MERCER COUNTY
Act 167 Stormwater Management Plan

Prepared for County Commissioners &
Pennsylvania Department of Environmental Protection

Phase I—Scope of Study

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1.0 INTRODUCTION

1.1 Stormwater Runoff

Stormwater is a term used to describe water that originates during precipitation events. Stormwater runoff occurs when precipitation from rain or snowmelt flows over impervious surfaces such as driveways, sidewalks, and streets preventing the water from naturally soaking into the ground. Anything that enters a storm sewer system is discharged into the streams or lakes we use for swimming, fishing, and drinking water.

As residential and commercial development increases within watersheds the management of stormwater becomes an important element of project planning. The lack of stormwater management results in increased runoff that creates problems, such as flooding, damage to properties, damage to roads, bridges, and culverts, reduced groundwater recharge, streambank erosion and increased sediment pollution leading to a degradation of water quality which effects the stream's biological life.

In recognition of the effects that increased stormwater runoff has within the watershed the Pennsylvania legislature recognized the need to manage stormwater effectively and more efficiently and enacted the Stormwater Management Act 167, herein referred to as Act 167. Initially, Act 167 required a Stormwater Management Plan be developed for each designated watershed, but a recent change in the policy is permitting plans to be created on a countywide basis.

1.2 Pennsylvania Stormwater Management Act (Act 167)

Under Act 167, the Pennsylvania Department of Environmental Protection (PaDEP) provides grant money for counties to develop Stormwater Management Plans (SWMP). During preparation of the SWMP, each municipality will provide input by participating in questionnaires and Watershed Plan Advisory Committee (WPAC) meetings. Preparation of the SWMP is facilitated by the Mercer County Regional Planning Commission (MCRPC) and will incorporate sound engineering principles and Best Management Practices (BMPs) to protect the quality of Mercer County streams, while considering the various needs of the municipalities.

The SWMP will be adopted by the Mercer County Commissioners and will ultimately result in the creation of a model Stormwater Management Ordinance that would be adopted by the municipalities within Mercer County. The model ordinance would provide the minimum requirements needed for future land development. The basis for the creation of the SWMP includes background research on existing stormwater ordinances within the County, coordination with county, state, and federal agencies, technical analysis of streams and watersheds, and most importantly on the information provided by the individual municipalities. Information from the municipalities provides important information to identify and assess the nature, cause, and severity of existing

and potential stormwater runoff impacts within each watershed. The PaDEP will review and approve the SWMP. The plan will be presented to the Mercer County Commissioners for adoption. The municipalities would then adopt the ordinance or create a stormwater management ordinance that is tailored to their municipality using the countywide ordinance as a basis. Projects involving land development would then be required to follow the requirements of the ordinance.

1.3 Benefits of Act 167 in Mercer County

According to the Executive Summary of the *Shenango River Watershed Comprehensive Plan (July, 2005)*, "Stormwater runoff is a major concern within the Shenango River Watershed." As with other counties in Pennsylvania, Mercer County has geological, economical, and political conditions that are unique. The *Shenango River Watershed Comprehensive Plan* specifically states the need for the completion and implementation of the Act 167 SWMP and recommends that individual watersheds be inventoried to determine percent of impervious cover and stormwater impacts. The *Mercer County Comprehensive Plan (April, 2006)* mentions that the county has not prepared a SWMP for any of its seven major watersheds, and according to the plan, stakeholders noted that many of the county's stormwater systems are in need of upgrades.

Currently, the municipalities in Mercer County vary in their implementation and enforcement of stormwater management regulations. The primary objective of the technical study and planning process is to develop a stormwater management ordinance to encourage and support the consistency of regulations throughout Mercer County. Municipalities will also be provided with a considerable amount of useful information that can be utilized for planning and engineering purposes. In addition, the watershed modeling will provide information that can be used by public works officials for a variety of projects.

1.4 Approach for the Development of the SWMP

Creation of the SWMP is divided into two (2) phases. Phase I included background research and secondary source data collection and coordination with the municipalities to identify problematic areas. The results of Phase I include the identification of problematic areas within the County and a technical analysis work plan for Phase II.

During Phase I, it was necessary to conduct comprehensive surveys of stormwater issues within all watersheds in Mercer County. A Watershed Plan Advisory Committee (WPAC) was initially formed of members from municipalities within Mercer County, the Mercer County Regional Planning Commission, the Mercer County Conservation District, interested state agencies, and interested non-profit watershed groups. During Phase I, an initial meeting with the WPAC was held to determine support for the project. Questionnaires were distributed during this meeting and over a period of a month, the questionnaires were returned for compilation.

A second meeting was held to review the results of the questionnaires and to receive further input. Stormwater related problems, significant obstructions, watershed characteristics, and hydrological conditions were compiled from the questionnaires and meetings. It is from these data and input provided by the Mercer County Regional Planning Commission and Mercer County Conservation District that a rough draft is compiled and submitted to the PaDEP for review and comments.

Phase II involves the completion of the technical analysis of the larger rivers within the County, problematic areas (e.g. street flooding, stream erosion, etc.), and creation of the model stormwater management ordinance. The technical analysis conducted in Phase II will include the hydraulic and hydrologic modeling of selected watersheds within Mercer County, the development of criteria for stormwater management, and will identify general solutions to stormwater problems identified during Phase I.

The final SWMP would be approved by the PaDEP and adopted by the Mercer County Commissioners. The final SWMP will provide procedures to aid in the implementation of the model ordinance by each of the forty-eight municipalities within the county

1.5 Previous Plan Efforts

No previous Act 167 Plans have been prepared for Mercer County. The following relevant documents will provide a valuable source of information for the development of the plan:

1. Mercer County Comprehensive Plan, (April, 2006)
2. Shenango River Watershed Comprehensive Plan (Revised: July, 2005)
3. Eight Headwaters Watershed Assessment & Protection Plan in Hermitage (August, 2004)
4. Natural Heritage Inventory (June, 2003)
5. GreenerVisions, Making Smart Growth Options Work in Mercer County (June, 2006)
6. Current Municipal Ordinances

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP). One role of the NFIP is to reduce future flood damages to buildings and their contents by requiring the local regulation of new development in floodplain areas. A floodplain area is defined as area that represents the extent of inundation for the base flood (100 year storm event). The floodplain area can be divided into two distinct areas, the floodway and the floodway fringe. The floodway is an area that must be kept free of obstruction to allow flood waters to freely discharge downstream. Development may occur in the floodway fringe provided it complies with applicable local ordinances, and does not cause an increase in the base flood elevation of greater than one foot. FEMA, as part of its normal updating procedures in developing areas, is scheduled to examine Mercer County within the next several years. This examination could result in changes to the existing FEMA and NFIP mapping throughout

the county. Continued coordination with FEMA will be conducted to incorporate their information into the SWMP.

Additionally, coordination will take place with Crawford and Venango Counties regarding Act 167 stormwater planning for the French Creek and Sandy Creek watersheds. Significant studies have already been conducted by the Western Pennsylvania Conservancy on the French Creek watershed, and these studies will be included in Phase II as appropriate. Coordination will also be conducted with Butler and Lawrence Counties regarding stormwater planning for the Slippery Rock Creek and Wolf Creek watersheds.

2.0 GENERAL COUNTY DESCRIPTION

2.1 Political Jurisdictions

Mercer County is a 5th class county with an elected 3-member Board of Commissioners. The Mercer County seat lies in the Borough of Mercer, located in the south-central portion of the County. Mercer County contains forty-eight (48) municipalities, including thirty-two (32) Townships, thirteen (13) Boroughs, and three (3) Cities (see Table 1). It is ranked 29th in the state in total population, having a population of 120,293 persons according to the 2000 Census. According to the *Mercer County Comprehensive Plan* the county saw a population decrease of 0.6% between 1990 and 2000.

