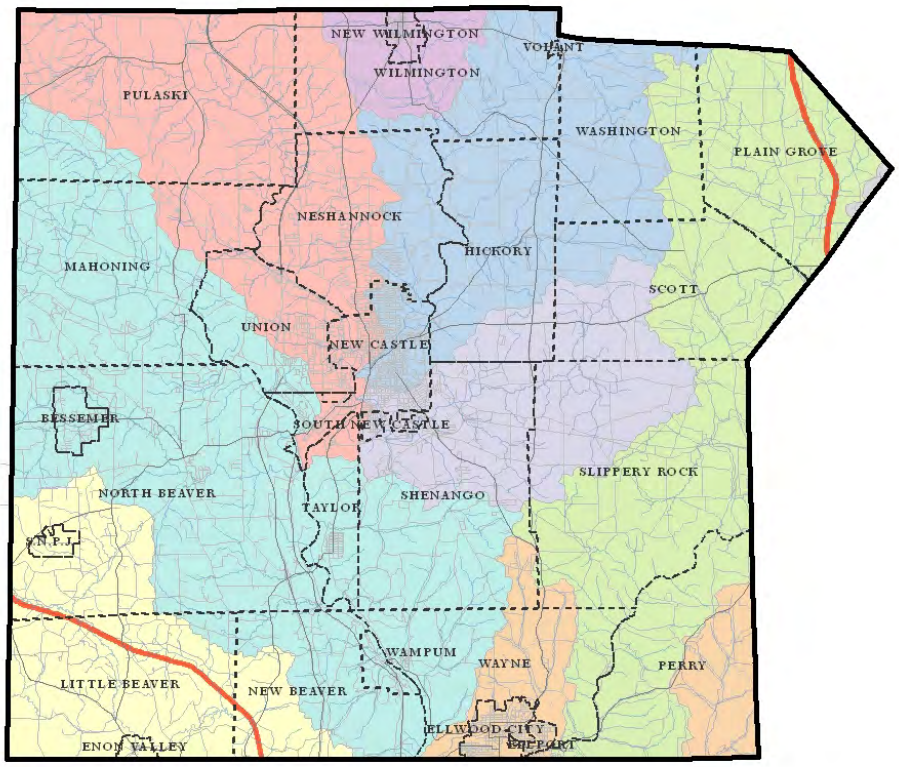
Lawrence County Planning Commission

Act 167 Stormwater Management Plan

Phase I – Scope of Study



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PHASE I – SCOPE OF STUDY

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ACKNOWLEDGEMENTS

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I. INTRODUCTION

Purpose

This report was prepared under and in accordance with a grant from the Pennsylvania Department of Environmental Protection (PADEP) for Lawrence County to conduct a county-wide Act 167 Stormwater Management Plan Phase I. This report presents the results of the Phase I 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 II Plan project.

The purpose of an Act 167 Study is to assess the current and future runoff conditions within a designated watershed and develop stormwater management standards, criteria and other ordinance provisions for adoption by the municipalities within the watershed to minimize adverse impacts from stormwater runoff associated with new or future development.

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 has increases, so does the problem of dealing with the increased quantity and decreased quality of stormwater runoff. Failure to properly manage this runoff resulted 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. 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 and verified 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 associated property damages and even causing loss of life. Therefore, given the distributed and cumulative nature of the land alteration process, a comprehensive approach must be taken if a reasonable and practical management and implementation 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 runoff of stormwater 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.

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 county-wide 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 uniform technical standards and criteria throughout the County's watersheds for the management of stormwater runoff from new land development sites. The new PADEP

Act 167 policy also stresses the opportunity for municipalities to retrofit existing sties to improve existing water quality impairments or existing sources of flooding problems.

The types and degree of controls that are prescribed in the stormwater management plan must be based on the expected development pattern and hydrologic characteristics of each individual watershed. The standards and criteria contained within the plan are to be developed from the technical evaluations performed in the planning process in order to respond to the "cause and effect" nature of existing and potential storm runoff impacts in the 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 (e.g., financial, legal, political, technical, etc.) of the municipalities in Lawrence County.

Act 167 Planning for Lawrence County

Based on the above history and information, the county-wide watershed planning process for Lawrence 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 I - 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 county-wide watershed stormwater management project.

The goal of Lawrence County's Act 167 planning process is to provide a county-wide comprehensive program to assist in the planning and management of stormwater. With coordination from the twenty-eight (28) municipalities in Lawrence County, the resulting stormwater management ordinance will address severe and ongoing stormwater related problems in critical areas throughout the County. Furthermore, cooperating member municipalities will be able to adopt stormwater management controls that collectively will have a beneficial impact on the waters of Lawrence County and those "problem" areas that presently remain unmanaged.

Lawrence County has received Phase I Scope of Study funding from PADEP. The Phase II 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 Lawrence 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 streambank erosion. The results will be a Plan to preserve and enhance Lawrence 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 more efficiently and cost-effectively developed 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.

A new initiative from PADEP indicates that the plan may 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 county-wide comprehensive planning and management of stormwater runoff, it was necessary to take a close look at all major watersheds within Lawrence County during Phase I. Since the Act itself is very dependent on municipal coordination 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 Lawrence County Planning Commission, municipalities, the Lawrence County Conservation District, and other interested organizations. Two WPAC meetings were held during Phase I to obtain their general commitment to the project and to distribute map-based Stormwater Management Planning Surveys. A third meeting, a public awareness and educational meeting, was held to disseminate and obtain information from the public. The Scope of Study was developed based on these meeting discussions, an evaluation of the Surveys, and in-house knowledge from Lawrence County and PADEP.

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

1. Phase I - 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.
2. Phase II - 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 by Lawrence County.
    - Approval by PADEP.
    - Adoption by all municipalities.
    - Municipal implementation.

Previous Stormwater Management Planning Efforts

There have been no previous Act 167 Plans prepared for Lawrence County. However, the following relevant documents have been prepared and will provide a valuable source of information for the development of the Plan:

1. Lawrence County Comprehensive Plan, Lawrence County Planning Commission, December, 2004
2. Lawrence County Hazard Mitigation Plan, Lawrence County Planning Department / Lawrence County Emergency Management Agency, April, 2004
3. Shenango River Watershed Conservation Plan, Western Pennsylvania Conservancy, July, 2005
4. Connoquenessing Creek Riparian Restoration and Protection Initiative, Western Pennsylvania Conservancy, August 24, 2006
5. Hell Run Conservation Plan, May, 2006
6. Connoquenessing Creek Watershed Conservation Plan
7. Lawrence County Natural Heritage Inventory
8. Enon Valley Watershed Assessment, November, 2003

II. GENERAL COUNTY DESCRIPTION

Lawrence County covers 362 square miles and, according to the 2000 census, is ranked 29th out of the sixty-seven counties in Pennsylvania with a population of 94,643. The largest municipality in Lawrence County is the City of New Castle with a population of 28,334. Two townships in the New Castle vicinity follow with 8,373 people in Neshannock Township and 7,187 people in Shenango Township.

Political Jurisdictions

The County is comprised of twenty-seven municipalities. The political jurisdictions include sixteen townships, ten boroughs, and one city.

Townships		Boroughs	Cities
Hickory	Taylor	Bessemer	New Castle
Little Beaver	Union	Ellport	
Mahoning	Washington	Ellwood City	
Neshannock	Wayne	Enon Valley	
North Beaver	Wilmington	New Beaver	
Perry		New Wilmington	
Plain Grove		S.N.P.J.	
Pulaski		South New Castle	
Scott		Volant	
Shenango		Wampum	
Slippery Rock			

Refer to Figure 1 for a County Base Map.

NPDES Phase II Involvement

Ellwood City, Ellport Borough, and portions of Wayne and Perry Townships are included in the Pittsburgh Urbanized Area (UA) as designated by the U.S. Census 2000. Each municipality owning or operating a system of stormwater conveyance (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) within the designated UA is required to comply with the National Pollutant Discharge Elimination System (NPDES) Phase II requirements for operators of municipal separate storm sewer systems (MS4s), as specified by the U.S. Environmental Protection Agency (EPA). The City of New Castle is also classified as as an MS-4 community.

NPDES Phase II requires owners of these MS4s to develop, implement, and enforce a stormwater management program designed to reduce the discharge of pollutants from their MS4s to the "maximum extent possible" to protect water quality. Each stormwater management program must address the following six minimum control measures (MCMs):

MCM	Description
1	Public Education and Outreach
2	Public Participation / Involvement
3	Illicit Discharge Detection and Elimination (IDD&E)
4	Construction Site Runoff Control
5	Post-Construction Runoff Control
6	Pollution Prevention / Good Housekeeping

General Development Patterns

The top ten municipalities in terms of subdivision activity over the twenty (20) year period studied for the latest Comprehensive Plan update are as follows:

1. Neshannock Township - 313 new lots
2. Slippery Rock Township - 235 new lots
3. Shenango Township - 201 new lots
4. North Beaver Township – 171 new lots
5. Wilmington Township - 158 new lots
6. Scott Township – 136 new lots
7. Pulaski Township – 130 new lots
8. Perry Township – 98 new lots

9. Hickory Township – 97 new lots
10. Mahoning Township – 93 new lots

Primary growth areas consist of those municipalities listed above, and include a new 1200-acre industrial park is being planned for Neshannock Township. Major subdivisions are occurring in Union, Shenango, and Wayne townships.

Public water and sewer improvements are underway in Pulaski Township. The new infrastructure could induce development pressure, especially since this township is about equidistant from both Sharon and New Castle.

The County also identified several growth areas in their latest Comprehensive Plan Update. These growth areas are shown on Figure 4, and are used to help identify those watersheds or subwatersheds where detailed modeling may be required under Phase II of the Act 167 planning process.

Land Use

Lawrence County contains three major watersheds: Slippery Rock Creek/ Connoquenessing Creek, the Shenango/Mahoning/Beaver River watershed complex, and North Fork Little Beaver Creek.

Slippery Rock Creek / Connoquenessing Creek: Land uses in these watersheds include the urban areas of Ellwood City, Ellport and Wayne Township, as well as agricultural, forestry, industrial and light residential land uses in the Slippery Rock Creek watershed.

Shenango/Mahoning/Beaver River Watersheds: Land uses in these watersheds include the heavily urbanized and industrial areas around New Castle, strip mining and gravel quarries in floodplain areas, agricultural, low density and medium density residential, and natural areas.

North Fork Little Beaver Creek: Land uses in this watershed include agriculture, rural residential and strip mine uses.

Physiography and Geology

Most of Lawrence County consists of undulating and rolling uplands, many poorly drained lowlands, rounded hills, and some steep ridges near the major streams. The southeast corner of Lawrence County consists primarily of rolling and hilly uplands and many narrow, steep-sided valleys. Here, the level and undulating areas are mainly on the broad ridge tops and in river valleys.

Elevations in the county range from a high of 1,440 feet just to the west of Slippery Rock Creek in Slippery Rock Township to a low of 740 feet at Rock Point where the Beaver River flows south out of the county in Wayne Township. Variations in aspect, slope, and elevation combine to create a number of different microenvironments throughout the county. Numerous soil types influenced by weathering of underlying bedrock, slope,

organic material and climate and sometimes the bedrock itself create the ecological foundation for Lawrence County.

Lawrence County is divided into two geologic provinces. The Pittsburgh glaciated plateau prominently covers about 4/5 of the county. The unglaciated Pittsburgh Plateau covers the rest of the county in the southeast delineated roughly by Slippery Rock Creek and Connoquenessing Creek. The underlying bedrock of the county is divided into four groups: the Pocono group underlies the steep slopes of the upper Mahoning and Shenango Rivers, and the Pottsville Group, Allegheny Group, and the Conemaugh Formation underlie the rest of the county.

Refer to Figure 2 for a general geology map of Lawrence County.

Soils

Soils in the Pittsburgh Plateau section of Lawrence County are part of the Gilpin-Wharton-Wiekert Association. These level to steep soils, are well drained and formed in the residual material from acid shale, siltstone and sandstone.

Many different associations cover the glaciated part of the county. The Conotton-Chili-Holly association underlies the major rivers and streams, such as the Beaver, Shenango and Mahoning Rivers and North Fork Little Beaver and Slippery Rock Creeks. These soils formed from glacial outwash and alluvium and range from level to very steep, and from excessively drained to poorly drained.

The Ravenna-Canfield-Frenchtown and Canfield-Ravenna-Loudonville associations underlie the uplands. Both of these soils associations are formed in glacial till and range from level to very steep, and well drained to poorly drained. Plain Grove Township contains a small area of the Candice-Frenchtown-Holly Association formed from glacial lake sediment.

County hydric soils are shown in Figure 3.

Water Resources

Various river and stream valleys cut through the landscape of Lawrence County. All of these either form or are tributaries to the Beaver River except for North Fork Little Beaver Creek, which flows directly to the Ohio River.

Slippery Rock Creek / Connoquenessing Creek

Connoquenessing Creek, a warm-water stream, begins in northern Butler County and drains 838 square miles. The creek flows through only a small section of Lawrence County, but picks up a major tributary, Slippery Rock Creek in the process. Connoquenessing Creek is considered the second most polluted waterway in the United States, primarily due to the pollution from AK Steel. Other pollution comes from more typical sources such as

agricultural runoff, sewage and siltation.

Slippery Rock Creek starts in Butler County, drains 836 square miles and flows for forty-seven miles to Connoquenessing Creek. It is classed as a warm-water fishery. Tributaries to the creek include Wolf Creek, Muddy Creek, Skunk Run, Grindstone Run, Hell Run and Taylor Run.

Hell Run is the only exceptional value (EV) stream in the county. It begins in Shenango Township, drains 6 square miles and has a length of 4.7 miles.

The upper sections of Slippery Rock Creek are affected by acid mine drainage, but current efforts by the Slippery Rock Watershed Coalition are underway to remediate the AMD. This is helping to improve the water quality in Lawrence County. Other problems include non-point siltation and light bank erosion.

Shenango/Mahoning/Beaver River Watersheds

The Mahoning River, also classified as a warm water stream, begins about 10 miles southeast of Alliance, Ohio, and flows through Pennsylvania for about 11 miles. The Mahoning River has been described as "one of the most polluted of any stream or river in Ohio" (OH EPA 1994), with the most polluted stretch located just downstream of Youngstown, Ohio. Dilution of the water makes the Pennsylvania section a little less polluted, but the sediment remains more contaminated than that found in Presque Isle Bay of Lake Erie. The Mahoning River's effects spread downstream into the Beaver River (see Beaver River description).

Major tributaries to the Mahoning River in Lawrence County include Coffee Run flowing from the north and Hickory Run, which joins the Mahoning River near the confluence of the Mahoning River and the Shenango River.

The Shenango River has its origin in Conneaut Township of Crawford County and flows more than 87 miles to its confluence with the Mahoning River to form the Beaver River. The drainage area is 1,062 square miles, of which 283 square miles are in Ohio (180,916 acres) and 779 square miles are in Pennsylvania (498,000 acres). The lower section from Shenango Lake to the

Mahoning River confluence is considered the worse section. This section, in addition to receiving the pollutants from further upstream has effluents from industry, wastewater treatment plants and urban development.

Major tributaries of the Shenango River in Lawrence County include Neshannock Creek, Hottenbaugh Run, Big Run and Deer Creek. Neshannock Creek is discussed in its own section because of its size.

North Fork Little Beaver Creek

North Fork Little Beaver Creek originates just north of New Springfield, Ohio, approximately 4.6 miles west of the Ohio-Pennsylvania border. Classed as a High quality-coldwater fishery, Little Beaver Creek flows for 30.6 miles to the Ohio River. This stream has numerous strip mines surrounding it in the upper reaches, and most of the mine drainage into the stream is alkaline. This AMD combined with the farm runoff contributes to water that has a high hardness and conductivity. Some industrial and municipal sewage discharges also affect water quality.

