notwithstanding the inherent autonomy of an individual municipality to enact ordinances regulating Stormwater activities within their own Geo-Political boundaries.

IV. ENFORCEMENT

Enforcement procedures and remedies under Article VIII of the County Model differ from the DEP Model in one significant aspect. Under the DEP Model Ordinance, a property owner who violates the ordinance may appeal to the governing body of the municipality. If the governing body (here the Board of Supervisors) agrees following an Administrative Hearing that a violation has occurred, the affected property owner may appeal to the Court of Common Pleas of Westmoreland County. However, if the governing body sustains the property owner's appeal, and finds no violation to exist, the case ends at that point.

Conversely, the County Model defines a "person" as a "governmental agency" having an interest in the ordinance. So, if for example, the Salem Township Supervisors finds in favor of an aggrieved property owner after an Administrative Hearing, the Westmoreland County Conservation District or the County itself could appeal those decisions to the Court of Common Pleas of Westmoreland County. The result is that, under the County Model, a municipality could, at least in theory, hear any number of challenges to the enforcement of

its Stormwater Management Ordinance, sustain every appeal and force either the Conservation District or County to initiate, and pay the cost of, appeals to Court to enforce the terms of the County's Model Ordinance. We do not believe the Commissioners want to incur that expense.

V. ECONOMIC IMPACT

Finally, it is my understanding that the Conservation District did not do an economic impact analysis to assess the effects of the County Model on municipalities, individuals or developers. We believe the County Model will increase both review costs, development costs and slow the plan review process tremendously.

First, the "no harm approval" process referenced above creates a new level of review for the Conservation District, and imposes new development costs by forcing the property owner to either (a) submit a stormwater management plan, or (b) submit appropriate documentation to show no stormwater management plan is necessary. We do not believe this can be done under the County Model without the retention of an engineer.

Second, the DEP Model imposes a requirement on municipalities to notify an applicant within forty-five (45) days from the date of submission that a stormwater management plan has been approved or disapproved, or within 90 days from the date of submission if a plan is part of a Subdivision or Land Development Application. Section 403.B of the DEP Model[7] provides:

> "The municipality shall notify the applicant in writing within 45 days whether the SWM site plan is approved or disapproved. If the SWM site plan involves a subdivision and land development plan, the notification shall occur within the time period allowed by the Municipalities Planning Code (90) days. If a longer notification period is provided by other statute, regulation or ordinance, the applicant will be so notified by the municipality."

The County Model does not contain a time requirement for the review of stormwater management plans. Given the nature and extent of the reviews required by the County Model that are not required by the DEP Model, from a developer's perspective, these plans could effectively go into a "black hole" unless there is a defined time period for the Conservation District to review and respond to an application. The Commissioners recently adopted a County-wide Comprehensive Plan to spur development. Without providing a defined time period for the Conservation District to review stormwater management plans, any realistic development anticipated in the County Comprehensive Plan will be stymied.

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[7] DEP Model, Pg. 14

are compelling enough to justifying the Commissioner's delay of the vote on this matter and the return of same to the agency that generated it for additional review and revisions.

Thank you for the opportunity to be heard.

Yours very truly,

Gary A. Falatovich
GAF/jmp
Cc: Salem Township Supervisors

Westmoreland Conservation District

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June 24, 2019

Honorable Gina Cerilli, Ted Kopas, and Charles Anderson
Westmoreland County Commissioners
2 North Main Street, Suite 101
Greensburg, PA 15601

RE: Westmoreland County Integrated Water Resources Plan and Model Stormwater Management Ordinance

Dear Commissioners Cerilli, Kopas and Anderson:

The Westmoreland Conservation District has reviewed the May 24, 2019 Memo addressed to you by Salem Township Solicitor Gary Falatovich Esq. expressing his concerns, and the Salem Township Supervisors' concerns, about the Model Stormwater Management Ordinance which was prepared as part of our countywide Integrated Water Resources Plan. Those comments were further expanded and clarified during the May 28, 2019 meeting which you attended. Our responses to Solicitor Falatovich's comments are enumerated below, and are reflected in the enclosed revised Model Ordinance.