As Table 1 indicates, a majority (30 of 48) of the municipalities has adopted or is in the process of completing a municipal or multi-municipal comprehensive plan. In addition to these localized comprehensive plans, the Mercer County Commissioners adopted the latest update to the county comprehensive plan in 2006.

Similarly, 30 of the 48 municipalities in the county have adopted zoning ordinances. While only 25% of Mercer County municipalities administer their own subdivision and land development ordinance (SALDO), the remainders are covered by the Mercer County SALDO.

A number of municipalities administer provisions or separate ordinances regarding specific stormwater issues including floodplains, stormwater, erosion or drainage. Eighteen municipalities have floodplain regulations, 11 stormwater, 4 erosion and sediment control and 9 address the issues of drainage. Following the completion of the stormwater management plan, all municipalities will covered by stormwater management planning.

Table 1. Municipal Comprehensive Plan Summary

MUNICIPALITY	COMPREHENSIVE PLANS		ZONING	SUBDIVISION and LAND DEVELOPMENT ORDINANCE		OTHER REGULATIONS / ORDINANCES			
	LOCAL	COUNTY		LOCAL	COUNTY	FLOODPLAIN	STORM	EROSION	DRAINAGE
CLARK BOROUGH	X		X	X		X			
COOLSPRING TOWNSHIP	X		X		X	X			
DEER CREEK TOWNSHIP		X			X				
DELAWARE TOWNSHIP		X			X				
EAST LACKAWANNOCK TOWNSHIP	X		X		X	X			
FAIRVIEW TOWNSHIP		X			X				
CITY OF FARRELL	X		X	X		X			
FINDLEY TOWNSHIP	X		X		X	X			X
FREDONIA BOROUGH		X			X				
FRENCH CREEK TOWNSHIP		X			X	X			
GREENE TOWNSHIP		X			X				
GREENVILLE BOROUGH	X		X		X	X			X
GROVE CITY BOROUGH	X		X	X		X			
HEMPFIELD TOWNSHIP	X		X		X				
CITY OF HERMITAGE	X		X	X		X	X		X
JACKSON CENTER BOROUGH		X			X				
JACKSON TOWNSHIP	X		X		X				
JAMESTOWN BOROUGH	X		X		X				
JEFFERSON TOWNSHIP	X		X	X					
LACKAWANNOCK TOWNSHIP		X			X	X			
LAKE TOWNSHIP		X			X				
LIBERTY TOWNSHIP	X		X		X	X			
MERCER BOROUGH	X		X	X		X	X	X	
MILL CREEK TOWNSHIP		X			X				
NEW LEBANON BOROUGH		X	X		X				X
NEW VERNON TOWNSHIP	X		X		X	X			
OTTER CREEK TOWNSHIP			X		X				
PERRY TOWNSHIP		X			X				
PINE TOWNSHIP	X		X		X	X	X		X
PYMATUNING TOWNSHIP		X	X		X				
SALEM TOWNSHIP		X			X				
SANDY CREEK TOWNSHIP		X			X				
SANDY LAKE BOROUGH	X		X		X		X		

Table 1 (Continued)

MUNICIPALITY	COMPREHENSIVE PLANS		ZONING	SUBDIVISION and LAND DEVELOPMENT ORDINANCE		OTHER REGULATIONS / ORDINANCES			
	LOCAL	COUNTY		LOCAL	COUNTY	FLOODPLAIN	STORM	EROSION	DRAINAGE
SANDY LAKE TOWNSHIP	X				X				
CITY OF SHARON	X		X	X		X	X		X
SHARPSVILLE BOROUGH	X		X	X					
SHEAKLEYVILLE BOROUGH		X			X				
SHENANGO TOWNSHIP	X		X		X		X		
SOUTH PYMATUNING TOWNSHIP	X		X	X		X	X	X	X
SPRINGFIELD TOWNSHIP	X		X	X		X	X	X	
STONEBORO BOROUGH	X		X		X				X
SUGAR GROVE TOWNSHIP		X			X				
WEST MIDDLESEX BOROUGH	X		X	X		X			
WEST SALEM TOWNSHIP		X			X				
WHEATLAND BOROUGH	X		X	X		X			
WILMINGTON TOWNSHIP	X		X		X	X	X		X
WOLF CREEK TOWNSHIP	X		X		X	X			
WORTH TOWNSHIP		X			X				

2.2 Transportation

The transportation system within Mercer County includes highways, rail service, public transportation and hiking trails. According to the *Mercer County Comprehensive Plan*, the following roadways in Mercer County are included in the National Highway System (NHS): I-79, I-80, US 322, US 62, PA 18, PA 58 and PA 60. The primary east-west highway across the United States, I-80, passes through the southern portion of the county, and the primary north-south connector between Erie and Pittsburgh, I-79, passes through the eastern portion of the county. Mercer County also has several important Minor Arterials that connect the economic and population centers to each other and to surrounding areas, including: PA 18, US 19, PA 58, US 62, PA 173, PA 208, and PA 358. Other highways, PA 418, PA 518, PA 718, and PA 846, in Mercer County function primarily as connectors within the economic activity centers.

Air transportation within Mercer County consists only of privately owned facilities: West Middlesex Airport, Greenville Municipal Airport, Grove City Airport, and Merry's Pymatuning Airport. There is no commercial air service located within the county.

The railroad system is an important transportation resource for commerce within Mercer County. Canadian National Railway, Norfolk Southern Railway, CSXT, and Western New York and Pennsylvania Railroad all have active rail lines within Mercer County.

Although the Shenango River is considered a navigable waterway, it is not used for commerce. According to the *Shenango River Watershed Comprehensive Plan*, current plans exist to develop the entire Shenango River into a water trail, increasing its recreational value.

Hiking trails within Mercer County include several Rail-to-Trail projects, specifically in the north and in the Shenango Valley.

2.3 General Development Patterns

The *Mercer County Comprehensive Plan* suggests that there has been a noted population shift between the municipalities in Mercer County. In general, the municipalities with the highest population growth are in the rural areas in the eastern portion of the county. The municipalities with the highest population loss are in or adjacent to the Shenango Valley region, comprised of the Cities of Farrell, Hermitage, and Sharon, the Boroughs of Clark, Sharpsville, West Middlesex, and Wheatland, and the Townships of Lackawannock, Shenango, and South Pymatuning. Combined, the housing units in the Shenango Valley make up approximately 48% of the County's total housing stock. Due to the close proximity to major transportation routes, the majority of industrial and commercial growth takes place in this area.

The rural areas in the county are experiencing the highest rate of residential growth. Overall, the trend in Mercer County is decreasing amounts of farmland due to fewer families farming, and more land being converted from farmland to forest lands or to residential lots.

According to the *Mercer County Comprehensive Plan*:

> Even though the County's population has been decreasing over the past thirty years (-5.4% between 1970 and 2000), the amount of developed land has increased significantly. Between 1973 and 1993, there was a 46% increase in residential land uses in Mercer County. This rate is more than double the increase in households within the County and is indicative of increasing sprawl throughout the county. Trends in Commercial and Industrial land use also indicate increased sprawl. Commercial land uses have increased by about a third while incomes and retail sales have been decreasing (-7% and -4% respectively). Industrial land use has increased by 24%, yet non-agricultural employment has only increased by approximately 2%.

According to the Penn-Northwest Development Corporation, there are 196 acres of available land within the active and proposed industrial parks within Mercer County.