Honey Creek, the only major tributary to North Fork Little Beaver Creek in Lawrence County, joins upstream of Enon Valley Borough.

Designated Act 167 watersheds in Lawrence County include:

Beaver / Mahoning River	Big Run
Shenango River	Neshannock Creek
Little Beaver Creek	Little Neshannock Creek
Connoquenessing Creek	Wolf Creek
Slippery Rock Creek	

Floodplains

The following municipalities participate in the National Flood Insurance Program:

Townships	Boroughs	Cities
Hickory	Bessemer	New Castle
Little Beaver	Ellwood City	
Mahoning	Enon Valley	
Neshannock	New Beaver	
North Beaver	New Wilmington	
Perry	Volant	
Plain Grove	Wampum	
Pulaski		
Scott		
Shenango		
Slippery Rock		

Townships	Boroughs	Cities
Taylor		
Union		
Washington		
Wayne		
Wilmington		

Climate

Winters are cold and snowy at high elevations in the County. It is also frequently cold in the valleys, but intermittent thaws preclude a long-lasting snow cover. Summers are fairly warm on mountain slopes and very warm with occasional very hot days in the valleys. Rainfall is evenly distributed throughout the year, but it is appreciably heavier on the windward, west- facing slopes than in the valleys. Normal annual precipitation is adequate for all crops, although summer temperature and growing season length, particularly at higher elevations, may be inadequate.

In winter, the average temperature is 30 degrees F, and the average daily minimum temperature is 21 degrees. The lowest temperature on record, which occurred at New Castle on January 29, 1963, is -23 degrees. In summer, the average temperature is 70 degrees, and the average daily maximum temperature is 80 degrees. The highest recorded temperature, which occurred at New Castle on September 2, 1953, is 100 degrees.

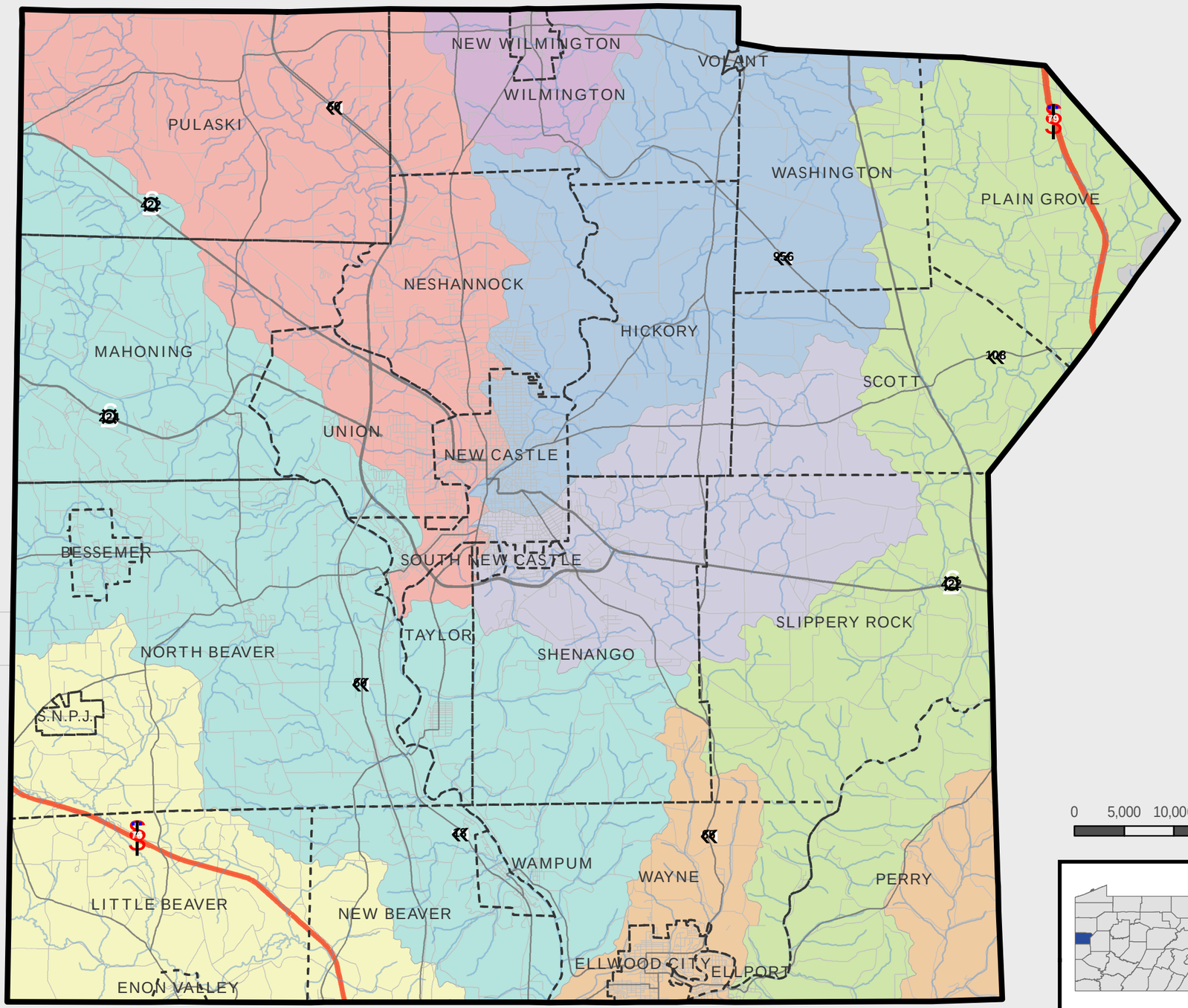
The total annual precipitation is 38 inches. Of this, 22 inches, or 60 percent, usually falls in April through September, but in 2 years out of 10, the rainfall in April through September is less than 17 inches. The heaviest 1-day rainfall during the period of record was 3.70 inches at New Castle on October 16, 1954. Thunderstorms occur on about 36 days each year, and most occur in summer. Heavy rains, which occur at any time of the year, and severe thunderstorms in summer sometimes cause flash flooding, particularly in narrow valleys.

Average seasonal snowfall is 38 inches. The greatest snow depth at any one time during the period of record was 19 inches. On an average of 24 days, at least I inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in mid-afternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 60 percent of the time possible in summer and 35 percent in winter. The prevailing wind is from the southwest. Average wind- speed is highest, 12 miles per hour, in winter.

Lawrence County
Stormwater Management Plan
Phase 1 Study

FIGURE 1
Base Map



Act 167 Watersheds
- Beaver River
- Big Run
- Connoquenessing Creek
- Little Beaver Creek
- Little Neshannock Creek
- Neshannock Creek
- Shenango River
- Slippery Rock Creek
- Wolf Creek

Other Features
- Interstate
- PA & US HWY
- Local Road
- Stream
- Municipal Boundary
- Lawrence County

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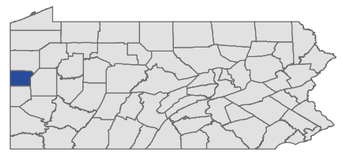

Location of Lawrence County within the state of Pennsylvania.

DISCLAIMER

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Project Number:

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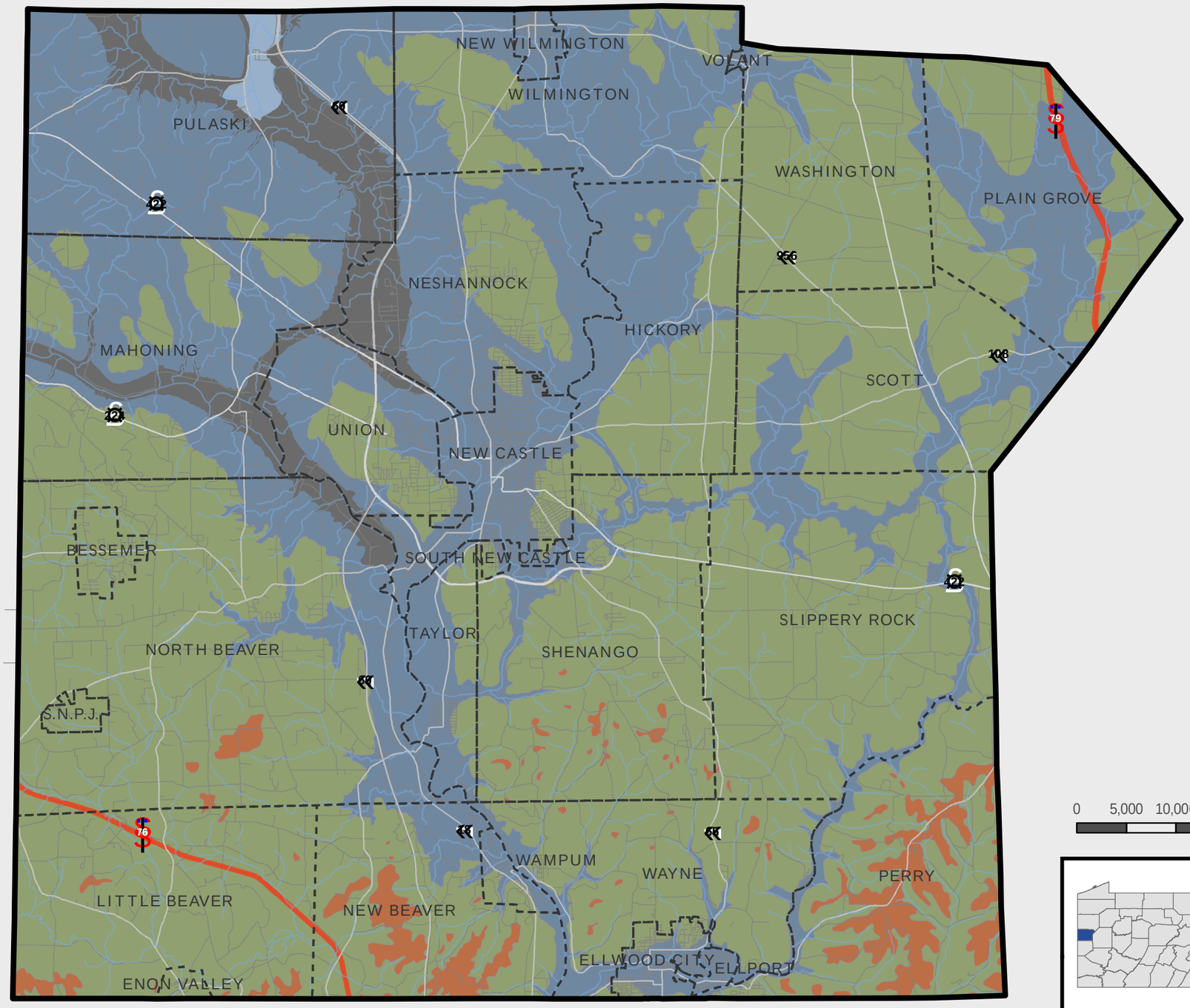
Lawrence County
Stormwater Management Plan
Phase 1 Study

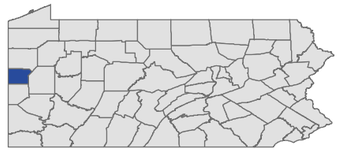
FIGURE 2
Geology



Bedrock
- Glenshaw Formation
- Allegheny Formation
- Pottsville Formation
- Cuyahoga Group
- Shenango Formation

Other Features
- Interstate
- PA & US HWY
- Local Road
- Stream
- Municipal Boundary
- Lawrence County

0 5,000 10,000 20,000 Feet



Location of Lawrence County within the state of Pennsylvania.

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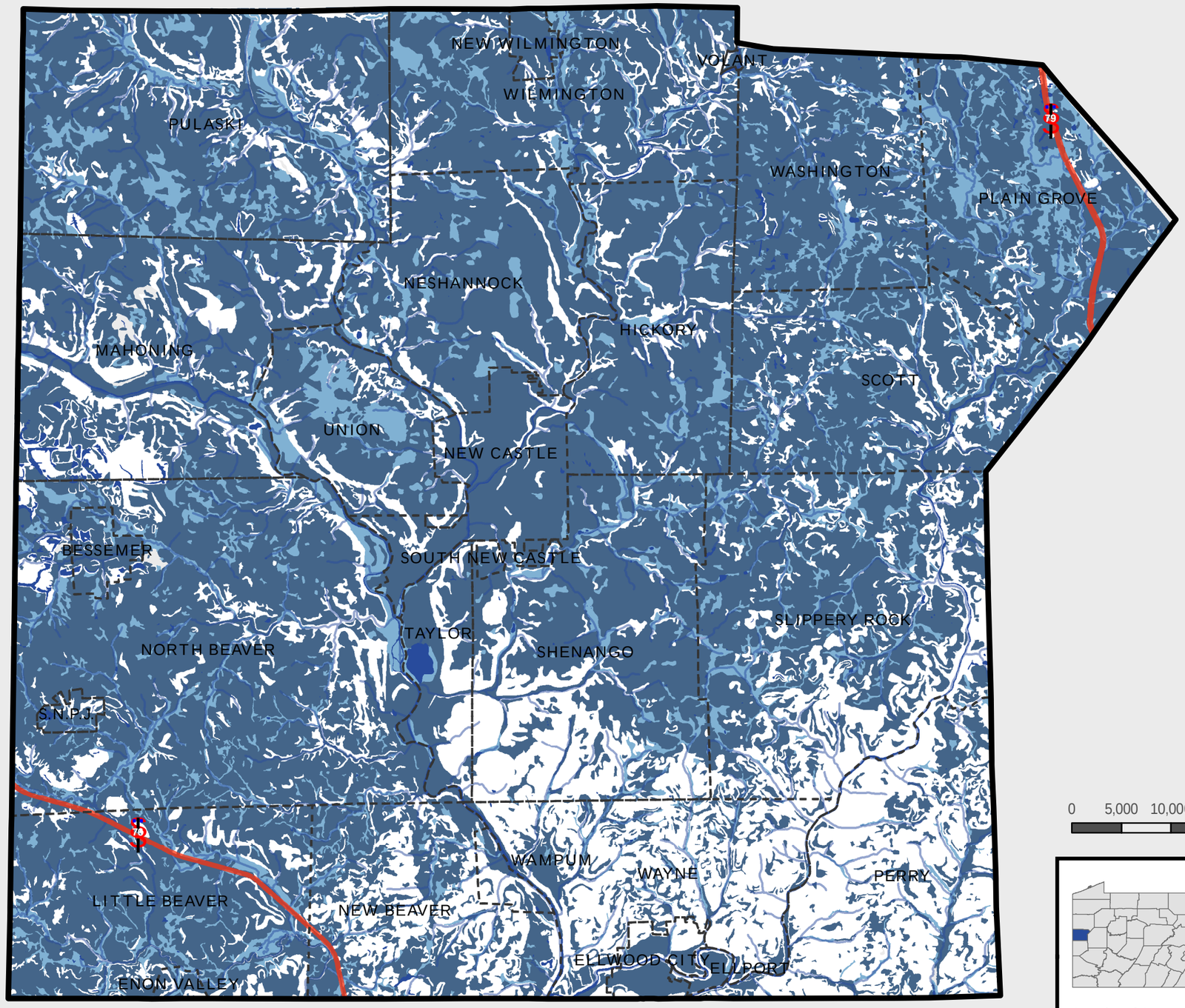
File Location: C:\Projects\2007\Lawrence\ArcProjects\Geology.mxd

Lawrence County
Stormwater Management Plan
Phase 1 Study

FIGURE 3
Hydric Soils



Soils
- Hydric
- Inclusion
- Non-hydric
- Water

Other Features
- Interstate
- Stream
- Municipal Boundary
- Lawrence County

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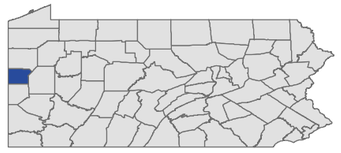

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III. ACT 167 PLANNING FOR LAWRENCE COUNTY

This section of the Phase I Scope of Study presents the concept and approach that has been developed to meet the Act 167 requirements for this county-wide watershed stormwater management project.