General Comments

In the 2nd paragraph on the first page of his letter Mr. Falatovich states four (4) general concerns with the Model Ordinance as prepared by the Westmoreland Conservation District (WCD), its technical advisory committee members and the Watershed Plan Advisory Committee (WPAC) as part of the County's Act 167 Plan and Integrated Water resources Plan (IWRP). The general concerns are as follows:

1. **[The Wm Co Model SWM Ordinance] goes far beyond the regulatory requirements of the DEP Model (2022).**
   WCD response: The DEP's 2022 Model SWM Ordinance recommends that it be used as a guideline and that 'municipalities should consider requirements unique to specific county-wide or watershed wide Act 167 Plans when developing ordinances'. Over the past three years of the IWRP / Act 167 plan development and through numerous meetings for input and discussion, the Westmoreland County Model SWM ordinance was created as a guideline for county municipalities using the DEP 2022 Model as a starting point and tailoring it to the needs of the Westmoreland County municipalities voiced during the plan process, while allowing built in flexibility to allow municipalities to encourage stormwater management practices as it affects their own communities.

2. **Is in conflict with the DEP Model.**
WCD response: Any conflict presented in Mr. Falatovich's comments are addressed below individually. The DEP Model is just that— a model, which may be observed, studied, and followed, but which is not necessarily in itself complete.

3. **Creates an overly cumbersome review process.**
WCD response: Westmoreland's Model Ordinance recommends a review process which can be tailored by each municipality to meet their own standards and requirements and to exceed the minimum requirements of the DEP Model 2022. Municipalities have the flexibility of adopting the Model and adjusting it as they see fit. Our office has extensive experience reviewing plans and the process we have outlined in the Model is not cumbersome— it is what we do successfully already.

4. **Will increase costs and stall land development.**
WCD response: The Westmoreland Model SWM Ordinance recommends a review process which can be tailored by each municipality to meet their own standards and requirements and to exceed the minimum requirements of the DEP Model 2022. Municipalities have the flexibility of adopting the DEP model as a minimum. WCD and our WPAC are of the opinion that good regulation creates better, more sustainable development which can actually cost less and attract more development. One has only to look at the more successful and more developing municipalities in our County— Murrysville, Penn Township, North Huntingdon, Hempfield— all of which have comprehensive stormwater regulations already, and all of which have strong continuing development activity.

The remainder of this response will address the specific concerns identified by Mr. Falatovich.

I. **Implementation Issues:**

The proposed Westmoreland Model Ordinance is more comprehensive than the DEP 2022 Model. Our model ordinance is a guideline reflecting the specific recommendations set forth in our IWRP/Act 167 plan as to how each municipality can better protect its citizens from increased stormwater runoff issues from new development. These recommendations have been produced through the input of many of the county's municipalities over the 3 year period of the plan development. If a municipality chooses not to follow the recommended model ordinance they can refer to the minimum recommendations of the DEP Model 2022.

II. **Definitional Differences:**

A. **Oil and Gas Well Activities:** The definition of earth disturbance used in the model ordinance was taken from DEP's own definition from Title 25 Chapter 105. This is just a definition and does not relate specifically to regulation of earth disturbance activities. Within the ordinance, an exemption from performance

standards has been added in Section 303 for any activity regulated by DEP such as (oil & gas, etc.) resource extraction.

B. **Impervious Surfaces:** The definition of impervious surfaces has been revised to reflect land development activity only, not land use activity. Further, Solicitor Falatovich's quote of DEP's model is incorrect as it has a typo (the word as should be if) which renders his point moot. DEP does consider decks, parking areas, and driveways to be impervious if they prevent infiltration of stormwater. Finally, the intent of our model ordinance is to regulate land development activities as they relate to stormwater; our intent is not to prevent someone from parking an RV beside their home.