2.4 Water Resources

Mercer County lies within the Ohio River drainage basin. PaDEP has identified eight major watersheds within the Mercer County area: French Creek, Sandy Creek, Wolf Creek, Slippery Rock Creek, Neshannock Creek, Little Neshannock Creek, Little Shenango River, and the Shenango River. Appendix A, Figure 1 shows the watershed designations and municipal boundaries within Mercer County. The French Creek and Sandy Creek watersheds are located in the northeast portion of the county and drain into the Allegheny River basin. The Neshannock Creek and Little Neshannock Creek watersheds drain into the Beaver River, a contributor to the Ohio River. The Wolf Creek watershed drains into Slippery Rock Creek flowing into the Beaver River. The Little Shenango River watershed drains into the Shenango River; it merges with the Beaver River to form the Mahoning River, which in turn flows into the Ohio River. Appendix A, Figure 2 shows the rivers, streams and lakes within Mercer County.

The Shenango River runs north/south through the western part of the County and is the County's major river. The river originates at the Pymatuning Reservoir approximately 1.5 miles north of Jamestown, Pennsylvania and flows south into Mercer County. In 1965, the Army Corps of Engineers completed The Shenango River Lake project, a dam providing flood protection for the Shenango River Valley, as well as for the Beaver and upper Ohio Rivers. The project also provides seasonal discharge regulation for water quality improvement and recreational opportunities. According to the US Army Corps of Engineers, the Shenango Lake encompasses 15,071 acres with a drainage area of 589 square miles. Though the Shenango River is considered to be a navigable waterway, it is currently not used for commerce. However, in the 1860's, the Shenango River was utilized as a section of the Erie Canal.

Aside from the Shenango River Lake, other significant lakes within Mercer County include Lake Wilhelm, a 1,860 acre lake within Goddard State Park, north of Sandy Lake Borough; Stoneboro Lake, a private 150 acre lake located in Stoneboro; and Lake Latonka, a private lake located along the border of Coolspring Township and Jackson Township.

The *Pennsylvania Chapter 93. Water Quality Standards* classifies all streams according to water quality and protected uses. Water bodies with exceptional water quality and other environmental features are referred to as "Special Protection Waters." Disturbances in those watersheds that could negatively affect surface water are more stringently regulated in an attempt to prevent degradation. Only the Little Sandy Creek in Mill Creek Township qualifies as a Special Protection Water and is currently considered a High Quality waterway.

Other use classifications within the County are Warm Water Fish (WWF), Cold Water Fish (CWF), and Trout Stock Fish (TSF). Most streams in Mercer County fall into the Warm Water Fish category; however, the Neshannock Creek basin, Lackawannock Creek, the Little Shenango River basin, and a segment of the Shenango River in Sharpsville from the reservoir dam to 1.0 river mile downstream are classified as TSF. The remainder of the Shenango River main stem is classified as WWF. Wolf Creek and the previously discussed segment of the Shenango River in Sharpsville are in the CWF category.

67 miles (6%) of the County's 1,135 miles of streams are impaired, meaning they fail to meet the water quality standards for their designated use or special protection classification. The following stream reaches are considered impaired:

- The Shenango River from the Dam south into Lawrence County and also from Jamestown south to a point about mid-way through Greene Township.
- Bobby Run, a tributary of the Shenango in Hermitage, south to its confluence with the main stem.
- Crooked Creek from the Crawford/Mercer County line to its confluence with the Little Shenango River.
- A small portion of Sandy Creek from the dam on Lake Wilhelm south to Sandy Lake Borough.
- A section of the East Branch of Wolf Creek north of I-80 near Venango County Line.
- Wolf Creek from the northern boundary of Grove City south to its confluence with Barmore Run
- A small section of Barmore Run near Barmore Lake in Liberty Township.
- A small section of Mill Creek (a tributary of Cool Spring Creek) that crosses under I-79 in Findley Township.
- Yellow Creek (another tributary of Cool Spring Creek) from Jackson Center south to its confluence with Cool Spring near the Jackson Township line.

There is approximately 1,900 acres of developed land that falls within the 100 year floodplains of Mercer County's waterways. This represents approximately 7% of the total floodplain acreage within the County and only 0.4% of all land in the entire County.

2.5 Climate

Mercer County is situated in the Allegheny Plateau Climatic Division of Pennsylvania. The Allegheny Plateau has a continental climate, with changeable temperatures and more frequent precipitation than other parts of Pennsylvania. Mercer County generally has a humid climate and occasionally, winter minimum temperatures can be severe. Winter precipitation is usually three to four inches less than summer rainfall and is produced most frequently from northeastward-moving storms. When temperatures are low enough,

these storms cause heavy snowfalls which may be twenty (20) inches or greater. Total precipitation ranges from 32”–47” annually. Heavy thunderstorm rains can cause severe flash flooding in many areas. Generally, the most widespread flooding occurs during the winter and spring with heavy rains, or heavy rains combined with snowmelt. The prevailing westerly winds carry most of the weather disturbances that affect Mercer County from the interior of the continent. Thunderstorms are concentrated in the warm months and are responsible for most of the summertime rainfall. (Penn State University, Department of Meteorology and Atmospheric Science).

2.6 Bedrock Formations

Appendix A, Figure 3, shows the bedrock formations located in Mercer County. Almost one half of the County is underlain by the Pottsville Formation or subsurface geologic formations. The Shenango Formation and the Cuyahoga Group are closely associated and are generally found in the northwestern part of the County. Together, they cover 35% of the County. Table 2 describes the most common bedrock features within Mercer County.

2.7 Slopes

Mercer County lies within the Appalachian Plateau Physiographic Province, specifically the Northwestern Glaciated Plateau section. The dominant topographic form within this section is characterized by broad, rounded upland and deep, steep sided, linear valleys that are partly filled with glacial deposits. The underlying rock is composed of shale, siltstone, and sandstone. Virtually all of the very steep slopes in Mercer County are found along the river and stream corridors, including the Big Bend area of the Shenango River, parts of Neshannock Creek in Lackawannock Township, and parts of Sandy Creek and at the south end of Lake Wilhelm. If disturbed, areas of steeper slope can produce heavy soil erosion and sediment loading in adjacent streams, therefore, additional requirements for addressing storm water runoff need to be in place in theses areas in order to minimize erosion and degradation of surface waters. Appendix A, Figure 4, shows the map of slopes in Mercer County.

2.8 Prime Farmlands

Mercer County contains approximately 225,000 acres of Prime Farmland soil types (51% of the County). Approximately 58,000 acres of these soils are not being used as active farmland, and are covered by forest. (Appendix A, Figure 5.) Mercer County also contains some farmland soils of statewide importance, approximately 145,000 acres or 1/3 of the total land area in Mercer County. Of these acres, approximately 37,000 are covered by forest.

Table 2. Bedrock Types in Mercer County.

Formation	Description	Porosity	Permeability
Allegheny Formation (Group)	A highly heterogenous unit composed of cyclic sequences of sandstone, shale, siltstone, claystone, and underclay	Sandstone moderate; others - low	Moderate to low
Berea Sandstone through Venango Formation, undivided	Wide variation of characteristics	Moderate to low	Moderate to low
Corry Sandstone through Riceville Formation, undivided	Wide variation of characteristics	Moderate	Moderate to low
Cuyahoga Group	Medium gray siltstone and dark-gray shale containing interbedded light-gray sandstone; marine fossils are common	Low	Low
Pottsville Formation (Group)	Light- to dark-gray, fine-grained to coarsely conglomeratic sandstone; subordinate amounts of gray shale, siltstone, limestone, coal, and underclay	Variable	Moderate to low
Shenango Formation	Upper part is soft, medium- to dark-gray shale, medium-light-gray siltstone, and limy siltstone; lower is fine-grained sandstone, light-gray to yellowish-gray, fossiliferous, cross-bedded, containing some interbedded dark- to medium-gray shale and siltstone	Moderate to low	Moderate to low

2.9 Soils

Mercer County generally contains soils that are poorly drained, predisposing the County to increased runoff issues, flooding and poor drainage. Appendix A, Figure 6 shows the general soils map for Mercer County. The following soil associations are found within the County:

Ravenna-Frenchtown soil group is the most extensive soil association in Mercer County. It is a somewhat poorly drained soil type found in the gently sloping to nearly level areas of Mercer County.