PADEP and Lawrence County Agreement

The Pennsylvania Department of Environmental Protection and Lawrence County entered into an agreement for a Phase I Watershed Stormwater Management Plan Grant for all watersheds of Lawrence County.

The agreement was made in order for Lawrence County to prepare a Stormwater Management Plan in two phases. Phase I is the preparation and submission of a Scope of Study to PADEP for their review and approval. The Scope of Study generally consists of a determination of the level of effort and cost required by Lawrence County to complete the second phase (Phase II). Phase II includes the preparation and adoption of the Stormwater Management Plan based on the level of effort identified in Phase I.

Engineering Consultant Selection

In order to assist in the preparation of Phase I, the Lawrence County Commissioners selected L. Robert Kimball & Associates, Inc., (Kimball) to provide stormwater planning services to Lawrence County; and to prepare this Phase I report.

Survey Creation and Distribution

Kimball created a map-based Stormwater Management Plan Survey, which was distributed by the Lawrence County Planning Commission early in the Phase I process. All municipalities and other interested citizen groups and public organizations were encouraged to complete the form. The purpose of the Survey was to gather various pieces of information to help determine the level of commitment from each municipality, to reveal what the major stormwater issues were that affected each municipality, and to determine the location of existing problem areas, significant obstructions, and stormwater management facilities.

Watershed Plan Advisory Committee (WPAC)

The purpose of the WPAC is to serve as a conduit for municipal input, assistance, voicing of concerns and questions; and to also serve as a mechanism to ensure intermunicipal coordination and cooperation is secured. The WPAC was formed by the Lawrence County Planning Department, in conjunction with the Lawrence County Conservation District, and consists of the required municipalities, County Conservation Districts, and interested group representatives.

As part of a new initiative by PADEP, it is their position that if a representative from each municipality does not volunteer to join the WPAC, then the head of each governing body will be the appointed member to the WPAC. As an appointed member, that member will be provided all correspondence, be considered an active member, and their name will be included in a list as a member of the WPAC contained within the

Plan. The head of each governing body will also be asked to assist their municipality in adoption of the provisions and requirements of the final Plan.

WPAC Member	Organization	Stormwater Survey Received?
Amy McKinney	Lawrence County Planning Department	---
Jay Russell & Megan Gahring	Lawrence County Conservation District	---
	Cities	
Tamara Gibson	New Castle	**Y**
	Boroughs	
Head of Governing Body	Bessemer	**N**
Head of Governing Body	Ellport	**N**
Rohanda Zellhart	Ellwood City	**Y**
Tyrone Petrich & Duane Clawson	Enon Valley	**Y**
David Hairhoger	New Beaver	**Y**
Fred Garret	New Wilmington	**Y**
Head of Governing Body	S.N.P.J.	**N**
Head of Governing Body	South New Castle	**N**
Head of Governing Body	Volant	**N**
Head of Governing Body	Wampum	**N**
	Townships	
Head of Governing Body	Hickory	**N**
Head of Governing Body	Little Beaver	**N**
Head of Governing Body	Mahoning	**N**
Head of Governing Body	Neshannock	**N**
James Gagliano, Jr.	North Beaver	**Y**
Head of Governing Body	Perry	**N**
Head of Governing Body	Plain Grove	**Y**
Head of Governing Body	Pulaski	**Y**
Head of Governing Body	Scott	**N**
Head of Governing Body	Shenango	**N**
Head of Governing Body	Slippery Rock	**N**
Head of Governing Body	Taylor	**N**
Head of Governing Body	Union	**N**

WPAC Member	Organization	Stormwater Survey Received?
Head of Governing Body	Washington	**Y**
Dennis Hall	Wayne	**Y**
Dale Elcer	Wilmington	**Y**

Watershed Plan Advisory Committee Meetings

Two Watershed Plan Advisory Committee meetings were held during the Phase I process. The purposes of the meetings were to exchange information and to provide opportunities for intermunicipal and county agency coordination.

WPAC Meeting 1 was held on January 10th, 2007. Kimball led the discussion by providing an overview of the Act 167 planning process, provided expectations and potential results and outcomes of the Plan, initiated the formation of the WPAC membership and concluded with a question and answer period.

WPAC Meeting 2 was held on December 18, 2007. Prior to the meeting, a draft copy of the Phase I report was supplied to the WPAC for their review. The purpose of this meeting was to summarize the Phase I Scope of Study, outline the tasks to be completed during Phase II, and address any comments or concerns of the WPAC from their review of the draft Phase I document.

IV. STORMWATER MANAGEMENT SURVEY RESULTS

The Survey was designed to solicit input relative to specific stormwater problem areas throughout Lawrence County from each municipality and other interested stakeholders. The Survey was distributed by Lawrence County shortly after the initial Phase I WPAC Meeting. The GIS-based Survey included a map of the individual municipalities to be used to identify locations and types of problem areas, significant obstructions, and existing or proposed stormwater management facilities. A copy of the Survey document is included as Appendix A. The information contained within the Surveys helped determine the scope of Phase II planning.

Because the most important part of the Act 167 planning process is the implementation of the final provisions and standards of the Phase II Plan, the Survey also was intended to help develop municipal interest in stormwater management issues. Generating interest and obtaining support from the municipalities early in the process will ensure a better product and ease the process of adoption and implementation by each municipality within Lawrence County. This Survey exercise might also enable the municipalities to act accordingly to change current development plans and regulations, and to try to fix inadequacies in the storm sewer system and other problems, or take the means to procure funding to do so.

Completed Surveys were received from twelve of the twenty-seven municipalities in Lawrence County. Additional information was obtained from the Conservation District,

a previous watershed assessment that was completed for the Borough of Enon Valley, and from the County Hazard Mitigation Plan. A geodatabase was then constructed and used to summarize and analyze the Survey results in sufficient detail for determining the Scope for the Phase II Plan.

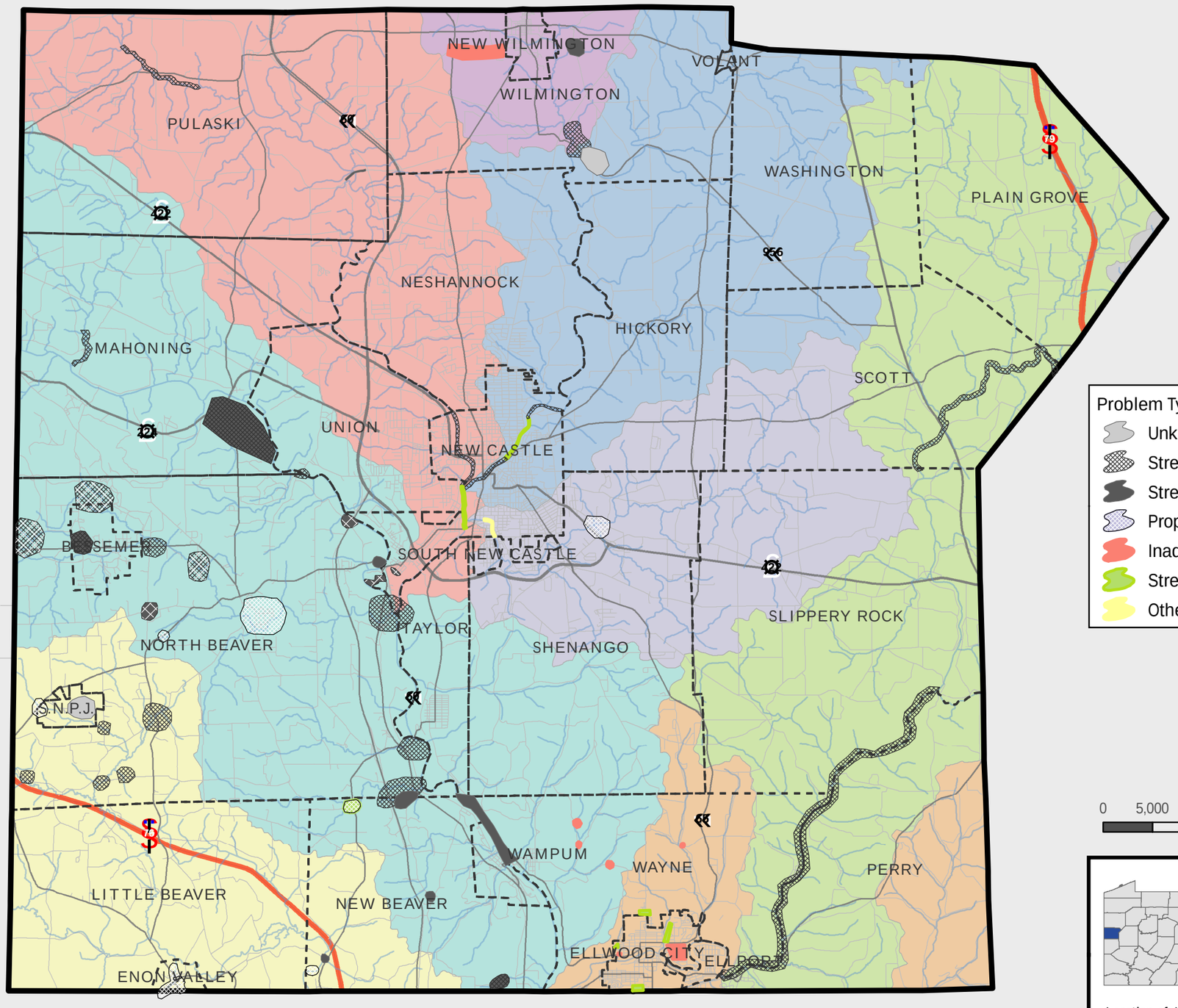
Through analysis of the Survey results, Kimball and County staff determined that the three primary stormwater problems are stream corridor flooding, street flooding, and property flooding. Based on Comprehensive Plan Update data, and input from the County Planning Department and various municipalities, the following areas are experiencing or are likely to experience the most development pressure in Lawrence County:

- The areas identified on Figure 4 as Future Growth Areas
- Floodplain areas in Union Township

A summary of the Survey results can be found in Appendix B. The identification of the problem areas will help in assessing the stormwater management controls needed in the future. Figures 4, 5 and 6 present a summary of the locations and types of stormwater management problems identified through the Survey process and as identified by local residents, and other agencies. These Figures also include problems identified in other studies researched for this report.

Lawrence County
Stormwater Management Plan
Phase 1 Study

FIGURE 4
Problem Areas: Problem Types

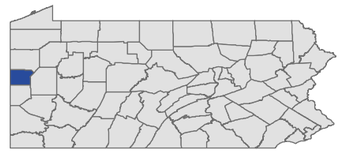


Problem Type
- Unknown
- Stream Corridor flooding
- Street flooding
- Property flooding
- Inadequate infrastructure
- Stream bed/bank erosion
- Other

Act 167 Watersheds
- Beaver River
- Big Run
- Connoquenessing Creek
- Little Beaver Creek
- Little Neshannock Creek
- Neshannock Creek
- Shenango River
- Slippery Rock Creek
- Wolf Creek

Other Features
- Interstate
- PA & US HWY
- Local Road
- Stream
- Municipal Boundary
- Lawrence County

0 5,000 10,000 20,000 Feet



Location of Lawrence County within the state of Pennsylvania.

L. Robert Kimball & Associates
Architects and Engineers
415 Moon Clinton Road Coraopolis, PA 15108-3886

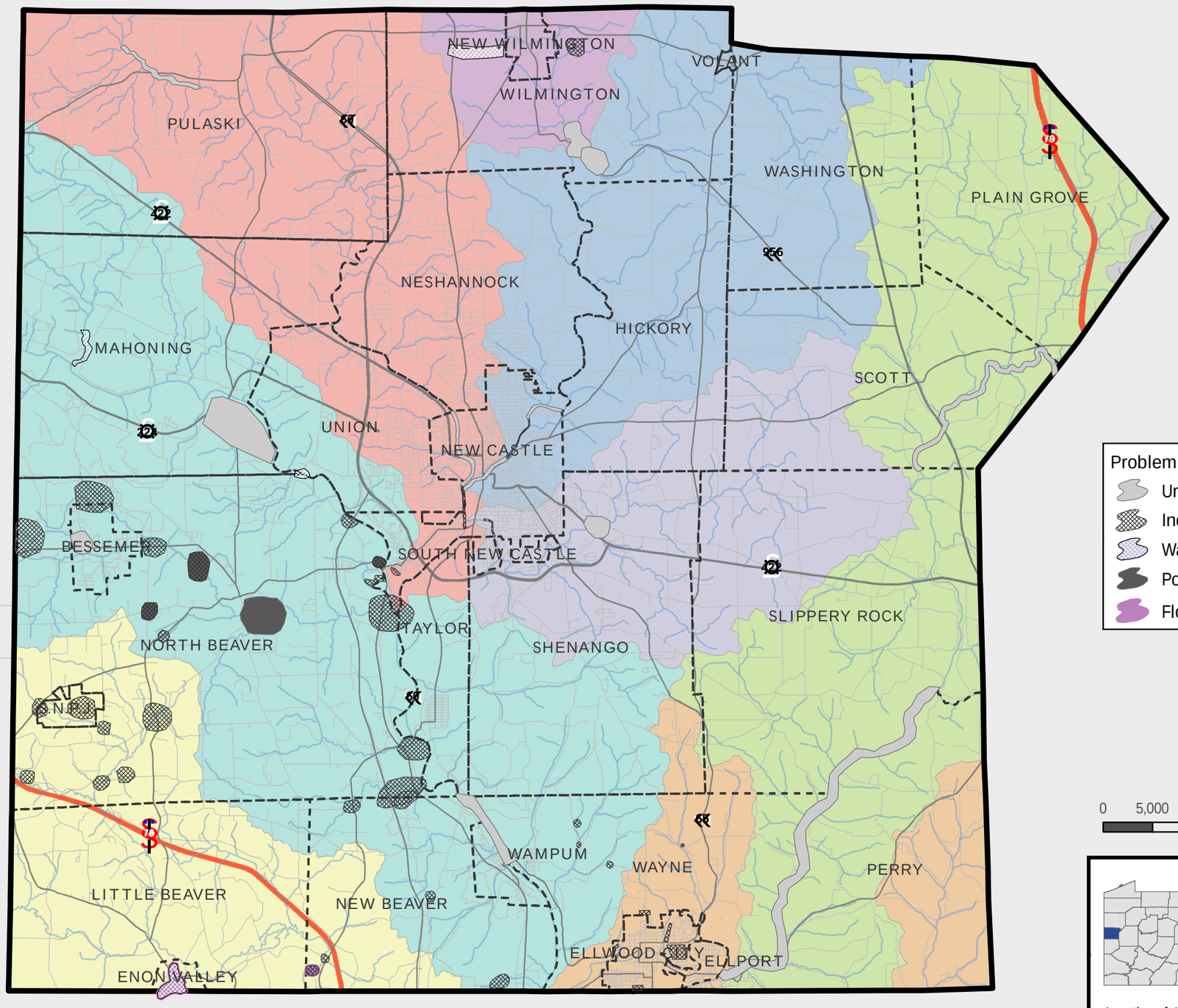
Prepared by: COS Date: 10/10/2007

Project Number:

File Location: C:\Projects\2007\Lawrence\ArcProjects\ProblemAreas.mxd

Lawrence County
Stormwater Management Plan
Phase 1 Study

FIGURE 5
Problem Areas: Problem Causes



Problem Cause
- Unknown
- Increase in SW volume
- Water obstruction
- Poor drainage
- Floodplain development

0 5,000 10,000 20,000 Feet

Location of Lawrence County within the state of Pennsylvania.