III. **Small Surface disturbance Activities:**

A. **A Regulated Development Activity Table was included in Section 302** of the model ordinance to make it easier to understand the differences in regulated activities and possible applications of the ordinance. As with everything in the model it was requested by many of our municipalities and is a recommendation that can be adjusted by the municipality to meet their own standards and requirements. In addition, the recommended 5-year look-back rule relates directly to DEP's consideration of 'cumulative impacts' as pertinent to permit issuance for land development sites.

B. **A no-harm option in Section 304** is allowed by the model ordinance to address certain sites within a municipality that may fall outside the norm for required stormwater management controls. This option actually increases the flexibility of the ordinance, allowing, at the municipality's discretion, 'difficult to develop sites' such as brownfields to choose a more feasible stormwater alternative. The no-harm option is not for every municipality--it is mostly intended for municipalities along large rivers such as Monessen or New Kensington. The entire no-harm option has been [bracketed] in the model ordinance to reflect that it is optional.

C. **Waivers, Modifications, Demonstrated Equivalencies:** this section likewise is recommended in the model ordinance but is not required. These categories allow outside-the-box thinking to place stormwater control measures where they are most effective in affected communities. These categories will also help to promote brownfield redevelopment. This section makes the model ordinance more flexible and will help to solve existing stormwater problems.

D. **Submission and Notification requirements (section 502)** recommended by the model ordinance do exceed the minimal requirements of DEP Model 2022, and are to be set by individual municipalities which may benefit from the additional agency review(s) to preclude any discrepancies which may occur during the project planning

and review process. WCD reviews are written into the ordinance not to 'feather our own nest' but to ensure a level playing field and consistent application of standards watershed-wide and county-wide, which is the only truly fair and impartial way to review projects and plans. Currently, WCD has Conservation Partnership Agreements (CPAs) with 50% of our municipalities and already perform concurrent reviews of stormwater management plans in those communities. That said, many instances in the ordinance [WCD] is placed in brackets to allow the municipalities the option of requiring WCD review. Our staff reviewers, acting on behalf of all county residents, bring a high level of professionalism and technical expertise to this process. The **requirement in section 502 b** to notify other affected municipalities is to help fulfill the requirement of Act 167, Section 5(c)1.

IV. **Enforcement:**
The definition of PERSON in the Model ordinance is that which appears in PA Act 167, a person being not only an individual, but also referring to a government agency and government officials. With respect to contesting a decision made by a governing body, Act 167 grants this ability to individuals and governments both.

V. **Economic impact:**

a. **Act 167**, the stormwater management act of 1978, **does not require** an economic impact study for stormwater ordinances. Economic impacts related to requirements set forth in stormwater ordinances are generally added to the land developers' responsibilities through fees paid to the reviewing agencies. Good design and planning related to meeting ordinance requirements will actually save costs in construction and maintenance and generally make for a more attractive development for the community. Adversely, the economic loss due to a lack of good stormwater management is experienced all across the County by citizens who have suffered years of unmanaged and uncontrolled storm damage.

b. **A No-Harm Option** as previously discussed, is recommended by the ordinance to allow for the discretion of the municipality. The wording in Section 304 of the ordinance has been revised to allow the municipality to set requirements for requesting a no-harm exemption for a site, and to set requirements for reviewing and approving 'no-harm' SWM requests.

c. A statement **limiting Stormwater Management plan review time** for written notification of approval or disapproval of plans has been added to the ordinance in Section 502 C. Our office currently meets all of our DEP-set time limitations for plan reviews. Furthermore, if an applicant expresses to our office a need for a rapid review, we always make a strong effort to accommodate them. Our office is not now, nor has ever been, a "black hole" for permits or plan reviews.

VI. Miscellaneous:

A. Our advisory committee thought it important to provide not only the municipality but other reviewing entities with a **liability disclaimer** in case of variations in construction practices, variations in site conditions, or ineffective design by others, things which are out of our sphere of control. Such language is standard among land development ordinances and DEP permitting as well. We doubt this language *will irk every person submitting a stormwater plan.*

B. **Potential for liability and enforcement responsibilities.** Many of our county municipalities wanted this exact statement regarding prohibiting the altering of natural flow, to be included in the model ordinance so they CAN enforce such prohibited activities. The municipality is not obligated to enforce such activities, but Sections 680.15 and 16 of Act 167 address civil remedies and preservation of existing rights and remedies, and our model ordinance follows this.