Chenango-Braceville-Halsey soil types occur on terraces along most of the major streams in the county and on moraines in the eastern and southeastern portions of the county. These soils can range from having well drained characteristics to having very poorly drained characteristics depending on the underlying deposits.

Canfield-Ravenna is dominant on the more strongly sloping parts of the uplands in the County. This soil type ranges from being moderately well drained to being somewhat poorly drained.

Wayland Course Variant-Papakating-Red Hook soil type occurs as bands on the floodplains of most of the streams in the County. It is a poorly drained to moderately well-drained soil found on nearly level land underlain by alluvium and on floodplains. Table 3 shows the general soil associations found in Mercer County and their most prominent characteristics.

Table 3. General Soil Associations in Mercer County

Soil Association	Drainage	Slope	Location
Ravenna-Frenchtown	Somewhat poorly drained to poorly drained	Nearly level to gently sloping	On uplands
Chenango-Braceville-Halsey	Well drained to very poorly drained	Gently sloping to moderately steep, underlain by sandy and gravelly deposits	On stream terraces and moraines
Canfield-Ravenna	Moderately well drained and somewhat poorly drained	Gently sloping to moderately steep, underlain by glacial till	On uplands
Wayland, course variant-Papakating-Red Hook	Very poorly drained to moderately	Nearly level land underlain by alluvium	On floodplains

2.10 Vegetation and Wildlife

The *Natural Heritage Inventory for Mercer County*, completed by the Western Pennsylvania Conservancy in June of 2003, provides an inventory and maps of the most significant natural places in Mercer County. Plant and animal species, natural communities that are unique or uncommon in the County and areas important for wildlife habitat and scientific study were investigated and included in the inventory process. This inventory provides necessary information to guide land acquisition and conservation decisions. The list of Natural Heritage Inventory sites can be found in the *Mercer County Comprehensive Plan, Profile 1 –Natural Resources, pages 13-15, Table 1-1-6.*

2.11 Forestry

Forests within Mercer County provide many resources such as: habitat for wildlife, water filtration, timber harvesting, and recreation. According to the *Mercer County Comprehensive Plan*, there are over 162,168 acres of forestland within Mercer County (37% of the county), of which approximately 154,651 acres are deciduous. There are five designated Pennsylvania Game Commission state game land areas in Mercer County:

- No. 270 – Sandy Creek and Deer Creek Townships
- No. 130 – Worth, Sandy Lake, Jackson and Lake Townships
- No. 151 – Liberty Township
- No. 284 – Springfield Township
- No. 294 – Coolspring and Fairview Townships

There are no National Forest Lands or State Forest Lands within Mercer County.

2.12 Mining

Mercer County has a long history of coal mining, primarily due to the location of bituminous coalfields in the eastern portion of the county. According to the PaDEP:

> Room-and-pillar mines have been active in Pennsylvania's bituminous coalfields since the late-1700s. Bituminous coal production in western Pennsylvania grew principally with western population growth, expansion and development of rail and river transportation facilities to the west, and the emergence of the steel industry. Towards the last half of the nineteenth century, the demand for steel generated by the explosive growth of the railroad industry and ship building concerns began to further impact bituminous coal production in western Pennsylvania. Until the maturation of modern longwall mining in the 1960s, Pennsylvania's underground bituminous coal production came almost exclusively from room-and-pillar mines (PaDEP Website).

The PaDEP lists two active coal mining permits in Mercer County. Even though a permit may be active, actual mining may not be taking place as there are various stages to active permits including: not started, active, treatment, reclamation, and forfeited. Coal mining accounts for 0.02% of land use within Mercer County totaling 103.7 acres (0.16 square miles).

Surface mining of non-coal/industrial minerals is a major industry within Pennsylvania, one of the top 10 producing states in the country for aggregate/crushed stone (PaDEP). The most common non-coal mines in Pennsylvania produce "aggregate" (hard granular material used in concrete, mortar, plaster, and blacktop). The types of rock used for these purposes are limestone/ dolomite, sandstone and argillite. Mineral deposits (that are not consolidated rock) of sand and gravel are also used. According to the *Mercer County Comprehensive Plan*, industrial mineral mining emerges as the dominant mining industry in Mercer County and accounts for 0.4% of land use (1,757.7 acres). The PaDEP lists thirty-eight active surface mining permits, mainly for sand, gravel, and slag within Mercer County.

3.0 PHASE I PLANNING PROCESS

3.1 Agreement between PaDEP and Mercer County

The Pennsylvania PaDEP and Mercer County entered into an agreement on August 21, 2007, for a Phase I Watershed Stormwater Management Plan Grant for all watersheds in Mercer County. Under the agreement, Mercer County is to prepare a SWMP in two phases: the first (Phase I) being the preparation and submission of a Scope of Study to the PaDEP for approval, and the second (Phase II) being the preparation and adoption of the plan. The Phase I completion date is June 30, 2008.

3.2 Engineering / Consultant Selection Process

The Mercer County Commissioners and Mercer County Regional Planning Commission retained Wallace & Pancher, Inc. to provide stormwater planning services and complete the Phase I report.

3.3 Creation & Distribution of Questionnaire

The Mercer County Regional Planning Commission and Wallace & Pancher, Inc. worked collaboratively to create the "Mercer County Watersheds Act 167 Stormwater Management Plan Questionnaire" (Appendix B, Figure 1.) This questionnaire was distributed at the first WPAC meeting and was mailed to any municipality that did not attend the first meeting. All municipalities and all interested agencies were asked to complete the questionnaire. The questionnaire assisted in the collection of information from the municipalities regarding their stormwater issues, and assisted in the establishment of the WPAC. Table 4 lists municipalities who chose to participate and their representatives.

Of the forty-eight (48) municipalities in Mercer County, thirty-six (36) completed and returned their questionnaires. Additionally, five (5) agencies/groups returned questionnaires and offered to participate in the WPAC (See Table 4). The WPAC members will be asked to assist their municipality in the adoption of the final plan and the ordinances required by plan.

Table 4. WPAC Municipalities and Corresponding Volunteers.