Act 167 Watersheds
- Beaver River
- Big Run
- Connoquenessing Creek
- Little Beaver Creek
- Little Neshannock Creek
- Neshannock Creek
- Shenango River
- Slippery Rock Creek
- Wolf Creek

Other Features
- Interstate
- PA & US HWY
- Local Road
- Stream
- Municipal Boundary
- Lawrence County

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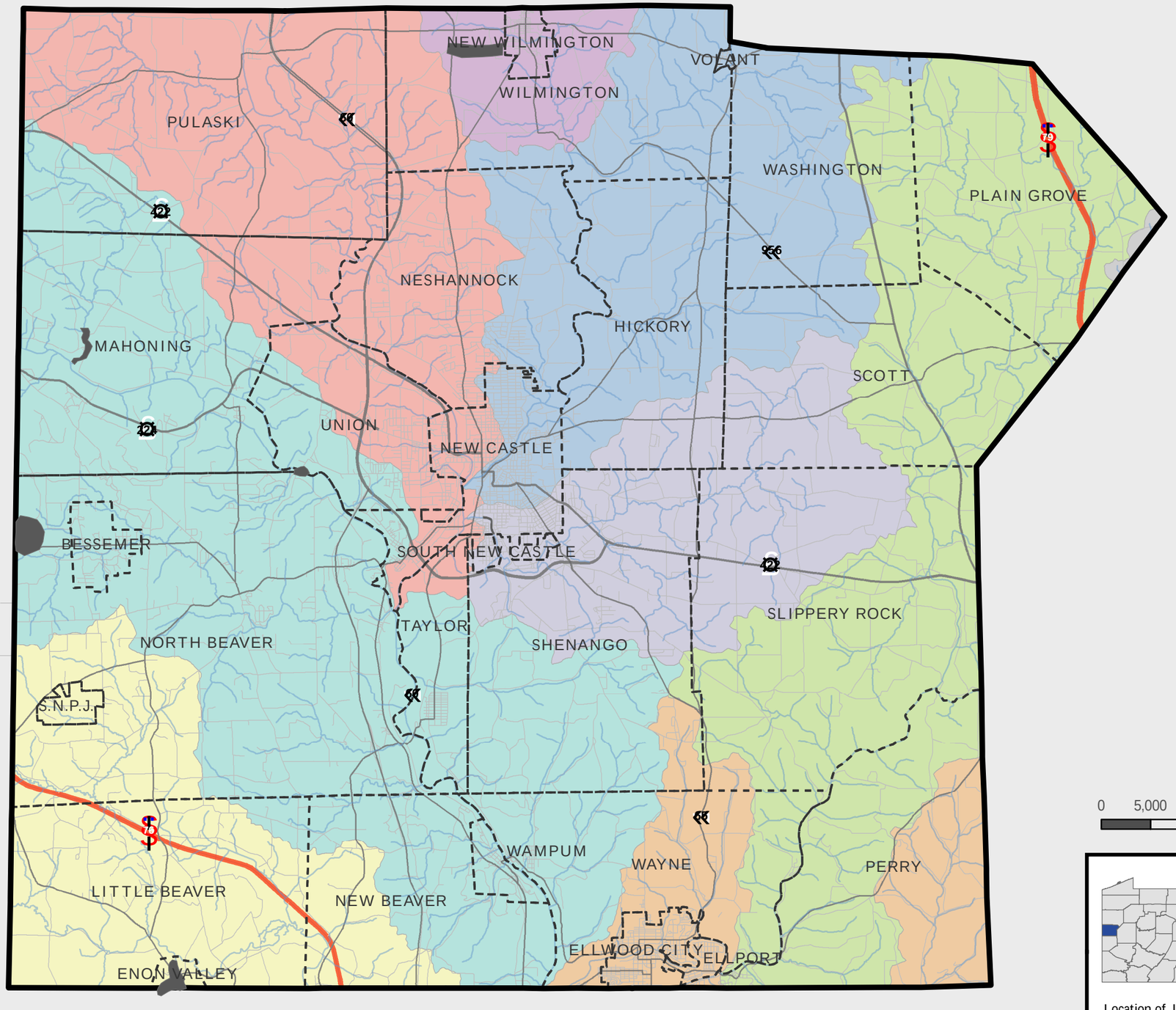
Prepared by: COS Date: 10/10/2007

Project Number:

File Location: C:\Projects\2007\Lawrence\ArcProjects\ProblemCause.mxd

Lawrence County
Stormwater Management Plan
Phase 1 Study

FIGURE 6
Problem Areas: Obstructions

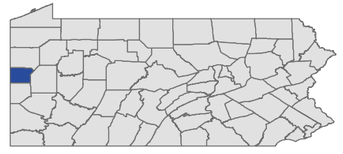


Obstructions

Act 167 Watersheds
- Beaver River
- Big Run
- Connoquenessing Creek
- Little Beaver Creek
- Little Neshannock Creek
- Neshannock Creek
- Shenango River
- Slippery Rock Creek
- Wolf Creek

Other Features
- Interstate
- PA & US HWY
- Local Road
- Stream
- Municipal Boundary
- Lawrence County

0 5,000 10,000 20,000 Feet



Location of Lawrence County within the state of Pennsylvania.

L. Robert Kimball & Associates
Architects and Engineers
415 Moon Clinton Road Coraopolis, PA 15108-3886

Prepared by: COS Date: 10/10/2007

Project Number:

File Location: C:\Projects\2007\Lawrence\ArcProjects\Obstructions.mxd

V. PHASE II SCOPE DISCUSSION

Phase II Plan Scope Summary

During Phase I, the WPAC made several decisions regarding certain specific items that should be addressed during the Phase II planning process and the Phase II Final Plan.

The following is a summary of the specific tasks and subtasks required for the Phase II Plan:

Task A – Data Collection/Review/Analysis

- SubTask A.1 – Data Collection
- SubTask A.2 – Municipal Ordinance Reviews/Evaluations
- SubTask A.3 – Data Preparation for Technical Analysis

Task B – Technical Analysis

- SubTask B.1 – Implement Volume Controls
- SubTask B.2 – Implement Rate Controls
- SubTask B.3 – Model Subwatersheds of Designated Watersheds (Refer to *Modeling Needs Assessment* below)
- SubTask B.4 – Provide Conceptual Solutions for Existing Problem Areas
- SubTask B.5 – Goals, Objectives, and Compilation of All Technical Standards
- SubTask B.6 – Implementation of Technical Standards and Criteria
- SubTask B.7 – Economic Analysis
- SubTask B.8 – Regulations for Activities Impacting Stormwater Runoff
- SubTask B.9 – Water Quality Impairments

Task C – Public/Municipal Participation

Task D – Plan Preparation and Implementation

- SubTask D.1 – PLAN Report Preparation
- SubTask D.2 – Model Ordinance Preparation
- SubTask D.3 – PLAN Adoption

Refer to Appendix C for a detailed breakdown of the Phase II Scope of Work.

Modeling Needs Assessment

One of the most critical assessments competed during Phase I was the determination of where detailed hydrologic modeling is necessary as part of the Phase II work. The following is a summary and rationale behind the Modeling Needs Assessment.

Designated Watershed	Detailed Modeling Necessary?	Rationale	Focus of Modeling Effort
Wolf Creek	No	Minor headwater to Wolf Creek watershed in Butler County	
Slippery Rock Creek	Yes - partial	Bio-diversity Area threatened by development	Hell Run subwatershed
		Recurrent Flooding along Slippery Rock Creek identified in County Hazard Mitigation Plan	Lower Slippery Rock Creek in Perry and Wayne Townships
Connoquenessing Creek	Yes - partial	Recurrent road flooding	Duck Creek subwatershed
		Recurrent road flooding	Squaw Creek subwatershed
		Recurrent road flooding	Connoquenessing Creek watershed in Ellwood City, Ellport, and Wayne Township
Little Beaver Creek	Yes - partial	Recurrent urban flooding due to stream obstructions and development in floodplain.	Tributary in Enon Valley Borough
			Sugar Creek subwatershed
Beaver/Mahoning River	Yes - partial	Recurrent stream corridor flooding, property damage	Hickory Run and Hickory Creek subwatersheds
		Recurrent stream corridor, property, and street flooding	Upper Mahoning River in Mahoning Township
		Recurrent street and property flooding	Lower Mahoning River in North Beaver Township
		Stream corridor flooding / obstruction(s)	Coffee Run subwatershed
		Recurrent street and property flooding, stream corridor flooding / obstruction(s)	Upper Beaver River/Jenkins Run/Edwards Run subwatersheds

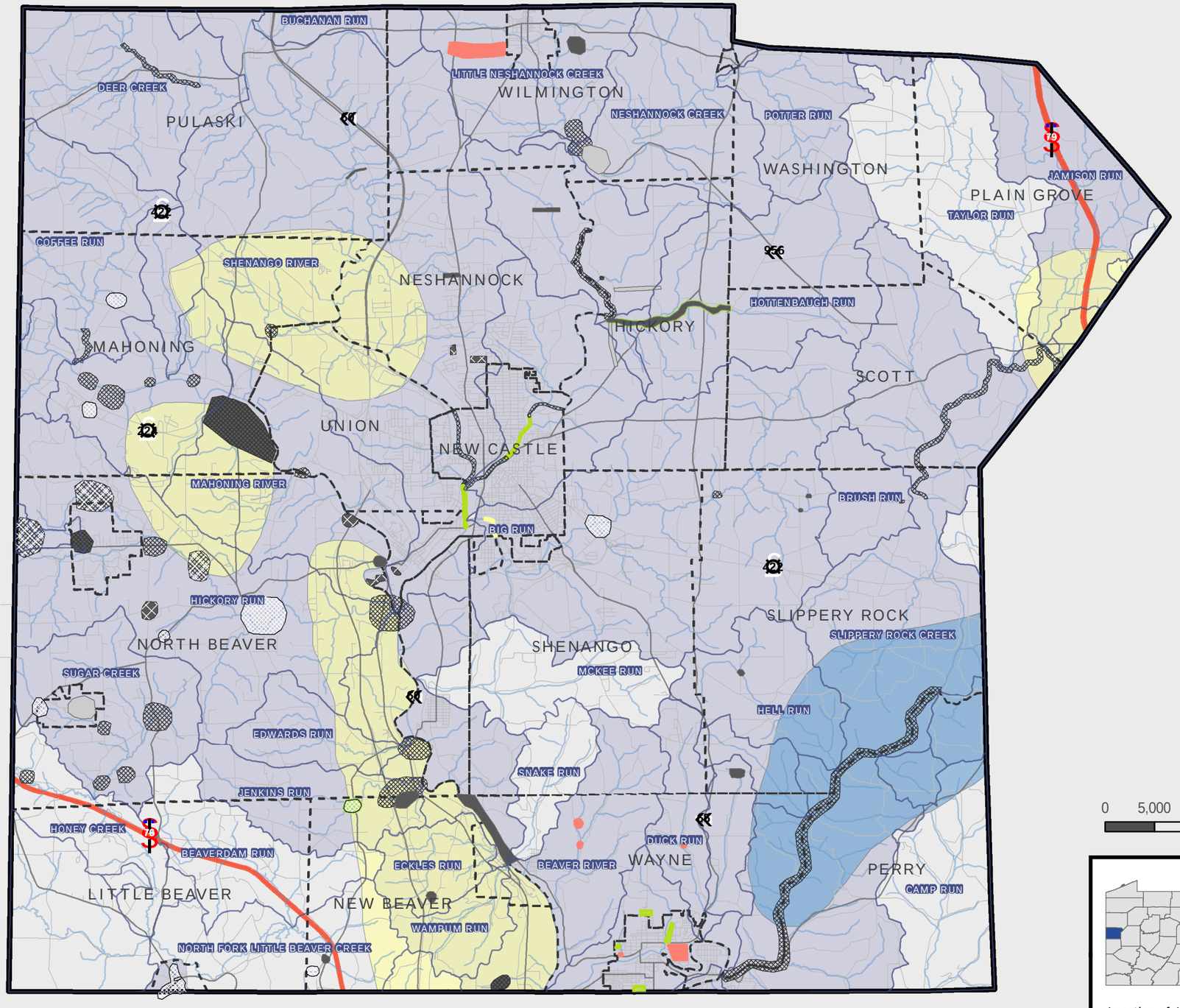
Designated Watershed	Detailed Modeling Necessary?	Rationale	Focus of Modeling Effort
Beaver/Mahoning River (cont.)		Obstructions, recurrent flooding due to increase in runoff	Unnamed tributary to Beaver River (Vinegar Valley) subwatershed in Wayne Township
		Recurrent street flooding in New Beaver Borough	Upper Eckles Run subwatershed
		Recurrent street and stream corridor flooding	Unnamed tributary to Beaver River (Possum Hollow) in New Beaver Borough
Shenango River	Yes	Growth areas, recurrent property flooding, water obstructions, urbanized areas	Designated Watershed
Big Run	Yes	Growth area, recurrent property flooding	Designated Watershed
Neshannock Creek	Yes	Growth area, urbanized areas, recurrent flooding and obstruction problems	Designated Watershed
Little Neshannock Creek	Yes	Recurrent flooding and obstruction problems in Wilmington Township	Designated Watershed

Figure 7 presents the subwatersheds or watersheds that are to be modeled under Phase II.

As part of the Phase II work, a Model Ordinance will be created which includes the standards and provisions of the Plan. An important part of the Model Ordinance will be the inclusion of regulations for activities impacting stormwater runoff. These regulations are not meant to discourage the activities, but instead make sure that they are completed in a proper manner with due regard to stormwater management.

Lawrence County
Stormwater Management Plan
Phase 1 Study

FIGURE 7
Watersheds to be Modeled in Phase II



Small Watersheds
- To be Modeled

Other Features
- Sensitive Area
- Future Growth Area
- Interstate
- PA & US HWY
- Local Road
- Stream
- Municipal Boundary
- Lawrence County

Problem Type*
- Unknown
- Stream Corridor flooding
- Street flooding
- Property flooding
- Inadequate infrastructure
- Stream bed/bank erosion
- Other

*Some problem areas have multiple problem types shown as various combinations of the Problem Type symbology.

0 5,000 10,000 20,000 Feet

Location of Lawrence County within the state of Pennsylvania.

L. Robert Kimball & Associates
Architects and Engineers
415 Moon Clinton Road Coraopolis, PA 15108-3886

Prepared by: COS Date: 11/26/2007

Project Number:

File Location: H:\PROJ\06-0646\CE\GIS\Lawrence\ArcProjects\ModeledSheds.mxd

General Work Plan

Phase II Agreement

Upon completion and submission of the Phase I report to PADEP, Lawrence County and PADEP will enter into an agreement to complete the Phase II portion of the project. Funding for the project should be allocated by PADEP prior to the beginning of any of the Phase II tasks. A 75% reimbursement procedure will be implemented between Lawrence County and PADEP during the Phase II project.

Consultant Selection

It is recommended that Lawrence County secure an engineering consultant to assist in completing at least the technical analysis task of the Phase II project. A qualified consultant knowledgeable in the Act 167 process (including adoption and implementation procedures), stormwater issues in the County, and municipalities within the County, will benefit the County during the Phase II process.

Survey

A Survey Form was distributed subsequent to the first Phase I WPAC meeting. The Survey (see Appendix A) solicited information on problem areas, obstructions, existing and proposed stormwater facilities, and flood control facilities. Other information requested relates to municipal ordinances, support for the plan, relative importance of various plan criteria, and interest in best management practices (BMPs). The municipalities were also asked to appoint a WPAC representative. The data collected through the Survey will assist in technical and non-technical aspects of the planning process and in scoping the overall Plan. The problem areas and significant obstructions indicated in the Surveys will need to be analyzed during Phase II and will become the basis of required subwatershed area modeling.