We believe the above points cover Solicitor Falatovich's comments as were expressed in his May 24 letter. A further concern was expressed to WCD staff by Salem Township Supervisor Kerry Jobe at the May 28 meeting in the Court House related to property rights and entry onto property. Accordingly, we have changed the model ordinance's **Section 801, Right of Entry,** to more clearly define when municipal officials or their designees may enter onto private property.

In response to other comments we have received from members of the WPAC since the DRAFT Model Stormwater Ordinance was issued 9-26-18, we have revised the following:

- The Draft date has been revised to June 2019.
- Where possible, the wording 'Conservation District' has been changed to WCD.
- Miscellaneous punctuation and misspellings have been corrected.
- In definitions, Agricultural Activity has been revised to exempt high tunnels.
- In definitions, High tunnel has been added.
- In Section 303.A, high tunnel has been exempted.
- In Section 307.B.1.c, wording has been revised to include 'owners of' affected properties.
- In Section 308.D, the 80% release rate has been bracketed and highlighted to indicate the municipality can determine the actual rate.
- In Section 603, the 10 year time period has been bracketed and highlighted to indicate the municipality can determine the period.
- In Section 702, Section 502 has been revised to be Section 510.

Finally, in response to comments received during the public hearing of May 3, 2019 we have adjusted the contents of the IWRP as follows:

- Chapter 4, Impacts, Water Use, page 48, to reflect comments by the Mountain Watershed Association and Protect PT regarding water usage by unconventional gas drilling and industry;

- Chapter 4, Impacts, Industry, Resource Extraction and Water Use, page 53, to reflect certain concerns of the Mountain Watershed Association and Protect PT about the impacts of unconventional well drilling;

- Chapter 5, Issues and Challenges, Indian Creek Area of Interest page 187, to reflect comments by the Mountain Watershed Association regarding impaired water in Indian Creek watershed.

Our office staff and the many members of our Watershed Plan Advisory Committee have put much thought and effort into formulating our Integrated Water Resources Plan and our Model Stormwater Management Ordinance. We appreciate Solicitor Falatovich's study of our Ordinance and his careful comments on it. We also appreciate the County Commissioners' ongoing support for our conservation efforts and respectfully ask for your approval of this Plan, including the Model Ordinance.

Sincerely,

James W. Pillsbury MS PE

Hydraulic Engineer.

Kathryn D. Hamilton RLA

Landscape Architect.

Appendix L

RESPONSE to Comments by WPAC members on IWRP, Appendix, and Model Stormwater Management Ordinance - updated 9-2018

Reviewer	Comment #	Section	Comment	Response
D.Carpenter / WCDP	1	Table of Contents, p3	Chapter 2, f: change Reimaging to Reimagining	revised
	2	Preface, p5:	Last sentence: unsure how integral the IWRP will be as part of the Comp Plan	revised to be considered separately
	3	Chapter 2, p19:	Rock Types map: consider adjusting the colors to make the map more legible,providing more distinction between types (numbering used does help)	cannot be done, external map
	4	Chapter 2, p28:	County Comp Plan, ¶2: still undetermined how/where/to what extent IWRP will bepart of Comp Plan – possibly within the strategies/actions associated with 1-2 coreobjectives	plan updated as needed, considered separatley from comp plan
	5	Chapter 3, p35:	Chapter 93 Stream Classification map: consider adjusting the colors to make themap more legible, providing more distinction between classifications	will use hydrology map instead
	6	Chapter 3, p39:	FEMA Floodplain Zones map: consider adjusting the colors to make the map morelegible, providing more distinction between zones	will include enlargment to show detail
	7	Chapter 4, p46:	¶1, quote source: change our to Our	revised
	8	Chapter 4, p55:	Oil and Gas map: consider adjusting the colors to make the map more legible,providing more distinction between well types	legend simplified to well location
	9	Chapter 4, p62:	Encroachments map: consider adjusting the colors to make the map more legible,providing more distinction between types	simplified legend to encroachments
	10	Chapter 4,p70:	AMD map: consider adjusting the colors to make the map more legible, providingmore distinction between priority/impacts	cannot be done, external map
	11	Chapter 4, p72:	Chapter 93 Stream Classification map: consider adjusting the colors to make themap more legible, providing more distinction between classifications	replaced with better colors