WPAC Members	Municipality / Organization
Mark Yersky – Jim Branca	City of Farrell
Marcia Hirschmann – Ian Garfoli	City of Hermitage
Joe Kurtanich	City of Sharon
Ed Winslow	Clark Borough
Sue Ringer	Fredonia Borough
Paul Boyer	Greenville Borough
Vance Oaks	Grove City Borough
Denny Heasley – Jerry Johnson	Mercer Borough
Ron Metzgar – Brent Miller	New Lebanon Borough
Curtis D. Kerns	Sandy Lake Borough
Ed Winslow	Sharpsville Borough
John Sweet	Stoneboro Borough
Dave George – Mabel Selby	West Middlesex Borough
Robert McGhee – Paul Minner – Dr. Robert Addison	Coolspring Township
Pat Campbell	Deer Creek Township
Daniel Micsky – Melissa Osborne	Delaware Township
James Ammen	East Lackawannock Township
Elliott Lengel	Findley Township
Todd Hittle	Hempfield Township
Linda Baun	Jackson Township
Robin Snyder	Jefferson Township
Ronald Faull	Liberty Township
Ken Dodson	New Vernon Township
Carl Swartz	Otter Creek Township
Joseph Goncz – Thomas Paxton	Pine Township
Donald Guthrie	Sandy Creek Township
Edwin Olsen	Sandy Lake Township
John McCurdy	Salem Township
David Garrett	Shenango Township
Mike Nashtock	South Pymatuning Township
Barbara Brown	Springfield Township
Wendy Campbell	Wilmington Township
Jim Morton	Wolf Creek Township
Denny Geibel – Dale Armstrong – Jeff Wheeler	Worth Township
William Wasser	DCNR – Bureau of State Parks
Jim Mondok	Mercer County Conservation District
Jeff Giardina	Pennsylvania Fish & Boat Commission
James Donatelli	Pennsylvania Game Commission
Jennifer Barborak	Shenango River Watchers

3.4 Watershed Plan Advisory Committee Meetings

Two rounds of WPAC meetings were held during Phase I. Because Mercer County is so large, each round of meetings was divided into four to five separate meetings and was held at a location central to those municipalities.

Round 1 Meetings: These meetings were held according to watershed and provided an overview of the ACT 167 process, the Phase I timeline, and served as a means for distributing the questionnaire.

Watersheds Represented	Date	Time	Location
Little Shenango River & Northern Portion of Shenango River	Wednesday, November 28, 2007	6:30pm	Hempfield Township Building
French Creek & Sandy Creek	Thursday, November 29, 2007	6:30pm	Sandy Lake Township Municipal Building
Wolf Creek & Slippery Rock Creek	Monday, December 3, 2007	6:30pm	Grove City Borough Building
Neshannock Creek & Little Neshannock Creek	Wednesday December 5, 2007	6:30pm	Mercer Cooperative Extension Building
Southern Portion of the Shenango River Watershed	Thursday, December 6, 2007	6:30pm	Mercer County Regional Planning Commission Office
Agencies & Organizations	Wednesday, January 16, 2008	2:00pm	Mercer County Regional Planning Commission Office

Round 2 Meetings: These meetings provided participants with rough drafts of each watershed description and problems identified within each watershed. The meetings also provided the opportunity for additional comments from the participating municipalities. Four meeting dates and locations were selected and participants chose the location and date that best suited their needs:

Location	Date	Time
Grove City Borough Building	Wednesday, March 12, 2008	6:30pm
Mercer County Regional Planning Commission Office	Thursday, March 13, 2008	6:30pm
Sandy Lake Township Municipal Building	Monday, March 17, 2008	6:30pm
Hempfield Township Building	Wednesday, March 19, 2008	6:30pm

4.0 PHASE I REPORT

4.1 Submission of Phase I Report to PaDEP

The Phase I Report serves as a scope of work and cost estimate to complete the Phase II Act 167 SWMP in Mercer County. Submission for the Phase I report is scheduled for the second week of June, 2008.

5.0 QUESTIONNAIRE DISCUSSION

5.1 Questionnaire Results

The questionnaire was developed to request information from participants concerning specific problems involving storm water management within their areas of jurisdiction. The questionnaire and a detailed map of the municipality were distributed to the corresponding participant during the initial WPAC meeting. The information from the questionnaire was used to determine the scope of planning for Phase II, as well as a means to determine levels of support from each municipality. Of the forty-eight (48) municipalities in Mercer County, thirty-six (36) returned their questionnaires. Additionally, three state agencies, one county agency, and one watershed group returned questionnaires. Overall, the primary stormwater concern in the County was increased runoff. Secondary issues were poor drainage and undersized culverts/structures; see Appendix C, Figures 1-16 for the compilation of the responses to questions #3 and #6 from the questionnaires. Following are the results from the questionnaires by watershed.

5.1.1 French Creek Watershed

The following municipalities lie within the French Creek watershed: All of New Lebanon Township, portions of Mill Creek Township, portions of French Creek Township, and portions of Deer Creek Township.

Within the French Creek watershed, the primary stormwater related concern was increased runoff, with the secondary issues being road flooding, erosion along roadways, and poor drainage. (Appendix C, Figures 1 & 2.)

The French Creek Watershed is located in the northeast corner of Mercer County. It drains an area of approximately 430,665 acres (672.9 square miles), of which 21,409 acres (33.5 square miles) are located within Mercer County. This watershed's drainage flows out of the county to the east and into the Allegheny River watershed. In general, the French Creek watershed consists of poorly drained soils and underlying bedrock that has moderate to low porosity and permeability, predisposing the area to excess runoff. Following is a detailed description of the portion of the French Creek watershed that lies within Mercer County:

Soils –The French Creek watershed, including its major tributaries (Deer Creek and Mill Creek) is dominated by the Canfield-Ravenna association. This soil type is typically found on gently sloping to moderately steep hillsides underlain by glacial till. The soil varies from moderately well drained to somewhat poorly drained, depending on its location. A small portion of French Creek is also underlain by the Chenango-Braceville-Halsey association, a soil type found mainly on stream terraces and moraines. This soil type is found on gently sloping to moderately steep hillsides and is underlain by sand and gravel, therefore it can range from being well drained to very poorly drained. The remainder of the watershed consists of the Ravenna-Frenchtown association. (Appendix A, Figure 6.) This soil association can be found on nearly level to gently sloping uplands

within the watershed. It is a somewhat poorly drained to poorly drained soil association. The French Creek watershed within Mercer County also contains approximately 11,560 acres (18 sq. mi.) of prime farmland soils, most of which is currently forested. (Appendix A, Figure 5.)

Geology – The section of the French Creek watershed underlying French Creek itself contains approximately 1,288 acres (2.0 square miles) of the Corry Sandstone through Riceville Formation, undivided, composed mainly of shale. This bedrock type has a moderate porosity and a moderate to low permeability. Surrounding that formation is approximately 815 acres (1.3 square miles) of the Cuyahoga formation, composed of sandstone. This bedrock type has low porosity and low permeability. Approximately 6,039 acres (9.4 square miles) of the Shenango formation, composed of siltstone, can be found underlying Deer Creek and Mill Creek. The Shenango formation has moderate to low porosity and moderate to low permeability. Approximately 13,155 acres (20.6 square miles) within the watershed consist of the Pottsville formation, composed of shale, siltstone, claystone, limestone and coal. This formation has variable porosity and moderate to low permeability. The remainder of the watershed contains 109 acres (0.17 square miles) of the Allegheny formation, a formation consisting mainly of limestone, clay and coal. (Appendix A, Figure 3.)

Slope – In general, the part of the French Creek watershed that lies within Mercer County is relatively hilly in topography. There are steeper slopes (9-15% and 16-25% grade) found around the streams, with relatively steep slopes (>25% grade) located along French Creek in the extreme northeast corner of the watershed. The western portion of the watershed is relatively flat, having 0-8% slopes. (Appendix A, Figure 4.)

Land use – Appendix A, Figure 7 contains a map of the primary land uses within Mercer County, overlain with the watershed boundaries. The following table presents coverage of the most dominant land uses within the watershed:

Land Use	Acres	Square Miles	Percent of Watershed
Forested	11,790	18.4	55%
Farmland	8,073	12.6	38%
Wetland	416	0.7	<1%
Low Density Urban	167	0.3	<1%
High Density Urban	138	0.2	<1%
Water	117	0.2	<1%

Stormwater Management Issues Identified as Significant by Each Municipality within the French Creek Watershed:

Borough of New Lebanon:

- Manage stormwater and field runoff causing damage to roads and the overflow of ditches (especially along Gorden Road).
- Stabilizing peak flow conditions.

- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Control stream and street flooding, soil erosion, stream bed and bank erosion, and damage to bridges and culverts caused by increased runoff.
- Control property flooding and damage.

Deer Creek Township:

- Finding funding to respond to stormwater related issues within Deer Creek Township including road flooding and berm erosion caused by excessive runoff, especially along Deer Creek Road.
- Poor drainage and infiltration due to existing soil types.
- Control erosion caused by excessive runoff entering the stream along Deer Creek Road north of the stream. Deer Creek Township is currently working with the county to improve road ditches.
- Stabilizing peak flow conditions.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Resolve street and stream flooding caused by increased runoff and poor drainage.

Agency Comments

- *Mercer County Conservation District:* North Deer Creek in French Creek Township along Creek Road to mouth has bank erosion, sedimentation, and flooding.
- *Mercer County Conservation District:* Powdermill Run in French Creek Township from the county line to the mouth has sedimentation, bank erosion, and flooding.

5.1.2 Sandy Creek Watershed

The following municipalities lie within the Sandy Creek watershed: A portion of Deer Creek Township, a portion of New Vernon Township, a portion of Salem Township, a portion of Sandy Creek Township, all of Sandy Lake Borough, all of Sandy Lake Township, all of Sheakleyville Borough, all of Stoneboro Borough, and a portion of Worth Township.

The primary stormwater concern in the Sandy Creek watershed was increased runoff. Secondary issues included poor drainage and road wash-outs. Other issues mentioned were: road flooding, undersized culverts, acid mine drainage, sedimentation, stream bank erosion, flooding, and beaver dams. (Appendix C, Figures 3 &4.)

The Sandy Creek watershed is located in the northeast corner of Mercer County. It drains an area of approximately 102,839 acres (160.7 square miles), of which 50,772 acres (79.3 square miles) are located within Mercer County. This watershed's drainage flows out of the county to the east and into the Allegheny River watershed. In general, the watershed is flat in topography, with some steeper slopes around streams. It consists of moderately drained to poorly drained soils with underlying bedrock that has moderate to low porosity and permeability, predisposing the area to excessive pooling and runoff. Areas of high density urban land use within the watershed include Sandy Lake and Stoneboro, and small areas adjacent to Routes 285 and 358. This urban land use predisposes the area to increased runoff, flooding, sedimentation, and water pollution. The remainder of the Sandy Creek watershed consists mainly of farmland to the northwest and forested area to the east. The northern portion of the watershed is dotted with wetlands, some considerable in size. These wetlands provide flood storage and help water to infiltrate into the groundwater rather than running off into and flooding nearby creeks. Following is a detailed description of the portion of the Sandy Creek watershed that lies within Mercer County:

Soils –Sandy Creek is dominated by the Wayland, course variant-Papakating-Red Hook soil association. This association is found on nearly level slopes within the floodplains and is underlain by alluvium and ranges from very poorly drained to moderately drained. The Sandy Creek floodplain consists of the Chenango-Braceville-Halsey association, a soil association found on gently sloping to moderately steep terraces and moraines underlain by glacial till. It ranges from well drained to very poorly drained. The remainder of the watershed consists of the Ravenna-Frenchtown association, a somewhat poorly drained to poorly drained association found on nearly level to gently sloping uplands. (Appendix A, Figure 6.) The Sandy Creek watershed within Mercer County also contains approximately 24,037 acres (37.56 square miles) of prime farmland soils, the majority of which remain forested. (Appendix A, Figure 5.)

Geology – Approximately 7,012 acres (11.0 square miles) of the Cuyahoga formation can be found underlying Sandy Creek in the northwest. This formation is composed of sandstone and has low porosity and low permeability. The Shenango formation makes up the floodplain of Sandy Creek, approximately 14,349 acres (22.4 square miles). This formation is composed of siltstone and has moderate to low porosity and moderate to low permeability. The Pottsville formation, composed of shale, siltstone, claystone, limestone, and coal, makes up the majority of the east, approximately 23,796 acres (37.2 square miles) and has variable porosity and moderate to low permeability. The Pottsville formation is intermixed with approximately 5,579 acres (8.7 square miles) of the Allegheny formation, a formation composed of limestone, clay, and coal. (Appendix A, Figure 3.)

Slope – The watershed is relatively flat with 0-8% slopes in the southeast; however, steeper slopes (>25% in grade) can be found along Sandy Creek. The northern part of the watershed is relatively hilly, with slopes of 9-15% grade throughout. Some of the smaller streams are surrounded by slopes of 16-25% grade. (Appendix A, Figure 4.)

Land use – Appendix A, Figure 7 contains a map of the primary land uses within Mercer County, overlain with the watershed boundaries. The following table presents coverage of the most dominant land uses within the watershed:

Land Use	Acres	Square Miles	Percent of Watershed
Forested	27,206	42.5	54%
Farmland	15,747	24.6	31%
Wetland	2,271	3.5	<1%
Water	1,852	2.9	<1%
Low Density Urban	779	1.2	<1%
High Density Urban	718	1.1	<1%

Stormwater Management Issues Identified as Significant by Each Municipality within the Sandy Creek Watershed:

Deer Creek Township

- Finding funding to respond to stormwater related issues within Deer Creek Township
- Road flooding and berm erosion along roadways in Deer Creek Township caused by excessive runoff.
- Poor drainage and soil infiltration caused by existing soil types.
- Stabilizing peak flow conditions.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Resolve street and stream flooding caused by increased runoff and poor drainage.

New Vernon Township

- Stormwater controls and best management practices.
- Increased runoff entering Lake Wilhelm along Creek Road between Lake Wilhelm Road and Borland Road.
- Increased runoff from Tributary 58632 to Sandy Creek in the vicinity of the intersection of Borland Road and Irish Ridge Road.

- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Stabilizing peak flow conditions.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Regulate and monitor overbank flows associated with extreme storm events.

Salem Township

- Control the erosion associated with roadways and keeping culverts free of obstructions.
- Stabilizing peak flow conditions.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Regulate stream flooding, soil erosion, stream bed and bank erosion, in-stream sedimentation, and bridge/culvert damage caused by increased runoff.

Sandy Creek Township

- Control stream bank erosion along Sandy Creek in the vicinity of Armour Road and Old Perry Road.
- Control stream bank erosion along Tributary 58652 to Sandy Creek in the Vicinity of Larimer Road.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Regulate stream flooding, soil erosion, stream bed and bank erosion, and bridge/culvert damage caused by increased runoff, undersized structures, and floodplain development.

Borough of Sandy Lake

- Sandy Lake Borough is situated in a low area. They are affected not only by situations within the borough, but also by conditions outside their corporate boundaries.
- Sandy Lake outlet to Sandy Creek – The Borough of Sandy Lake has suggested that the outlet is in need of dredging.
- Culverts under Pintree Drive have been plugged by a beaver. Pennsylvania Game Commission and PennDOT have been made aware of the problem.
- McCutchoen Run at Broad Street and Laura Drive – The box culvert under Broad Street has been obstructed. During storms the runoff along the course of Laura Drive can reach sufficient velocity to cause considerable damage.