Watershed Plan Advisory Committee (WPAC)

During Phase I, a WPAC was formed. The County requested each municipality to appoint at least one person from their individual municipality to the WPAC. These requests were in response to Section 6(a) of the Pennsylvania Management Act (Act 167), which states "The county shall establish, in conjunction with each watershed stormwater planning program, a watershed plan advisory committee composed of at least one representative from each municipality within the watershed, the county soil and water conservation district

and such other agencies or groups as are necessary and proper to carry out the purposes of the committee."

For those municipalities that did not respond to the survey or did not appoint a WPAC member, PADEP has taken the position that the head of the governing body will be appointed to the WPAC if a representative from a municipality was not appointed.

It is intended that the WPAC will continue to serve as the primary source of plan guidance for the overall planning process throughout Phase II. The committee members will also serve as the primary contact point for the municipalities/organizations that they represent. It is anticipated that each of these municipalities/organizations will continue to have representation in the WPAC.

The WPAC identified the following organizations as possible WPAC participants:

Connoquenessing Watershed Alliance

Lawrence County Conservation District

PA CleanWays of Butler-Lawrence Counties

Shenango Conservancy

Slippery Rock Streamkeepers

Western Pennsylvania Conservancy

Wild Waterways Conservancy

These organizations and entities were contacted and invited to join the WPAC during Phase I. Additional stakeholders may be identified during Phase II. If appropriate, an invitation to join the WPAC will be extended to these entities.

Municipal Engineers Committee (MEC)

The MEC will meet to discuss the more technical aspects of the Plan. These elements include modeling, technical analysis, and development of management criteria. This committee will be comprised only of municipal engineers and will focus solely on the engineering aspects of the Plan as opposed to the more general objectives and overall Plan contents.

Legal Advisory Committee (LAC)

The purpose of the LAC is to incorporate information between municipal solicitors into the Plan. This committee will focus on implementation of the Model Ordinance from a legal and regulatory framework standpoint.

Standards

The Plan will include criteria and standards for a comprehensive stormwater management strategy that includes the elements listed below. The criteria and standards established in the plan will be mandatory for municipal implementation through the local ordinances.

1. Peak Rate Control Management - Implementation of Release Rates for various subwatersheds will be developed based on collected data, modeling, engineering judgment, and committee input.
2. Volume Control Management - Implementation of Control Guidance 1 and Control Guidance 2 from the Pennsylvania Stormwater Best Management Practices Manual.
3. Water Quality Management – Implementation of non-point source pollution removal methodologies that meet State Water Quality requirements (Chapter 93).
4. Establish streambank erosion requirements using an analysis of the erodability of soils in and along streams and their channels within the watershed.
5. Establish groundwater recharge/infiltration requirements
6. Establish channel protection requriements based on detention of the 1-year design storm with the discharge of this volume over 24 hours.

Roles Of County And Consultant

The division of work and responsibilities between Lawrence County and the Consultant should be determined prior to the beginning of Phase II tasks. Generally, the County may serve as project coordinator and be responsible for non-technical aspects of the Plan. This may include appropriate data collection, plan composition, ordinance analysis, and assisting the Consultant with field data collection.

The Consultant would be responsible for technical aspects of the Plan. This includes data review, problem area and significant obstruction analysis, hydrologic modeling, development of technical criteria, and economic analysis. The Consultant would compose technical components of the Plan text and provide draft and final project mapping.

Work Schedule

A work schedule should be developed early in the Phase II process in conjunction with Lawrence County and the

Consultant. The work schedule will set target dates for various tasks with the intention of completing the project for PADEP review within the Phase II contract period.

VI. REFERENCES

1. Lawrence County Comprehensive Plan, Lawrence County Planning Commission, December, 2004
2. Lawrence County Hazard Mitigation Plan, Lawrence County Planning Department / Lawrence County Emergency Management Agency, April, 2004
3. Shenango River Watershed Conservation Plan, Western Pennsylvania Conservancy, July, 2005
4. Connoquenessing Creek Riparian Restoration and Protection Initiative, Western Pennsylvania Conservancy, August 24, 2006
5. Connoquenessing Creek Watershed Conservation Plan
6. Hell Run Conservation Plan, Lawrence County Conservation District and Friends of McConnell's Mills State Park, Inc., Fall 2006
7. Lawrence County Natural Heritage Inventory, Western Pennsylvania Conservancy, 2002
8. Enon Valley Watershed Assessment, L. Robert Kimball & Associates / Enon Valley Borough, November, 2003
9. Soil Survey of Beaver and Lawrence Counties, Pennsylvania, United States Department of Agriculture Soil Conservation Service, April, 1982
10. Maryland Stormwater Design Manual Volumes I & II, Maryland Department of the Environment, 2000.
11. Pennsylvania Handbook of Best Management Practices for Developing Areas, Pennsylvania Association of Conservation Districts, November 14, 1997
12. Pennsylvania Stormwater Best Management Practices Manual, Pennsylvania Department of Environmental Protection – Bureau of Watershed Management, December, 2006
13. Pennsylvania Model Stormwater Management Ordinance, Pennsylvania Department of Environmental Protection – Bureau of Watershed Management, January, 2007

APPENDIX A
STORMWATER SURVEY FORM

Municipal Stormwater Problem Survey

Municipality: _____

Person Completing Form: _____

Phone Number: _____

Email Address: _____

This survey is the initial stage of Lawrence County's stormwater planning effort for the entire County. Your input and information will help focus the future planning efforts on those areas experiencing stormwater–related problems.

The Survey has two sections. The first section requests general information about municipal ordinances and current municipal Stormwater – related issues and their priority to your community. The second section requests an inventory and identification of stormwater facilities, problem areas, and other related information.

SECTION 1

1. Please identify which of the following your Municipality has:

	YES	NO	LOCATION
Comprehensive Plan	☐	☐	
Zoning Ordinance	☐	☐	
Subdivision/Land Development Ordinance	☐	☐	
FEMA Flood Insurance Study	☐	☐	
Floodplain Regulations *	☐	☐	
Stormwater Management Regulations *	☐	☐	
Erosion Control Regulations *	☐	☐	
Drainage Regulations *	☐	☐	

* Please list where the regulation is found in the "Location" column (e.g., Subdivision / Land Development Ordinance, Zoning Ordinance, etc.) using the following abbreviations:
CP = Comprehensive Plan
ZO = Zoning Ordinance
SL = Subdivision/Land Development Ordinance
BC = Building Code
SO = Separate Ordinance

2. Is your Municipality considered a small MS4 Municipality under the current NPDES Phase II stormwater regulations?

   ☐ Yes ☐ No

   If yes, is your small MS4 Municipality currently in compliance with the NPDES Phase II Permit?

   ☐ Yes ☐ No

3. The Lawrence County Act 167 Plan will address five (5) key stormwater design criteria, as listed below. Please identify the importance of each in your community.

	Very Important				**Not Important**
Peak Flow Rates	5	4	3	2	1
Water Quality	5	4	3	2	1
Groundwater Recharge	5	4	3	2	1
Stream Bank Protection	5	4	3	2	1
Flooding	5	4	3	2	1

Peak Flow Rates: Increased flow rates of stormwater runoff contribute to stream erosion, localized ponding, and flooding, which may cause damage to infrastructure.

Water Quality: Dissolved and un-dissolved pollutants washed off the land surface have negative impacts to recreation, aesthetics, and in-stream habitat.

Groundwater Recharge: Increased runoff volumes decrease the amount of rain that recharges groundwater. Decreased groundwater supplies may have negative effects on well water supplies and may decrease or eliminate stream baseflow during periods of dry weather.

Stream Bank Protection: Eroding banks and beds may undercut roads and utilities, damage in-stream habitat, and clog and or scour culverts and bridges.

Flooding: Large scale overbank flows, such as the 50-year and 100-year floods associated with extreme storm events, cause damage to roads, bridges, culverts, etc.

4. Stormwater Management Plans are required under the Pennsylvania Stormwater Management Act, Act 167. Authorization to proceed with this plan as required by Act 167 has been given by the Lawrence County Commissioners. The long-term goal of this Plan will be to maintain the existing hydrologic conditions including: stream storm flows, water quality, groundwater levels, and stream base flow. With this in mind, what level of support will your Municipality or agency provide for this project?

Strongly Support				**Strongly Oppose**
5	4	3	2	1

5. Will your Municipality or agency be interested in attending future Watershed Plan Advisory Committee meetings?

   ☐ Yes ☐ No

   If Yes, please list your meeting representative's contact information below:

   Name: _____

   Address: _____

   Phone Number: _____

   Email Address: _____

6. Do you know of any existing or proposed flood control projects in your Municipality?

   ☐ Yes ☐ No

   If yes, please describe the project(s) below:

   _____

   _____

   _____

   _____

   _____

7. Would you suggest any other agencies or organizations that should be included on the Watershed Plan Advisory Committee? If so, please provide contact information below:

   Name: _____

   Organization: _____

   Address: _____

   Phone Number: _____

   Email Address: _____

8. Are existing (public or private) stormwater management facilities (storm sewer outfalls, detention/retention basins, etc.) being maintained (e.g., removal of debris from outlet structures, adequate control of vegetation, capacity maintenance, etc.)?

   ☐ Yes ☐ No

   If No, please describe the location/problem(s) below:

   _____

   _____

   _____

   _____

   _____

9. Please provide any input you feel is relevant regarding current watershed management procedures in your municipality.

   _____

   _____

   _____

   _____

   _____

SECTION 2

Step 1. On the attached map, please identify the location of the stormwater problem areas, obstructions, and those areas where you predict stormwater problems developing within the next 10 years. These predicted areas are often those areas where you see growing development pressure. When identifying the problem areas and obstructions, please give each a unique number, and try to outline the boundaries of the areas affected by the stormwater problem.

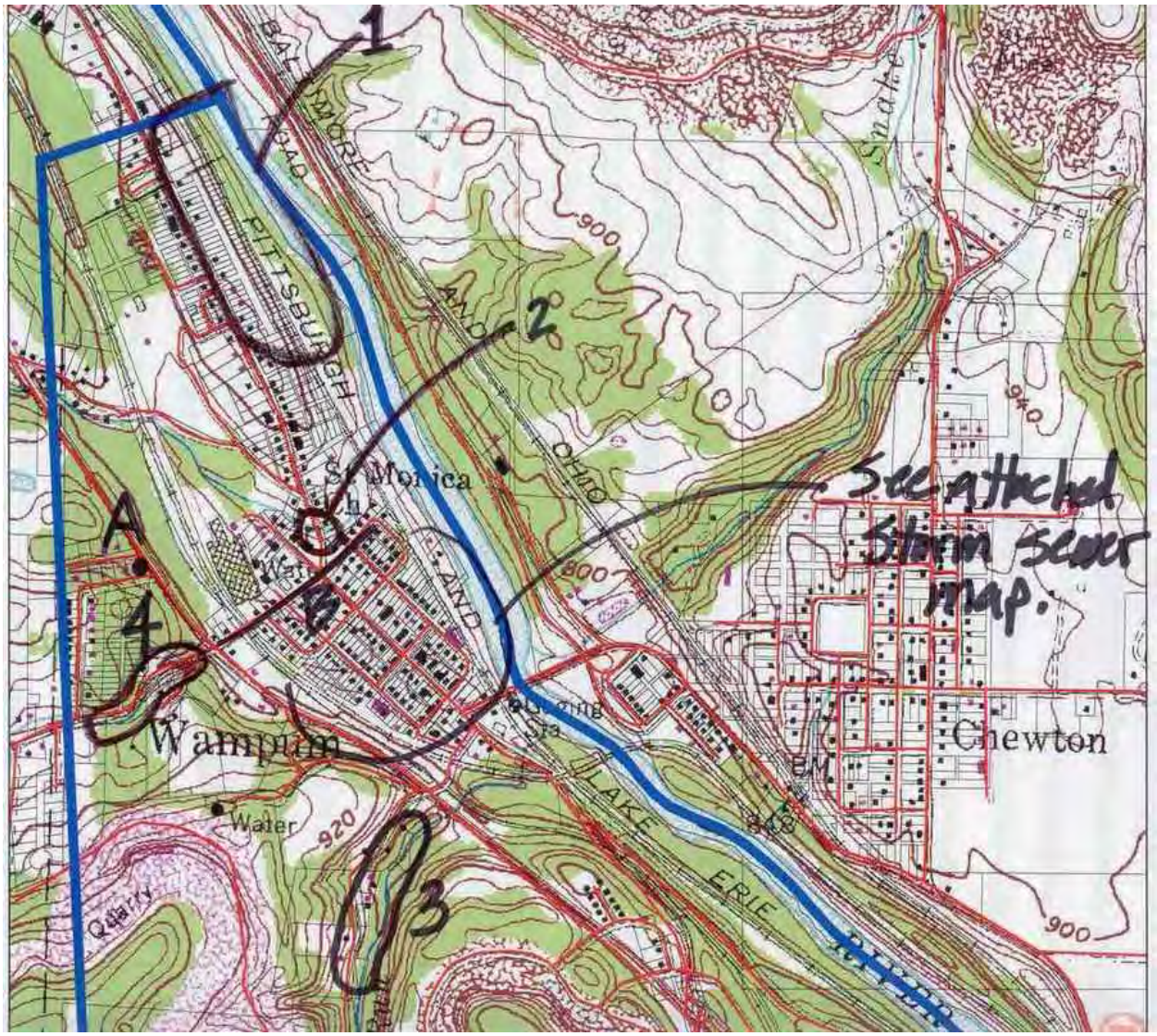
If you received an 11" x 17" map, a pen such as a Sharpie permanent marker works best because these smaller maps were printed on a laser printer.

Definitions:

Problem Areas - Areas of ponding or flooding, erosion, stream channel or bank erosion, property damage, safety concerns, etc.

Obstructions - Bridges, pipes, culverts, dams or other physical barriers to stream flow that restrict the channel flow and typically cause ponding or flooding upstream of the structure.

Refer to the examples below:



The above images are only examples, and may or may not be representative of the stormwater problems in the areas shown.

Step 2. For each problem area identified in Step 1, please use the form provided in Attachment A to describe the type of problem, the cause, how often the problem happens, and the type of damage.

To help you in this effort, we have prepared the following list of codes for you to use so that you do not have to write out detailed descriptions.

Problem Type	Description
1	Stream corridor flooding
2	Street flooding
3	Property flooding
4	Surface Water Pollution
5	Inadequate Infrastructure (culverts/bridges/etc.).
6	Accelerated soil erosion
7	Sediment in streams
8	Stream bed/bank erosion
9	Storm sewer outfall erosion
10	Surface Water Pollution
11	Inadequate Infrastructure (culverts/bridges/etc.)
12	Habitat/water resource loss or damage
13	Other

Problem Cause	Description
1	Increase in the amount of stormwater (volume)
2	Velocity of stormwater
3	Poor drainage
4	Discharge location (direction of flow)
5	Water obstruction
6	Floodplain development
7	Other

How Often?	Description
1	Occurs more than once per year
2	Occurs every 1 to 3 years
3	Occurs every 4 to 8 years
4	Only during major flood events

Damage Type	Description
1	Loss of life
2	Loss of vital services
3	Property damage

If a problem area solution is already planned, please identify the proposed solution in the "Optional Description" areas of Attachment A.

If you wish to more fully describe the stormwater problem(s), please feel free to write in your descriptions in the space provided below each Problem ID.

Step 3. Please also identify on the attached map all existing or proposed stormwater management or drainage facilities. These are storm sewer systems, permanent stormwater detention ponds, underground detention facilities or other systems or facilities intended to collect, convey, or detain stormwater.

Please place a letter on the map corresponding to each site. Use the form provided in Attachment B to provide a brief description of each facility.

Should you have any question about this Survey or about the information being requested, please do not hesitate to call either of the following:

Amy McKinney, Lawrence County Planning Director 724-656-1907

or

Tim Dean, L. Robert Kimball & Associates, 412-262-5400

We value your input and your responses will provide focus and direction for the County's stormwater planning process.