	12	Chapter 6, overall:	Action Plan seems more of a list of resources, programs, and organizations o Should outline specific actions and/or projects with goals, timelines, and responsibleentities as solutions to the issues and challenges	added action plan implementation plan matrix
	13	Chapter 6, p210:	Recommendations for Implementation, first sentence: not sure to what extent IWRPwill be adopted as part of the Comp Plan	will be consdered separately but hope to get water resources strategy page in comp plan
	14	Appendix A, Phase 2, p1:	#3: emphasis is on Comp Plan to direct/guide growth (which is limited in power) and approach has not been fully developed yet	anticipated
	15	Appendix A, Phase 2, p3:	#13: would not tie IWRP review/update to Comp Plan, should have independent review/update timeline	will be considered separately
	16	Appendix B, p12:	Land Development: include MPC (as amended) notation as provided for subdivision definition	revised
	17	Appendix B, p16:	Subdivision: include actual definition from MPC along with MPC (as amended)notation	revised
T.Spedeliere, Rostraver	18	Ch1-6, Ap	What an impressive undertaking by Westmoreland County and the Conservation District. This is a wonderful starting point and the possibilities are endless with more funding.	no action required
	19	Ch5	The Youghiogheny River should be examined more closely like some of the other watersheds to have recommended release rates.	completion of all watershed modeling is in the action plan
	20	Ch4, p51	On page 51 of the plan, there are more Agricultural Security Areas in Rostraver Township than shown.	map dated from 2009
	21	Ch5, p157	On page 157 of the plan, assets in the Monongahela watershed seems to have an incomplete sentences/thought	revised
E.Bove, Bove Eng.	22	Ch.4, p58	regarding septic systems, change 'sandmound' to 'alternative' systems as sandmounds are affordable systems now.	revised

	23	SWMO 307.b/c, p23of 51	ot? Or is it OR?	revised
	24	SWMO 402B/g, p34 of 51	boundary of drainage areas should ALSO include POI point of interest	revised
	25	SWMO 603, p 43 of 51	O&M maybe should include inspection fee for 10 year time period or is this an option set by each municipality?	revised to allow municipality to make determination on time period
	26	Ch.5	Sediment loading rates are different than DEP set no.s. Ie New Stanton PRP plan uses 1839 lb/ac/year impervious, 265 lb/ac/yr pervious vs iwrp mapping recommends 241 lbs/ac/year. Which # supercedes? Answer: IWRP once it is adopted as Act 167	no action
	27	308.D, p25 of 78	80% release rates for ALL areas not within study? Keep this? Supercede 100%? Mun. choice?	rates are recommended, to be set by muicipality
	28	Ch.5	will performance district release rate maps in the report be changed to actual release rates once the Twp sets them and adopts them? Where will these maps live?	maps are located on website, will be updated as required