- Hamilton Hill – Undersized culverts have caused culvert clogging and street flooding.
- Unnamed wet weather stream entering Sandy Lake Borough from the south – This stream originates at the outlet of a pond on the east side of SR 173 south of town. This stream catches water from Lakeview and Oakview School properties, possibly 2 churches, and state highway runoff. If one walks south from Elbow Street in the Borough, severe stream bank erosion will be observed. The Borough of Sandy Lake has suggested that a storm retention device and a trash rack upstream from Elbow Street would alleviate this situation.
- Flooding and property damage (basement flooding) has occurred in the vicinity of Elbow Street.
- Sandy Lake Borough has recently replaced approximately 250' of pipe and a box culvert at a crossing of Mercer Street.
- High Street – A wet weather stream crossing under High Street has the potential for washing out due to trash in the culvert crossing.
- Patton Road, (aka Coal Hill) – Patton Road is a 1/4 mile, of steep, paved roadway that has a high potential for wash out. The runoff contributes to storm water on North Main Street.
- Mill Street – Mill Street has the potential for washing due to its long, steep gradient and the collection of runoff from adjacent properties. Its ditches have been enclosed with culvert pipes with inlets at intervals along its length.
- Main Street – The elevation of the pavement on Main Street is 6"–8" higher than it was 40+ years ago. Currently, no curb exists on North Main Street (north of the traffic light). As a result, ponding occurs at many of the intersections. PennDOT storm sewers at the traffic light (intersection of SR 0062, SR 0358, and SR 0173) are inadequate. The Borough of Sandy Lake has suggested that a major storm water study be performed by PennDOT and appropriate action taken.
- Stabilizing peak flow conditions.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Regulate and monitor overbank flows associated with extreme storm events.

Sandy Lake Township

- Haun Hill Road often washes out due to excessive runoff.
- Triple Link Road frequently floods due to obstructions in the stream. Sandy Lake Township has suggested the re-routing and cleaning of the stream.
- Regulate stream flooding, street flooding, soil erosion, in-stream sedimentation, property damage, pollution, and bridge/culvert damage caused by increased runoff, undersized structures, and floodplain development.

Borough of Stoneboro

- In-stream obstructions cause pooling and prevent water transport downstream.
- Stream flooding exists in the vicinity of the intersection of Mercer Road and Mine Road. The Borough of Stoneboro has suggested a rerouting of the stream.
- A beaver dam exists east of Sandy Lake in the vicinity of Linden Road backing up water and preventing normal drainage. The Borough of Stoneboro has suggested the removal of the beaver dam.
- A beaver dam exists south of Sandy Lake in the vicinity of Franklin Road backing up water and preventing normal drainage. The Borough of Stoneboro has suggested the removal of the beaver dam.
- A beaver dam exists south of Sandy Lake along Sawmill Run backing up water and preventing normal drainage. The Borough of Stoneboro has suggested the removal of the beaver dam.
- Regulate stream, street, and property flooding, in-stream sedimentation, and property damage caused by poor drainage.
- Stabilizing peak flow conditions.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.

Worth Township

- Regulate moderate stream bed and bank erosion.

Agency Comments

- *DCNR Bureau of State Parks:* "Yellow Boy" in seep run located 500 feet west of dam breast on Creek Road.

- *DCNR Bureau of State Parks:* Creek road is un-paved and the terrain to the south of the road is steep. Sediment is carried by small runs and road ditches directly into the lake.
- *DCNR Bureau of State Parks:* Considerable sedimentation enters the lake from existing tributaries, especially Dugan's Run and James Run. Need for the development of new Conservation Plans for farming in the park.
- *DCNR Bureau of State Parks:* Monitor the development of proposed natural gas wells within the park.
- *Mercer County Conservation District:* In Stoneboro Borough, Sawmill Run has sedimentation and bank erosion.
- *Mercer County Conservation District:* Un-named tributary of Sandy Creek from Lakeview High School to mouth experiences flooding and sedimentation. In the Borough of Sandy Lake, an un-named tributary to Sandy Creek from Oakview Elementary to US 62 has erosion, sedimentation, and flooding.
- *Mercer County Conservation District:* Stoneboro Lake at SR 845 has flooding issues.
- *Mercer County Conservation District:* McCutcheon Run from Lara Lane to mouth in Borough of Sandy Lake has sedimentation and flooding.

5.1.3 Wolf Creek Watershed

The following municipalities lie within the Wolf Creek watershed: All of Grove City Borough, a portion of Liberty Township, all of Pine Township, a portion of Springfield Township, a portion of Wolf Creek Township, and a portion of Worth Township.

The primary stormwater concern in the Wolf Creek watershed was increased runoff. Secondary issues included poor drainage and stream flooding. Other issues mentioned were: bank erosion, inadequate stormwater facilities, and clogged culverts. (Appendix C, Figures 5 & 6.)

The Wolf Creek watershed makes up the southeast corner of Mercer County. It drains approximately 63,870 acres (99.8 square miles), of which 50,078 acres (78.2 square miles) are located within Mercer County. This watershed's drainage flows out of the county to the south and into Slippery Rock Creek which flows into the Beaver River, part of the Ohio River watershed. In general, the Wolf Creek watershed is relatively flat in topography. It consists of poorly drained soils with underlying bedrock that has moderate to low porosity and permeability, predisposing the area to excess runoff. Areas of high density urban land use within the watershed include Grove City and East Lackawannock. As development continues in these areas and in areas in the headwaters of the Wolf Creek watershed, runoff will increase due to the increase of impermeable surface (paving, structures, etc.) coupled with the impermeable soils and bedrock. The remainder of the watershed consists mainly of a mixture of forest and farmland. Wetlands are also noted in the vicinity of Wolf Creek. These wetlands provide flood storage and help water to

infiltrate into the groundwater rather than running off into and flooding nearby creeks. Following is a detailed description of the French Creek watershed within Mercer County:

Soils – The primary soil association is the Ravenna-Frenchtown association. This association is found on nearly level to gently sloping uplands within the watershed and ranges from somewhat poorly drained to poorly drained. The Chenango-Braceville-Halsey association is prevalent along Wolf Creek and Swamp Run. This association can range from being well drained to very poorly drained and is found on gently sloping to moderately steep moraines and stream terraces and is underlain by sand and gravel deposits. A small portion of the Canfield-Ravenna association can be found in the extreme south along Wolf Creek. This soil association can be moderately well drained and somewhat poorly drained, and is found on gently sloping to moderately steep uplands underlain by glacial till. (Appendix A, Figure 6.) This watershed also contains 25,250 acres (39.5 square miles) of prime farmland soils, of which approximately 1/3 are currently used for farming. (Appendix A, Figure 5.)

Geology – The main bedrock feature in this watershed is the Pottsville formation, encompassing 30,835 acres (48.2 square miles). This formation is composed of shale, siltstone, claystone, limestone, and coal. It has variable porosity and a moderate to low permeability. The northern part of the watershed contains 3,844 acres (6.0 square miles) of the Shenango formation, consisting of siltstone, and having moderate to low porosity and permeability. Approximately 15,400 acres (24.1 square miles) of the Allegheny formation, composed of limestone, clay and coal, and having low porosity and moderate to low permeability can be found in the south east. (Appendix A, Figure 3)

Slope – Though the majority of the watershed is relatively flat, having 0-8% grade, some of the areas around streams have steeper slopes ranging from 9%-25% grade. These areas are found mainly in the north. (Appendix A, Figure 4.)

Land use – Appendix A, Figure 7 contains a map of the primary land uses within Mercer County, overlain with the watershed boundaries. The following table presents coverage of the most dominant land uses within the watershed:

Land Use	Acres	Square Miles	Percent of Watershed
Forested	22,363	34.9	45%
Farmland	18,187	28.4	36%
Wetland	2,752	4.3	<1%
High Density Urban	1,932	3.0	<1%
Low Density Urban	940	1.5	<1%
Water	568	0.9	<1%

Stormwater Management Issues Identified as Significant by Each Municipality within the Wolf Creek Watershed

Borough of Grove City

- Completion of the East Pine Street storm water collection system to alleviate localized flooding and ponding concerns.
- Management of flooding increased by development and inadequate storm facilities**.** The construction of a new storm sewer from CN Railroad along East Pine Street to Wolf Creek may solve this problem.
- Stabilization of peak flow conditions.
- Control of stream, street, and property flooding issues associated with extreme storm events.
- Management of sediment transport issues including scour at outfalls, property damage, and in-stream sedimentation.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat.