Please return the completed survey by May 15, 2007 to:

Amy McKinney
Lawrence County Planning Director
Lawrence County Planning Department
430 Court Street
New Castle, PA 16101

Thank you for participating.

ATTACHMENT A

Map ID	Problem Type	Problem Cause	How Often?	Damage Type
1				
	Optional Description:			
2				
	Optional Description:			
3				
	Optional Description:			
4				
	Optional Description:			
5				
	Optional Description:			
6				

Should a problem area involve a culvert, storm sewer, or bridge, please provide the size or dimensions of the problem structures.

Map ID	Problem Type	Problem Cause	How Often?	Damage Type
	Optional Description:			
7				
	Optional Description:			
8				
	Optional Description:			
9				
	Optional Description:			
10				
	Optional Description:			

Should a problem area involve a culvert, storm sewer, or bridge, please provide the size or dimensions of the problem structures.

(Copy this sheet for additional problem areas)

Problem ID (from map)	Problem Type	Problem Cause	How Often?	Damage Type
	Optional Description:			
	Optional Description:			
	Optional Description:			
	Optional Description:			
	Optional Description:			

Should a problem area involve a culvert, storm sewer, or bridge, please provide the size or dimensions of the problem structures.

ATTACHMENT B

EXISTING OR PROPOSED STORMWATER MANAGEMENT OR DRAINAGE FACILITIES

Map ID	Description
A	
B	
C	
D	
E	
F	
G	
H	
I	
J	
K	
L	
M	
N	

Map ID	Description
O	
P	
Q	
R	
S	
T	
U	
V	
W	
X	
Y	
Z	

Map ID	Description

APPENDIX B

STORMWATER SURVEY SUMMARY

Stormwater Management Survey Summary

Question No.	Q1												Q2		Q3					Q4	Q5	Q6	Q8
Municipality	Comp Plan	Zoning Ord	Subdivision/LDO	FEMA FIS	Floodplain Regs	Floodplain Regs Location	SWM Regs	SWM Regs Location	Erosion Control Regs	Erosion Cntrl Regs Location	Drainage Regs	Drainage Regs Location	MS4	MSF Compliant	Peak Flow Rates	Water Quality	Groundwater Recharge	Stream Bank Protection	Flooding	Support Project	WPAC	Flood Control Projects	Maintained SW Facilities
Bessemer																							
Ellport																							
Ellwood City	Y	Y	Y										Y	Y	4	5	3	4	3	5	Y	N	Y
Enon Valley	Y			Y	Y	SO	Y	SO		SO			Y		4	3	3	4	5	5	Y	N	Y
Hickory																							
Little Beaver																							
Mahoning																							
Neshannock																							
New Beaver	Y		Y		Y	SO	Y	SO		SO			N		5	5	5	5	5	5	Y	N	Y
New Castle	Y	Y	Y	Y	Y	SO	Y	SO	Y	SO	Y	SO	Y	Y	5	5	2	4	3	4	Y	N	Y
New Wilmington	Y	Y	Y				Y						Y		3	3	3	3	3	3	Y	N	Y
North Beaver	Y	Y	Y	Y	Y	SO	Y	SL	Y	SL	Y	SL	N		3	3	4	5	4	4	Y	N	
Perry																							
Plain Grove	Y	Y	Y		Y		N		N		N		N		2	4	4	2	3	3	N	N	Y
Pulaski	Y	Y	Y				Y								4	4	4	4	5		Y	Y	
Scott																							
Shenango																							
Slippery Rock																							
SNPJ																							
South New Castle																							
Taylor																							
Union																							
Volant																							
Wampum																							
Washington	N	N	N	N	Y		N		N		N		N		1	1	1	1	1	2	N	N	Y
Wayne	N	N	Y	Y	N		N				N				4	3	3	3	3	2	Y	Y	Y
Wilmington		Y	Y		Y								Y		5	3		3	5	4	Y		

Survey Questions:

Question 1: Does your municipality have the following regulations?
Question 2: Is your municipality considered a small MS4 municipality, and if so are you in compliance?
Question 3: How important (5 = Very Important to 1 = Not Important) are the following issues?
Question 4: How much support with your municipality provide (5 = Strongly Support to 1 = Strongly Oppose)?
Question 5: Is your municipality interested in attending WPAC meetings?
Question 6: Do you know of any existing or proposed flood control projects in your municipality?
Question 8: Are existing SW management facilities being maintained?

Stormwater Management Problem Areas Identified in Survey

ID	Municipality	Problem Type 1	Problem Type 2	Problem Cause 1	Problem Cause 2	Problem Frequency	Damage Type	Description / Comments
1	**Ellwood City**	8	-	1	-	2	3	Open storm culvert causing erosion
2	**Ellwood City**	8	-	1	-	2	3	Bank and yard erosion with debris accumulation. Possible AMD
3	**Ellwood City**	5	-	1	-	1	2	Ewing Park combined sewer system that is old
4	**Ellwood City**	8	-	1	-	2	3	Barry's run
5	**Ellwood City**	8	-	1	-	2	3	Bridge St. Run. Also possible AMD from Wayne TWP.
6	**Ellwood City**	5	-	-	-	-	2	WWTP storm steps. Old stormwater outfall is deteriorating.
55	**Mahoning**	1	2	-	-	-	-	Flooding in Edinburg, Coffee Run prior to entering Mahoning
37	**New Beaver**	3	-	1	6	1	-	Private road-Freed's camp
38	**New Beaver**	2	-	1	-	1	-	Haggerty Road
39	**New Beaver**	2	-	1	-	1	-	Glenkirk Rd.
40	**New Beaver**	3	8	1	-	1	-	McBride Rd
41	**New Beaver**	2	-	1	-	1	-	Mallory Rd.
42	**New Beaver**	1	2	1	-	1	-	Possum Hollow Run
32	**New Castle**	8	-	1	-	1	2	-
33	**New Castle**	13	-	1	5	3	2	-
34	**New Castle**	2	3	1	-	4	2	-
35	**New Castle**	2	3	1	-	3	2	-
36	**New Castle**	8	2	1	-	1	2	-
11	**North Beaver**	1	-	1	-	-	2	Mallory/Halltown Rd.
14	**North Beaver**	1	-	1	-	-	2	Galilec/Wampum Rd.
15	**North Beaver**	1	-	1	-	-	2	Willow Grove
16	**North Beaver**	3	-	3	-	-	2	Jackson Knolls
17	**North Beaver**	1	3	1	3	-	2	Hickory View
18	**North Beaver**	3	-	1	-	-	2	Westfield Rd/Pond overflow
19	**North Beaver**	1	-	1	-	-	2	Moravia Rd.
20	**North Beaver**	1	-	1	-	-	2	Moravia Rd.
21	**North Beaver**	1	-	1	-	-	2	Moravia/Musser Rd
22	**North Beaver**	1	-	1	-	-	2	McClain Rd
25	**North Beaver**	1	-	1	-	-	2	Enon Rd./culvert
26	**North Beaver**	1	-	1	-	-	2	Smalls Ferry Rd
27	**North Beaver**	2	3	1	3	-	2	Smalls Ferry/Columbiana Rd.
28	**North Beaver**	1	3	1	-	-	2	East Beechwood Rd
29	**North Beaver**	1	3	1	5	-	2	Len Ann Dr.
30	**North Beaver**	2	3	1	-	-	2	Covert Rd./run off from Rt. 60 overpass
31	**North Beaver**	2	-	1	3	-	2	Mt. Jackson Rd./Mahoning Town swamp overflow
43	**Pulaski**	2	-	-	-	-	-	Prone to flooding
44	**Pulaski**	1	-	-	-	-	-	Prone to flooding
23	**SNPJ**	-	-	1	-	-	2	SNPJ surface water washed out culverts

ID	Municipality	Problem Type 1	Problem Type 2	Problem Cause 1	Problem Cause 2	Problem Frequency	Damage Type	Description / Comments
24	**SNPJ**	3	-	1	-	-	2	SNPJ lake overflow
45	**Wayne**	5	-	3	-	1	-	Friday Hill Rd
46	**Wayne**	5	-	1	-	1	-	Smiley Stop
47	**Wayne**	5	-	1	-	4	-	Green House Rd
48	**Wayne**	5	-	1	-	4	-	Green House Rd
49	**Wilmington**	1	-	-	-	4	3	Little Neshannock Creek floods when we get lots of rain
50	**Wilmington**	2	-	1	-	1	-	Riding stable area, floods road and basements
51	**Wilmington**	-	-	-	-	-	-	Big Neshannock Creek
52	**Wilmington**	5	-	5	-	4	-	Beechwood Rd. 3ft culvert plugs up and needs replaced

Description Codes:

Problem Type	Description	Totals
1	Stream corridor flooding	16
2	Street flooding	13
3	Property flooding	12
4	Surface Water Pollution	0
5	Inadequate Infrastructure (culverts/bridges/etc.).	6
6	Accelerated soil erosion	0
7	Sediment in streams	0
8	Stream bed/bank erosion	3
9	Storm sewer outfall erosion	0
10	Surface Water Pollution	0
11	Inadequate Infrastructure (culverts/bridges/etc.)	0
12	Habitat/water resource loss/damage	0
13	Other	1

Freq.	Description
1	Occurs >1 per year
2	Occurs every 1 to 3 years
3	Occurs every 4 to 8 years
4	Only during flood events

Problem Cause	Description	Totals
1	Increase in the amount of stormwater (volume)	38
2	Velocity of stormwater	0
3	Poor drainage	5
4	Discharge location (flow direction)	0
5	Water obstruction	3
6	Floodplain development	1
7	Other	0

Damage Type	Description	Totals
1	Loss of life	0
2	Loss of vital s	26
3	Property dan	3

Stormwater Management Problem Areas Identified by Local Residents/Agencies

ID	Municipality	Problem Type 1	Problem Type 2	Problem Cause 1	Problem Cause 2	Problem Frequency	Damage Type	Description
54	**Bessemer**	1	2	-	-	-	-	Flooding along Hickory Run upstream of sewage plant
53	**Enon Valley**	1	-	-	-	-	-	-
60	**Enon Valley**	3	-	5	6	-	3	Property damage
59	**Enon Valley**	3	-	-	-	-	3	House flooding - property damage
61	**Mahoning**	1	-	5	-	-	-	-
56	**New Castle**	1	-	-	-	-	-	-
57	**New Castle**	1	-	-	-	-	-	-
58	**New Castle**	1	-	-	-	-	-	-
62	**Perry**	1	-	-	-	-	-	-
63	**Scott**	1	-	-	-	-	-	-
64	**Shenango**	3	-	-	-	-	-	-
65	**Wayne**	2	-	-	-	-	-	-

Description Codes:

Problem Type	Description	Totals
1	Stream corridor flooding	8
2	Street flooding	2
3	Property flooding	3
4	Surface Water Pollution	0
5	Inadequate Infrastructure (culverts/bridges/etc.).	0
6	Accelerated soil erosion	0
7	Sediment in streams	0
8	Stream bed/bank erosion	0
9	Storm sewer outfall erosion	0
10	Surface Water Pollution	0
11	Inadequate Infrastructure (culverts/bridges/etc.)	0
12	Habitat/water resource loss/damag	0
13	Other	0

Freq.	Description
1	Occurs >1 per year
2	Occurs every 1 to 3 years
3	Occurs every 4 to 8 years
4	Only during flood events

Problem Cause	Description	Totals
1	Increase in the amount of stormwater (volume)	0
2	Velocity of stormwater	0
3	Poor drainage	0
4	Discharge location (flow direction)	0
5	Water obstruction	2
6	Floodplain development	1
7	Other	0

Damage Type	Description	Totals
1	Loss of life	0
2	Loss of vital services	0
3	Property damage	2

Summary Table of Obstructions provided by the Survey form and Local Residents/Agencies									
ID	Municipality	Problem Type 1	Problem Type 2	Problem Cause 1	Problem Cause 2	Problem Freq.	Damage Type	Description	From Survey?
60	**Enon Valley**	3	-	5	6	-	-	Watershed Assessment	N
61	**Mahoning**	1	2	5	-	-	-	Edinburg Flooding	N
66	**Mahoning**	1	-	5	6	-	3	Coffee Run Flooding	N
33	**New Castle**	13	-	1	5	3	2	-	Y
29	**North Beaver**	1	3	1	5	-	2	Len Ann Dr.	Y
52	**Wilmington**	5	-	5	-	4	-	Beechwood Rd. 3ft culvert plugs up and needs replaced	Y

Description Codes:

Problem Type	Description	Totals
1	Stream corridor flooding	**3**
2	Street flooding	**1**
3	Property flooding	**2**
4	Surface Water Pollution	**0**
5	Inadequate Infrastructure (culverts/bridges/etc.).	**1**
6	Accelerated soil erosion	**0**
7	Sediment in streams	**0**
8	Stream bed/bank erosion	**0**
9	Storm sewer outfall erosion	**0**
10	Surface Water Pollution	**0**
11	Inadequate Infrastructure (culverts/bridges/etc.)	**0**
12	Habitat/water resource loss or damage	**0**
13	Other	**1**

Freq.	Description
1	Occurs >1 per year
2	Occurs every 1 to 3 years
3	Occurs every 4 to 8 years
4	Only during flood events

Problem Cause	Description	Totals
1	Increase in the amount of stormwater (volume)	**2**
2	Velocity of stormwater	**0**
3	Poor drainage	**0**
4	Discharge location (direction of flow)	**0**
5	Water obstruction	**6**
6	Floodplain development	**2**
7	Other	**0**

Damage Type	Description	Totals
1	Loss of life	**0**
2	Loss of vital services	**2**
3	Property damage	**1**

WPAC Meeting Representative Contact Information from Survey

Municipality	Representative Name	Representative Address	Representative Phone	Representative Email
Ellwood City	Rohonda Zellhart, OPS Mngr.	525 Lawrence Ave. Ellwood City, PA 16117	724-758-4749	eehrenberg@access995.com
Enon Valley	Tyrone Petrich/ Duane Clawson	P.O. Box 295 Enon Valley Pa 16120	724-336-5968	veronica@ccia.com
New Beaver	David Hairhoger	Galilee Rd. New Galilee 16141	724-535-8868	newbeaverboro@access995.com
New Castle	Tamara P. Gibson	230 N. Jefferson St. N.Caste, PA 16101	724-656-3540	bus.admin@verizon.net
New Wilmington	Fred Garret	NewWilmington, PA 16142	724-946-8167	
North Beaver	James Gagliano Jr.	255 Old Hickory Rd. New Cast. PA 16102	724-667-7413	jgagliano@comcast.net
Wayne	Dennis Hall	1418 Wampum Road, Ellwood City, PA 16117	724-752-1361	
Wilmington	Dale Elcer	2810 St. Rt. 916.	724-946-3226	

APPENDIX C
PHASE II SCOPE OF WORK

Phase II Scope of Work

The COUNTY shall prepare Phase II of the PLAN in accordance with the tasks described in this Appendix C. The Lawrence County Planning Commission shall be considered as the COUNTY and shall assume all responsibilities deemed to be assumed by COUNTY. The COUNTY, with the help of the consultant, will accomplish the technical and non-technical components of the PLAN.

The final Phase II Report and associated Model Ordinance shall be considered as the PLAN.

The Pennsylvania Department of Environmental Protection shall be considered as the DEPARTMENT.

The selected engineering firm shall be considered as the CONSULTANT.

The Phase II contract between Lawrence County and the Pennsylvania Department of Environmental Protection shall be considered as the AGREEMENT.

Project Administration

The COUNTY shall be responsible for, but not limited to, overall administration of all tasks, including the preparation of invoices and progress reports, organizing and/or attending meetings, attending to budgeting and organizational matters, and participating in teleconferences regarding the PLAN.