S.Huba LWSA	29	Chapter 2: Page 13 – First Sentence	Stream miles are hard to determine, but it was cited in the Loyalhanna Creek Watershed Assessment and Restoration Plan that the Loyalhanna Creek Watershed had upwards of 2,500 miles of waterways…..this total is higher than that DEP reports for the entire County. If you have a revised total for our watershed that we should be using and could pass that along, I would appreciate that J	completion of all watershed modeling is in the action plan
	30	Chapter 2: Page 13	Loyalhanna Stream Meaning Blue Box“Middle Stream” located between the Juniata and Ohio Rivers	revised
	31	Chapter 3: Page 35	Stream Classification mapDifficult to make out the different colors of blue used to identify the stream classifications – suggest using more contrasting colors	replaced with hydrology map
	32	Chapter 4, Page 51	ASA Map Hard to tell if this is already indicated, but the Watershed Farm was recently added to the ASA in Ligonier Township (March, 2018) and should be included on this map.	map from 2009, relocated to Ch 6 Initiatives
	33	Chapter 4, Page 52	Westmoreland’s Trout Stocked Streams Four Mile Run should be “Fourmile Run” Also, Loyalhanna Creek should be added to this list.	revised
	34	Chapter 4, Page 72	Stream Classification map Same as above – colors difficult to see	replaced
J.McCabe, SkellyLoy	35	maps	Were samples taken to prove/debunk pollutant loading? Answer: No, maps are guidance/ resource (* See D.Hixson COMMENT)	pollutant modeling methodology in appendix
JP/KH WCD	36	flowchart	streamline report to absolute necessary info in report print out	no action

	37	dashboard	is it really up to date?	will be maintained as needed
	38	Chapter 2, Page 13	NWI- link to plan- wetland Inventory	no link provided
	39	Chapter 2, Page 17	beef up background, especially rd system and Penn twp Limits to make more readable	no action
	40	Chapter 2, Page 19, 23, 24, 26, 27	static maps available online at www.wcdpa.com, move to westmorelandstormwater.org	no action
	41	Chapter 4, Page 2	Land developing is expanding - but not **population which =** sprawl, show demographic change	revised
	42	Chapter 4:	add Marc. Well map	no action
	43	Chapter 4:	is the complaints map available? What is years of complaints? Answer: maps are - currently internal- can we make available?	no action
	44	Chapter 5: Turtle Creek	Annoying that Map sizes keep changing	no action
	45	Chapter 5:	Key symbols- use on all these repetitve maps- Sed/ PH/ N/ release rates etc.	no action
	46	SWMO	not intended to be adopted verbatum- solicitor/ eng review required	no action

	47	SWMO 308. D	performance District maps, Where are they??	completed for 5 AOIs,
J. Turack Smart Growth	48	Chapter 4:	open space in urban areas is good, but ahould Increase urban density which is better for smart growth	IWRP presents ideas, so each municipality can be flexible with their own growth
	49	SWMO	Demonstrated equivalency - can it cross municipal lines? Answer: Within same watershed possibly, check on applicability within ordinance	no action
	50	SWMO	what incentives are there for municipalities to work cooperatively- Answer: we can possibly add to stormwater management ord, leverage each others …	no action
J.Richards County Parks	51	Chapter 4:	Identify soils on abandoned lots for sw, ag, development, etc	add map regarding soils recommendations
	52	SWMO	muni- will have 180 days to adopt act 167? Answer: Yes, State Law	no action required
A. Quinn JCWA	53	SWMO 110. C. 7/78	110 C. Prohibited Act - is it retroactive? Answer: No- only moving forward only, historic discharges not regulated	civil suit only, moving forward anything new could address old issues

J. Campfield	54	SWMO	non- MS4 communities are not required to comply with entire ordinance. MPC-Saldo or freestanding ord.-	no action required
	55	SWMO 601 D 41/78	municipal cooperation, reword item -D-	revised
	56	SWMO	municipality can adopt separate property maint code- include swm features- can be a tool to enforce when owners removing sw controls	no action required
	57	SWMO definitions	Agricultural Activity' should comply with Act 15 of 2018: Activities accociated with agriculture such as agricultural cultivation, agricultural operation, and heavy use areas. This includes the work of producing crops and raising loivestock including tillage, land clearing, plowing, disking, harrowing, planting, harvesting crops, or pasturing and raising of livestock and installation of Conservation Practices. Except for High Tunnels that are exempt pursuant to the provisions of Act 15 of 2018, construction of new buildings or impervious areas is not considered an agricultural activity.	revised