This task also covers the administrative work required to initiate the AGREEMENT between the DEPARTMENT and the COUNTY, and to initiate selection of a CONSULTANT and, upon selection, to initiate contracts between the COUNTY and the CONSULTANT and to lay out a framework for the critical coordination aspect with the municipalities. Activities include defining the framework for accomplishing various elements of the PLAN, scheduling of time and defining the budget, progress reporting procedures and formats, and finalizing the work schedule. It will also include the preparation for and holding the Phase II start-up meeting between the DEPARTMENT, the COUNTY, and the CONSULTANT.

This task also includes the delineation of work for Phase II between the COUNTY and the CONSULTANT.

Project Billing

The COUNTY shall complete all of the tasks (A through D) and report the progress and status of the PLAN. The COUNTY shall prepare and submit monthly invoices and report the status of work accomplished to the DEPARTMENT pursuant to the terms and conditions specified in the AGREEMENT.

TASK A - Data Collection/Review/Analysis

SubTask A.1 - Data Collection

This task will involve the necessary efforts to gather, review, and analyze the required data to complete the technical and institutional planning steps for the PLAN. The CONSULTANT and COUNTY will work jointly to collect data from county offices, municipalities, and local, state, and federal agencies that will aid in preparation of the PLAN. The data will consist of information concerning existing and future conditions throughout Lawrence County. All data collection activities will be accomplished by gathering available information from the WPAC or from the Survey Form that was distributed to the municipalities during Phase I.

Data to be collected will include, but may not be limited to (and will be based on available information and/or survey results):

1. Comprehensive land use plans.
2. Existing municipal ordinances.
3. Stormwater-related problems areas and proposed conceptual solutions.
4. Existing and proposed flood control projects.
5. Existing and proposed stormwater control facilities.
6. A listing of existing and proposed stormwater collection and control facilities, including a designation of those areas to be served by stormwater collection and control facilities within a 10-year period, an estimate of the design capacity and costs of such facilities, a schedule and the 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, where this information is readily available.
7. Soils.
8. Geology.
9. Significant water obstructions.
10. Topographic and other readily available mapping.
11. Aerial photographs.
12. Previously completed engineering and planning studies.
13. Stream flow and rain gauge data and other water quality information.
14. FEMA FIS floodplain information.

Conduct necessary field investigations to gather and/or confirm the data. This task also involves the review and preliminary analysis of the technical data that has been obtained for consistency and usability. It also includes the review of the institutional

data collected through the Phase I Survey Form process for consistency and usability in the final PLAN.

Problem Areas and Obstructions Inspection/Summary/Proposed Solutions

- Perform a detailed investigation to evaluate any problem areas and obstructions identified during Phase I and field-evaluate those problem areas and obstructions recognized as "significant".
- Designate these "significant" problem areas or obstructions as points of interest, develop associated design storm flows, and complete detailed modeling for the subwatershed(s) where these problems occur (SubTask B.3).
- Compile and review for proposed solutions a collection of past studies/investigations including any PennDOT hydrologic computations, if possible.
- The PLAN will summarize these problem areas and obstructions, provide proposed solutions, and will specify possible sources of funding to pursue for implementation.
- The PLAN will make suggestions for other programs/activities to deal with the issues raised during the planning process. The identification of the problem areas will help in assessing the stormwater management rate controls needed for the subwatersheds.

Although the identification of the problem areas will help in assessing the stormwater management rate controls needed for the subwatersheds, the Act 167 program will not provide funds to correct infrastructure problems or implement conceptual solutions. It will however, provide for a systematic approach and help to identify potential sources of funding to correct the problems, and will, through the preparation and implementation of stormwater ordinances, provide administrative means to correct existing problems and prevent future problems from uncontrolled runoff from future development and activities that may affect stormwater.

Review of Existing Plans/Studies/Reports/Programs

Perform a comprehensive review of related documents and/or programs and develop a coordinated list of goals and objectives from each of the documents.

Anticipated Product

The product will include the information listed above, gathered and organized in such a way as to be usable for both short and long term municipal and county stormwater planning (including updates). A final data summary will be prepared that will identify and/or catalogue the collected data and funding streams.

SubTask A.2 - Municipal Ordinance Reviews/Evaluations

This task will involve the detailed evaluation of the provided municipal ordinances in order to prepare a municipal ordinance comparison matrix. This matrix is intended to display (for both the actual preparation of the implementation PLAN and for the

municipal education process), the current stormwater management provisions in the various municipal ordinances for all municipalities within Lawrence County. The matrix objectives are to easily compare the similarities and differences, as well as the consistency/inconsistency, between the various municipal ordinances in the County. The matrix will be used to develop ordinance provision recommendations for the various municipalities.

Anticipated Product

The product will be a complete matrix of stormwater management ordinance provisions for the municipalities, which identify the status of ordinance provisions as they relate to stormwater management.

SubTask A.3 - Data Preparation for Technical Analysis

This task involves the engineering work necessary to transform the information collected under SubTask A.1 into a Geographic Information System (GIS) geodatabase that can be used for the later technical tasks and map (plate) production. Included will be the preparation of "land characteristics" GIS data layers for modeling and display purposes. All data will be incorporated into the GIS geodatabase on an as needed basis.

The GIS data layers will include:

- **Base Mapping** – Existing base map information (roads, streams, municipal boundaries, text, etc.) will be collected and the most accurate data will be utilized to develop the County's base map. All data will be projected into the coordinate system utilized by Lawrence County. All data from various sources will be merged into a seamless base map.
- **Land Use/Land Cover Information** – Current aerial (photographic and/or digital images), available GIS land use files, and zoning maps will be collected and formatted into the format required for hydrologic modeling based on NRCS (formerly SCS) land use classifications. Land development projects completed subsequent to existing data will be added as necessary.
- **Future Land Use Conditions** – Future projected planning information will be overlaid on the existing land use conditions mapping to determine the future land use scenario for development at a 10-year build-out condition.
- **Soils Information** – The County Soils Survey maps will be modified and/or prepared to illustrate NRCS hydrologic soils groups instead of individual soil types. Overlay mapping will be necessary to prepare the hydrologic soils group map necessary for modeling.
- **Digital Elevation Models** – Digital Elevation Models (DEMs) will be utilized and evaluated for watershed and subwatershed delineation and to assign slope category information to the subwatersheds for which detailed modeling will be completed. The DEMs will be merged to form a seamless watershed map and projected to the appropriate coordinate system.

- **Digital Raster Graphics (DRGs)** – Ortho digital USGS topographical maps will be compiled and utilized to evaluate NRCS land use classifications and to determine the location of significant obstructions and problem areas.
- **Geology** – If available, digital geologic maps that include pertinent geologic features (limestone, sandstone, etc.) will be developed for the County and be extracted and displayed as part of the PLAN.
- **Obstructions** – Obstructions will be located on the appropriate base map and data or attributes will be attached or linked to the locations.
- **Problem Areas, Flood Control Structures, Stormwater Management Facilities** – These items will be located on the appropriate base map and data or attributes will be attached or linked to the locations.
- **Floodplains** – Available FEMA FIS floodplain data will be transposed to the appropriate base map and displayed with the development in Lawrence County.

A summary of data sources will be supplied (simplified Metadata) and will include data type (coverage, shape file, image), source, projection, and year.

Delineation of Subwatersheds

As required, the watersheds and subwatersheds will be delineated by the CONSULTANT on a base map at the scale that results in a manageable map size and adequate detail. Subwatersheds will be established based on the collected data and results of field reconnaissance. This breakdown of the watersheds by major tributary drainage courses and points-of-interest will be the basis for the hydrologic and hydraulic analyses. The CONSULTANT will determine the size of the subwatersheds; however delineations of subwatersheds smaller then three (3) square miles requires the COUNTY's concurrence.

The subwatersheds will be delineated based on the following:

- The location of existing regionally significant stormwater management problems, as identified by the WPAC in the Survey Form, during the field reconnaissance, or from data compiled in any previous studies or reports.
- The location of significant regional stormwater and flood control obstructions such as highway bridges and culverts, or stormwater control facilities.
- Confluence points of tributaries, as deemed appropriate and significant relative to regional stormwater management planning based on engineering judgment and good modeling practice.
- Other points of interest, such as stream gage or water quality monitoring stations, locations of water quality concerns, potential flood control project sites, significant outfall locations downstream of existing developments, or where significant development is anticipated and projected to occur.

This task will also include mapping of relevant regional watershed planning information onto GIS data layers. This mapped information will include:

- Floodplain Areas - The approximate floodplain limits plotted over the watershed base map or the highlighting of those stream segments for which FEMA detailed or approximate Flood Insurance Studies are available.
- Regionally significant stormwater obstructions and their capacities - "Significant" obstructions will be those that are identified in the Survey Form and/or which are confirmed by the CONSULTANT as being areas where insufficient capacity exists to pass the necessary storm flows, thereby resulting in a flooding hazard to persons or property, or those obstructions that would act as regionally significant impoundments that may affect watershed modeling and the watershed stormwater response.
- Storm Sewer Systems - Areas where significant storm sewer systems exist will be indicated generally on the final base map.
- Existing local, state, and federal flood protection and stormwater management facilities.
- Proposed stormwater facilities within the 10-year planning period where known and confirmed by the municipalities through the Survey Form completion process.
- Regionally Stormwater Related "Problems" - Those areas indicated in the Survey Form and where confirmed by the CONSULTANT through technical modeling/analysis (for example, flooding points or areas of streambank erosion).

Anticipated Product

The product will be completed GIS watershed data layers and maps. The maps completed for this task will be preliminary and will be modified and finalized as a part of the final PLAN preparation efforts.

TASK B - Technical Analysis

The technical analysis will describe the analytical processes involved with developing a strategy to regulate existing and new land development and activities that may affect stormwater runoff. Since stormwater runoff has a direct impact on flooding, water quality, and groundwater recharge, this analysis will consider the following objectives:

- Implement non-point source pollution removal methodologies.
- Preserve and restore natural stormwater runoff regimes and natural course, current, and cross section of Waters of the Commonwealth, to the maximum extent practicable.
- Preserve, protect, maintain, and restore groundwater recharge and recharge areas.
- Protect stream channel and land areas from erosion.
- Restore and preserve flood carrying capacity of streams.

- . Manage extreme flood events.

These objectives will be accomplished under SubTasks B.1 to B.9.

SubTask B.1 - Implement Volume Controls

Establish the Design Storm Method (Control Guidance 1 in The Pennsylvania Stormwater Best Management Practices Manual) and the Simplified Method (Control Guidance 2 in The Pennsylvania Stormwater Best Management Practices Manual) consistent with the Department of Environmental Protection, Bureau of Watershed Management's Pennsylvania Model Stormwater Management Ordinance.

SubTask B.2 - Implement Rate Controls

Establish a minimum 100% release rate for all lands contained within Lawrence County. More restrictive release rates may be developed in subwatersheds with existing problem areas or intense development pressures.

SubTask B.3 - Model Designated Watersheds / Subwatersheds

This task involves the hydrologic modeling, quantitative computations, and evaluations necessary to analyze runoff characteristics of the subwatersheds under existing and future conditions. It will also establish the need and extent of release rates for the subwatersheds. Subwatersheds to be modeled are identified in the Modeling Needs Assessment in the Phase I document. Existing and future land use and land cover will be used to determine existing and future peak rates of discharge. Input data including rainfall information, drainage network layouts and capacities, travel times within subwatersheds, significant obstructions, and GIS based data will be added to develop the selected hydrologic model.

Model Calibration

The individual subwatershed models will be run to get preliminary results. The models will be calibrated to verify the results. Calibration efforts will include the adjustment of the model parameters to accurately simulate natural runoff conditions of the subwatershed. Consideration will be given to all calibration techniques including, but not limited to use of any available gaging information, comparison with rainfall and runoff information from similar watersheds, comparison with Flood Insurance Study information, and regression analyses. As necessary, calibration will be performed at multiple points within the subwatersheds to assure the most accurate modeling.

Design Storm Selection

Subsequent to calibration of the model, the model will be run for the 2-, 10-, 25-, 50- and 100-year storm events under various durations. An analysis on downstream impacts during these storms will be performed to determine the required design storm(s) based on the subwatershed hydrologic response of the five (5) storms.

Model Runs

The calibrated models will be run for the selected subwatersheds under the determined design storm(s) for both the existing and future projected land uses.

This will also involve the detailed evaluation of modeling results to perform a problem identification analysis (i.e., a "cause and effect" analysis). This will concentrate on identifying the downstream storm runoff impacts of projected future land development projects. This evaluation will consider both the increases in current downstream storm runoff problems, as well as anticipated projected downstream runoff problems.

This work step also consists of performing a technical evaluation of the hydrologic analysis for existing and future land use conditions (estimated 10-year build out) and recommending standards and criteria to regulate land development activity that influences stormwater runoff. This subtask may also involve performing a release rate analysis and a preliminary distributed storage analysis, and developing criteria and standards for the management of both overbank flooding events (2-, 10- and 25-year storms) and the extreme flooding events (50- and 100-year storms), to be determined by the WPAC.

SubTask B.4 - Provide Conceptual Solutions for Existing Problem Areas

Based on the results of SubTask B.3, this information will be used to develop alternative conceptual solutions for the problem areas identified in the Survey Forms and other problems areas as identified by the WPAC. Problem areas may generally consist of flooding, stream channel or bank erosion, property damage, detention basis (retrofitting), etc. The developed solutions will be conceptual in nature (i.e. no final engineering or specification will be completed). These conceptual solutions will be presented as recommendations to the municipalities. It will be up to the individual municipality's discretion whether to implement the conceptual solutions to the problem areas. The municipality will also be responsible to acquire funding sources to implement the final solutions.

SubTask B.5 - Goals, Objectives, and Compilation of All Technical Standards

Stormwater problems will be restated as goals and objectives for the Act 167 planning process. The goals and objectives need to:

- Satisfy all regulatory requirements (including correcting water quality impairments related to stormwater or urbanization appearing in the EPA 303(b) and (d) lists, or impairments associated with approved TMDLs).
- Meet the purpose and policy of Act 167.
- Meet regulatory and permit requirements associated with the NPDES MS4 program.
- Meet local requirements and objectives established by the WPAC.

When restated as engineering performance standards for the PLAN, the goals and objectives become the basis for the standards and criteria for regulation and control of land development and activities that may affect stormwater.

The standards and criteria will provide a basis for the selection and application of analytical methodologies and BMPs for the implementation of stormwater controls.

The candidate stormwater management strategies meeting the identified goals and objectives (i.e., show how the proposed standards and criteria for the Final Report and Model Ordinance meet the goals and objectives set by the WPAC) will be prepared and presented to the WPAC.

The proposed standards and criteria will address the following control requirements:

1. Apply to all areas covered by the PLAN.
2. Establish release rate percentages (if applicable) or other levels of control of runoff.
3. Specify design flood frequencies and computational methodologies for design of stormwater management measures.
4. Provide specifications for construction and maintenance of stormwater management systems (if applicable).
5. Provide conceptual solutions to both regional and local problems areas.
6. Summary and prioritization strategies for long-term potential solutions.
7. Identify funding sources for correction of existing problems related to infrastructure.
8. Maintain consistency with concurrent studies including a summary of what tasks will be completed to avoid duplication of effort.
9. Provide a fee schedule for: submissions of permit applications, review of permit applications, construction inspections, periodic inspections, and enforcement actions.
10. Provide an implementation strategy, including funding, for retrofit measures, if necessary.

The recommendations will be presented in layman's language, keeping in mind that they are directed towards local municipalities and are to address solutions to stormwater management issues. The technical standards and criteria developed as a part of this task will apply to all areas covered by the PLAN.

Water quality BMP information will be presented including recommendations for the implementation of water quality BMPs for land development and activities to minimize stormwater impacts from land development and activities. This educational effort will primarily involve discussions, presentations, and handouts on BMP technology to municipal officials during regularly scheduled WPAC meetings. Information available from PADEP and other sources will be distributed.

Methods for controlling stormwater runoff quantity and quality will be evaluated and included in the Model Ordinance.