	58	SWMO, definitions	suggest adding the definition of 'high tunnel' which is the definition set forth in Act 15 of 2018: A structure which meets the following: 1. is used for the production, processing, keeping, storing, sale or shelter of an agricultural commodity as defined in section 2 of the Act of December 19, 1974 (P.L.973, No.319), known as the Pennsylvania Farmland and Forest Assessment Act of 1974, or for the storage of agricultural equipment or supplies. 2. Is constructed consistent with all of the following: (i) Has metal, wood or plastic frame. (ii) When covered, has plastic, woven textile or other flexible covering. (iii) Has floor made of soil, crushjed stone, matting, pavers or a floating concrete slab.	revised
	59	SWMO, Section 303 A	suggest that Section 303 A. be changed to add a subsection 6, which would provide: 6. A High Tunnel, if proof is provided that the high tunnel is exempt pursuant to the provisions of Act 15 of 2018. Such an exemption does not exempt high tunnels from other requirements applicable under Federal, State or municipal laws.	revised
	60	SWMO, Section 307 B. 1. c.	should read 'To notify adjacent property owners or **owners of** affected properties of any alteration **or** increase of stormwater flows	revised
	61	SWMO, Section 702	change reference from Section 502 to **Section 510** in the last line of the section	revised
	62	SWMO, entire	please use a program to check punctuation. Periods, semi-colons, and other punctuation is needed,	revised

B.Reefer	63		July 31- comments back …. To co. comiss. To adopt then Dep review	no action required
	64		work is impressive	no action required
Carol St. Vincent	65		Maps on westmorelandstormater.org request password - should be fixed	access repaired
D.Hixson Gannett-Fleming	66	IWRP, maps, exhibits	ensure that any statements, graphics, exhibits, and/or maps that are not based on actual data, there should be a disclosure statement (e.g. saying based on estimated data) found on the exhibit. I cannot recall which map we were talking about at the WPAC meeting, but someone asked Matt about one of the figures and he indicated that it was basically created / speculative. If non-verified on the source, maps, data, etc. gets put into the manual, then the municipalities (and others) likely will interpret it as “the law” restricting development when in fact it could be disputed. This should be done to protect both the municipalities and the IWRP creators from (potential) lawsuits from developers that may dispute restrictions put on their particular project area. (* See J.McCabe COMMENT)	maps and data sources identified in plan
B.McMillan Gibson-Thomas	67	Chapter 6	big ommissions of funding agencies - sent matrix including USDA, CDBG, PennVest, RUS, other federal etc.	added some, generalized others

	68	Chapter 6	Step by step action items missing. Will try to consider some and send over	added action plan implementation plan matrix
E. Kepple Adams SPC	69		Thinking ahead/big picture. There was no mention of working towards integrating hazard mitigation plans with the county comp plan (this is really important in areas where flooding could be an issue re future development/retrofitting existing development, storage of hazardous materials, enforcement of NFIP ordinances etc). This could be broken down/created as several “Actions” for the IWRP (Working with the various agencies (EMA, County Planning, USACE, FEMA, PEMA, SPC WRC) through supporting holistic planning efforts for flood resiliency/stormwater mgt in Westmoreland County. You could outline specific future projects, educational efforts, enforcement of NFIP/Flood Plain Mgt ordinance assistance(tie as another service WCCD could offer? Frame like Chapter 102 inspections upon MOU with Muni’s?) Stormwater and flooding so often these days are going hand-in-hand and people need to start thinking about having all the programs work together. Mutifunctional benefits for educational efforts, planning and/or projects is key.	Action plan revised

	70		MS4: Have you talked to some of the MS4 communities and asked them what projects they have outlined in the their PRPs? Maybe a way to tie together IWRP “actions” with MS4 PRP projects in the county to be able to provide assistance to apply for funds to help munis complete projects. May give Muni’s a step up in ranking for grant/foundation funding if specific types of projects are identified in the IWRP to help with the overall PRPs/DEP’s goals? Also would provide specific “projects” and lead organization…	Action plan revised
	71		ORSANCO- See e-mails I sent earlier http://www.orsanco.org/programs/pollution-control-standards/ Comment period remains open until August 20t	no action