SubTask B.6 - Implementation of Technical Standards and Criteria

This subtask will involve the identification of the necessary ordinance provisions for each municipality. Included will be the modification of the Model Ordinance and/or recommendations for updating existing municipal ordinances, including but not limited to, subdivision and land development, zoning, erosion and sediment control, and building code ordinances to effectively implement the technical standards and criteria for stormwater management throughout Lawrence County. A design example will be provided to show how to incorporate the various aspects of the Model Ordinance into the stormwater management design process.

Anticipated Product

The product will be the charts, tables, figures, plates, and graphs needed to present the technical analysis including evaluation of both water quantity and water quality requirements. The product will also include modeling results, the technical interpretation of the modeling results, and the definition of the technical standards and criteria for use in the preparation of the PLAN. The product will also include the identification of necessary recommended municipal ordinance provisions to implement the technical standards, including a complete stormwater management Model Ordinance.

SubTask B.7 - Economic Analysis

This subtask will involve an economic analysis of implementing the technical standards and provisions of the PLAN. A design example will be created and estimated costs will be associated with the design example to demonstrate how implementation of the standards and provisions can be cost effective to developers.

Anticipated Product

The product will be the design example.

SubTask B.8 - Regulations for Activities Impacting Stormwater Runoff

This subtask will involve the research and development of standards and provisions regarding regulating activities that may influence stormwater runoff. These activities may include, but are not limited to, timber harvesting, oil & gas extraction, and agriculture. The activities will only be regulated in regards to stormwater management controls and protecting water quality requirements to ensure the protection of health, safety, and property of the people and Waters of the Commonwealth.

Anticipated Product

The product will be a section in the Model Ordinance addressing activities that may influence stormwater runoff.

SubTask B.9 - Water Quality Impairments

This subtask involves the research and identification of water quality impairments throughout Lawrence County from the 303(b) and 303(d) lists and designated Total Maximum Daily Loads (TMDLs).

Anticipated Product

The product will be to identify how to protect the existing uses and, for non-attaining waters, how to improve the water quality to the designated use.

TASK C – Public/Municipal Participation

SubTask C.1 - WPAC/MEC/LAC Meetings

Coordination efforts and/or activities will continue throughout the duration of the project and will be organized to include the necessary meetings with the COUNTY, CONSULTANT, DEPARTMENT, and WPAC.

In addition to the WPAC, two committees will be established to educate and solicit input and comment from the public, municipal governments (elected officials, engineers, and solicitors), and other interest groups such as watershed associations. These committees are the Municipal Engineers Committee (MEC) and the Legal Advisory Committee (LAC).

As previously indicated, the WPAC consists of representatives from each municipality in Lawrence County, as well as the Lawrence County Conservation District, and other interested groups. The WPAC meetings will be held to provide education on the planning process and to receive advice from the municipal officials to assure the PLAN fits the needs of the municipalities while soliciting valuable technical and institutional data and other information. The advisory role of the WPAC during the development of the PLAN is vital to the ultimate adoption and implementation process.

The Municipal Engineers Committee (MEC) will consist of municipal engineers from each municipality and any invited engineering, technical, or scientific individuals. The MEC will provide a technical forum to assist the COUNTY and CONSULTANT during the preparation of the technical portions of the PLAN by evaluating watershed modeling, water quality efforts, and the establishing of overall technical standards.

The Legal Advisory Committee (LAC) will include the solicitors representing each municipality. A meeting with the LAC will be convened to educate the municipal solicitors on the ordinance adoption and implementation requirements of the PLAN and to receive comments and direction in the finalization of the Model Ordinance.

A BMP Workshop for the municipalities and municipal engineers will be developed and conducted. The presentation of the workshop shall be based on *The Pennsylvania Stormwater Best Management Practices Manual*. The workshop will

contain one or more examples showing the design and construction of BMPs, including design calculations, review procedures, and approval of permit applications.

The following describes proposed WPAC, MEC, and LAC meetings and public hearing schedules, including the focus of each meeting:

WPAC 1 and WPAC 2 Meetings were held during Phase I.

Meeting	Meeting Focus	Meeting Schedule
WPAC 3	Review Phase I, discuss problem areas and obstructions from Survey Form, present GIS maps and data, and review overall goals of Phase II.	Beginning of Phase II
WPAC 4 & MEC 1	Review the project status, review technical aspects of the PLAN, including initial modeling runs, calibration efforts, and review of technical standards (Control Guidance 1 & 2). Purpose is to receive comments and direction in the development of the Model Ordinance.	Middle of Task B
WPAC 5 & MEC 2	Present final technical modeling results, present technical standards and criteria, discuss water quality issues, and preliminary ordinance provisions for the municipalities. Review final modeling runs and present draft PLAN and address previous comments.	End of Task B
WPAC 6 & LAC 1 & Public Hearing & BMP Workshop	Present final draft and review municipal implementation procedures. Educate municipal solicitors on ordinance adoption and implementation requirements of the PLAN. Conduct pubic hearing required by Act 167 to present the final PLAN. Educate municipalities on implementing stormwater quality through the BMP Workshop.	End of Phase II

This task will also involve the production and distribution of a meeting agenda and meeting minutes updating the WPAC, MEC, and LAC members, municipal officials, interest groups and the public on the program, status, and issues of the PLAN. The agenda and minutes will be created for each meeting during Phase II.

Anticipated Product

The product will include correspondence and meeting notes/minutes from the individual committee meetings. In addition, the presentation materials prepared for the individual committee meetings will constitute a defined product of this subtask for the overall project.

TASK D - PLAN Preparation and Implementation

SubTask D.1 - Final Phase II Report Preparation

Components of the previous task and subtasks will be included, or at least referred to in the PLAN. In this way, the PLAN shall contain such provisions as are reasonably necessary to manage stormwater such that storm runoff from land development or other activities in each municipality shall not adversely affect health, safety, property, and water quality. In addition, the PLAN shall consider and be consistent with other existing municipal, county, regional and state environmental and land use plans and local and state laws and regulations. The PLAN shall include the following:

- A description of the hydrologic characteristics of the subwatersheds; the existing and future land uses and their impacts on stormwater runoff and stormwater collection systems; the available runoff control techniques and their efficiencies in the subwatersheds; a list of significant obstructions; and available FEMA FIS floodplain information. Either the available floodplain information will be included in the PLAN or their sources will be referenced.
- Based upon the results of the subwatershed modeling, the technical evaluation will generate the criteria and standards governing the use of stormwater management controls throughout the subwatersheds. An important aspect of the technical components of the PLAN will be the delineation of subwatersheds with specific management strategies. This determination will be accomplished based upon an evaluation of any land development activities on critical drainage points throughout Lawrence County. Peak discharge tables will be compiled for the critical drainage points from the hydrologic model runs involved in the modeling effort. BMP tables and data on their effectiveness and applicability will be presented or referenced.
- The tables for the rainfall depths for various frequency durations that are computed as part of the hydrologic modeling.
- Approximate floodplain limits for areas where detailed FIS studies are available. Where detailed flood control engineering plans for proposed remedial measures are available from municipality, county, or private agencies, a summary analysis and evaluation of those plans will be included in the PLAN. Where detailed plans are not available, preliminary recommendations relating to such measures will be provided.
- Recommendations for solutions to the existing drainage problems will only be conceptual in nature indicating the type of approach needed and intermunicipal cooperation issues. Identification of sites for potential restoration and/or protection projects that would qualify for Pennsylvania's "Growing Greener" Funds will be identified.
- Recommendations for new drainage facilities to prevent future problems due to new land development and a discussion regarding inter-municipal arrangements for funding the projects will also be discussed.

- Priorities for Implementation. The conclusions and recommendations of the goals and objectives of the PLAN will be summarized. Recommended actions will be listed according to agency, municipality, or individual responsible for each action. Priority of recommended actions will be based on chronological order, importance, hydrologic significance, or other factors as may be appropriate. This will include type and location of potential watershed projects that could be considered under Pennsylvania's "Growing Greener" grant program.
- PLAN Update. As a part of the implementation strategy for the PLAN, specific steps and/or procedures will be established for pursuing and completing the PLAN as required by Act 167. Specific circumstances will be identified and described in the PLAN document that will "trigger" a decision to update. For example, land development circumstances (such as major changes in the type and/or amount of proposed land development, and in excess of that which was assumed for the preparation of the original PLAN) will be identified as reasons for pursuing an update of the PLAN prior to the required 5-year period identified in Act 167.

The preliminary outline for the PLAN is as follows:

Part I

Section I - Introduction

Section II - Lawrence County Description

Section III - Significant Problem Areas and Obstructions

Section IV - Watershed Level Stormwater Management Planning

Section V - Technical Analysis

Section VI - Existing Municipal Regulations

Section VII - Economic Impact of Stormwater Management Standards

Section VII - Goals, Objectives, and Additional Recommendations

Section IX - PLAN Implementation and Update Procedures

Section X - References

Part II

Model Ordinance

Plates:

- Existing Land Use Basemap
- Future (10-year) Land Use Basemap
- Subwatersheds used for hydrologic analysis including information on applicable release rate management strategies

Hydrologic soil groups and development and floodplains.

Stream obstructions, flooding, and problem areas.

Areas where storm sewer networks exist (if available) and projected future storm sewer networks.

Anticipated Product

The product will be the final Phase II Report. The Phase II Report will be prepared in both digital and paper formats.

SubTask D.2 - Model Ordinance Preparation

A Model Ordinance that includes the provisions and standards developed during Phase II will be created consistent with the Department of Environmental Protection Pennsylvania Model Stormwater Management Ordinance. The WPAC will make a determination on whether drainage and construction standards will be included.

Anticipated Product

The product will be the final Model Ordinance. The Model Ordinance will be prepared in both digital and paper formats.

SubTask D.3 - PLAN Adoption

The PLAN will include the final Phase II Report and the Model Ordinance. One copy of the draft PLAN will be transmitted to the official agency and governing body of each involved municipality, each member of the WPAC, and the DEPARTMENT by official correspondence. The involved municipalities, WPAC, and DEPARTMENT will then review the draft PLAN. Their review will include an evaluation of the PLAN's consistency with other plans and programs affecting stormwater management. The reviews and comments will be submitted to the COUNTY by official correspondence. The review comments will be received, tabulated, and responded to appropriately and the draft PLAN will be revised accordingly.

Prior to final PLAN adoption, and as necessary, meetings will be held with each municipality individually as identified in WPAC meetings and municipal training schedule; to identify specific ordinance changes and method(s) of incorporation of the standards and criteria into municipalities' existing ordinance framework. In addition, the meeting(s) can also serve to provide clarification of any remaining questions or concerns that municipalities may have concerning the implementation of the PLAN.

The COUNTY will hold a public hearing concerning the PLAN. A notice for the public hearing will be published at least two (2) weeks before the hearing date. The public hearing notice will contain a brief summary of the principal provisions of the PLAN and a reference to the sites and/or website where copies of the PLAN may be examined or purchased at cost. The COUNTY will review the comments received at the public hearing and appropriate modifications in the PLAN will be made as applicable.

The Lawrence County Commissioners will vote by resolution on the adoption of the PLAN. The resolution will have to be carried by an affirmative vote of at least a

majority of the Commissioners, and should refer expressly to the maps, charts, textual matter, and other materials intended to comprise the PLAN. Upon positive resolution, this action will then be recorded on the adopted PLAN.

The COUNTY will then submit to the DEPARTMENT a letter of transmittal, and three (3) copies of the adopted PLAN, along with a digital version and GIS data layers, the review by the official Planning agency and/or governing body of each municipality, Lawrence County Planning Commission, regional Planning agencies (Section 6(c) of Act 167), public hearing notice and minutes (Section 8(a) of Act 167), and the resolution of adoption of the PLAN by the COUNTY (Section 8(b) of Act 167). The letter of transmittal will state that the COUNTY has complied with all procedures outlined in Act 167 and will request DEPARTMENT to approve the adopted PLAN. The COUNTY will also submit to the DEPARTMENT a current list of all names, addresses, and phone numbers of the municipalities, municipal engineers, and solicitors located in Lawrence County.

Subsequent to the DEPARTMENT's approval of PLAN, fifty (50) copies of PLAN will be printed and distributed. As desired by the County, the adopted PLAN could be posted on the COUNTY's and/or CONSULTANT's websites.

All backup material including hydrologic and hydraulic analyses of the subwatersheds will be retained at the COUNTY office for future use during PLAN updates or any other reference.

Anticipated Product

The product of this subtask will include the official documentation regarding PLAN adoption and implementation process, including the necessary documentation from the COUNTY certifying the adoption of the PLAN, an adopted PLAN, and associated Plates.

The Plan will contain, at a minimum, the following items:

1. A survey of existing runoff characteristics in minor as well as large storms, including the impact of soils, slopes, vegetation, and existing development.
2. A survey of existing significant obstructions, their capacities, and associated storm return periods.
3. An assessment of projected and alternative land development patterns in Lawrence County, and the potential impact of runoff quantity, velocity, and quality.
4. An analysis of existing and future development in flood hazard areas, and its sensitivity to damages from future flooding or increased runoff.
5. A survey of existing drainage problems and proposed conceptual solutions.
6. A review of existing and proposed stormwater collection systems and their impacts.
7. An assessment of alternative runoff control techniques and their efficiency in the individual subwatershed.

8. An identification of existing and proposed local, State, and Federal flood control projects located in Lawrence County and their design capacities.
9. A designation of those areas to be served by stormwater collection and control facilities within a ten (10) 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.
10. An identification of FIS delineated floodplains throughout Lawrence County.
11. Criteria and standards for the control of stormwater runoff from existing and future development that are necessary to minimize dangers to property and life and carry out the purposes of Act 167.
12. A BMP Workshop to inform engineers and local officials about enhanced water quality and groundwater recharge stormwater management techniques (information on BMPs is also to be included or referenced in the PLAN).
13. Priorities for implementation of conceptual solutions.
14. Provisions for periodically reviewing, revising, and updating the PLAN.
15. Provisions as are reasonably necessary to manage stormwater such that land development or activities in each municipality do not adversely affect health, safety, and property in other municipalities of Lawrence County and in drainage basins to which the watershed is tributary.
16. Consideration for consistency with other existing municipal, county, regional, and State environmental and land use plans.

APPENDIX D
PHASE II COST ESTIMATE

	Consultant		Lawrence	
	Effort	Expenses	County	Total
TASK A - Data Collection/Review/Analysis	$33,560	$1,440	$5,500	**$40,500**
TASK B - Technical Analysis	$78,140	$2,360	$5,500	**$86,000**
TASK C - Public/Municipal Participation	$19,500	$2,500	$15,000	**$37,000**
TASK D - PLAN Preparation and Implementation	$38,300	$2,700	$14,500	**$55,500**
Project Management & Administration	$5,200	$800	$21,000	**$27,000**
PHASE II PROJECT TOTAL	***$174,700***	***$9,800***	***$61,500***	***$246,000***

APPENDIX E
PROPOSED PHASE II SCHEDULE

Proposed Phase II Schedule

Milestone	Estimated Completion Date
Execute PADEP/Lawrence County Phase II Agreement	February 2008
WPAC Meeting 3	April 2008
Problem Areas / Modeling Field Visits	September 2008
Conceptual Solutions to Problem Areas	March 2009
WPAC Meeting 4 and MEC Meeting 1	April 2009
Draft Phase II Report	September 2009
Draft Model Ordinance	November 2009
WPAC Meeting 5 and MEC Meeting 2	December 2009
Finalize Phase II Report, Model Ordinance, and Exhibits	February 2010
WPAC Meeting 6, LAC Meeting 1, and BMP Workshop	March 2010
Public Hearing	March 2010
County Commissioner Approval of Phase II Plan	March 2010
Phase II Report Submission to PADEP	April 2010
PADEP/Lawrence County Agreement Deadline	May 2010