Liberty Township

- Extreme storm events cause street flooding, soil erosion, and damage to bridges/ culverts. Increased runoff has caused these problems to escalate in particular in the areas of Old Mill Road and Plain Grove Road.

Pine Township

- Maintenance and control of culverts that have occasionally been clogged.
- Property flooding, property damage, and stream bed/bank erosion caused by increased surface runoff and poor drainage.
- Stabilization of peak flow conditions.
- Control the erosion of stream banks and beds, causing undercut roads and utilities, damage to in-stream habitat, and clogging to culverts and bridges.

Springfield Township

- Maintenance and control of stormwater caused by increased runoff along Route 208, near Prime Outlet Mall.
- Extreme storm events cause stream flooding, property damage, erosion of stream banks and beds, and bridge/culvert damage caused by increased surface runoff and poor drainage.
- Stabilization of peak flow conditions.
- Control the erosion of stream banks and beds, causing undercut roads and utilities, damage to in-stream habitat, and clogging to culverts and bridges.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat.

Wolf Creek Township

- Find and implement a solution to the Beaver Dam problem on Scrub Grass Road. This is a potentially very dangerous situation and lowering the Beaver Dam and installing guide rails may alleviate the danger.
- Maintenance and control of flooding associated with small tributaries during extreme storm events.
- Low areas prone to flooding exist at: Sophen Road near the eastern most tributary of the East Branch of Wolf Creek, at Patterson School Road at the southernmost tributary to the East Branch of Wolf Creek, and at Creek Road at a northern tributary to Wolf Creek.
- General stream flooding due to heavy rainfall occurs along Centertown Road at the East Branch of Wolf Creek.

Worth Township

- Regulate moderate stream bed and bank erosion.

Agency Comments

- *PA Fish & Boat Commission*: Direct access of storm drain into creek at Oregon Road in Springfield Township.
- *PA Fish & Boat Commission*: Wolf Creek is full of sediment downstream from site of dam removal.
- *Mercer County Conservation District:* Wolf Creek upstream of SR 108 through the Borough of Grove City to the Borough line has bank erosion and sedimentation.

5.1.4. Slippery Rock Creek Watershed

Only a small portion of Mercer County lies within Slippery Rock Creek watershed, including: a portion of Liberty Township, and a portion of Springfield Township.

Within the Slippery Rock Creek watershed, the primary stormwater related concern was increased runoff, with the secondary issue being stream flooding. (Appendix C, Figures 7 & 8)

A small portion of the Slippery Rock Creek watershed is located in the southeast part of the county. It drains an area of approximately 194,340 acres (303.7 square miles), of which 2,892 acres (4.5 square miles) are located within Mercer County. This watershed's drainage flows out of the county to the south into the Beaver River, part of the Ohio River watershed. In general, the Slippery Rock Creek watershed is relatively flat in topography with few slightly steeper slopes. The watershed consists of poorly drained soils with underlying bedrock that has moderate to low porosity and permeability, predisposing the area to excess runoff. Aside from a few small areas of low density urban areas, the majority of the Slippery Rock Creek watershed that lies within Mercer County consists primarily of forest and farmland. Following is a detailed description of the Slippery Rock Creek watershed within Mercer County.

Soils – The Canfield-Ravenna association makes up the small part of the Slippery Rock Creek watershed that lies within Mercer County. This association can be found on gently sloping to moderately steep uplands, and is underlain by glacial till. This association ranges from moderately well drained to somewhat poorly drained. (Appendix A, Figure 6.) The Slippery Rock Creek watershed also contains 1,508 acres (2.4 square miles) of prime farmland soils, the majority of which are currently forested. (Appendix A, Figure 5.)

Geology – The majority of this watershed is composed of approximately 2,171 acres (3.4 square miles) of the Allegheny formation. This formation consists of limestone, clay, and coal and has low porosity and moderate to low permeability. The remainder of the watershed is composed of the Pottsville formation, which consists of shale, siltstone, claystone, limestone, and coal. It has variable porosity and moderate to low permeability. (Appendix A, Figure 3.)

Slope – In general, the part of the Slippery Rock Creek watershed that lies within Mercer County is relatively flat having a 0-8% grade. A small portion of the northern aspect of the watershed is hilly in topography, having a grade of 16%-25%. (Appendix A, Figure 4.)

Land Use – Appendix A, Figure 7 contains a map of the primary land uses within Mercer County, overlain with the watershed boundaries. The following table presents coverage of the most dominant land uses within the watershed:

Land Use	Acres	Square Miles	Percent of Watershed
Forested	1,290	2.0	45%
Farmland	1,165	1.8	40%
Wetland	186	0.3	<1%
Low Density Urban	60	0.1	<1%
High Density Urban	38	0.1	<1%
Water	39	0.1	<1%

Stormwater Management Issues Identified as Significant by Each Municipality within the Slippery Rock Creek Watershed

Liberty Township

- There were no comments related to this watershed.

Springfield Township

- Extreme storm events cause stream flooding, property damage, erosion of stream banks and beds, and bridge/culvert damage caused by increased surface runoff and poor drainage.
- Stabilization of peak flow conditions.
- Control the erosion of stream banks and beds, causing undercut roads and utilities, damage to in-stream habitat, clogging to culverts and bridges.

- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat.

5.1.5. Neshannock Creek Watershed

The following municipalities lie within the Neshannock Creek watershed: All of Coolspring Township, a portion of Delaware Township, a portion of East Lackawannock Township, a portion of Fairview Township, all of Findley Township, all of Fredonia Borough, all of Jackson Center Township, all of Jackson Township, a portion of Jefferson Township, a portion of Lake Township, all of Mercer Borough, a portion of Otter Creek Township, a portion of Perry Township, a portion of Springfield Township, a portion of Wilmington Township, a portion of Wolf Creek Township, and a portion of Worth Township.

Within the Neshannock Creek watershed, the primary stormwater related concern was increased runoff, with secondary issues being undersized culverts and poor drainage. Other issues included: stream flooding, stream erosion, ponding and road flooding, and floodplain development. (Appendix C, Figures 9 & 10)

The Neshannock Creek watershed is located in the southeast portion of Mercer County, adjacent and to the west of the Wolf Creek watershed. It drains an area of approximately 123,406 acres (192.8 square miles), of which 92,815 acres (145.0 square miles) are located within Mercer County. This watershed's drainage flows out of the county to the south and drains into the Beaver River, part of the Ohio River watershed. In general, the Neshannock Creek watershed is relatively flat in topography with some steep slopes along the southern reach of Neshannock Creek. The watershed consists of poorly drained soils with underlying bedrock that has moderate to low porosity and permeability, predisposing the area to excess runoff. High density urban areas exist in Mercer and Fredonia. There are several high density urban areas dotted along Route 62, and a low density urban/commercial area around Lake Latonka. All of the urban areas can cause increased runoff due to increased pavement from parking lots and roads. When mismanaged, this runoff will flood Neshannock Creek and its tributaries. The remainder of the watershed is forested in the south central portion and consists primarily of farmland in the north. Following is a detailed description of the Neshannock Creek watershed within Mercer County:

Soils – Neshannock Creek is underlain by the Wayland, coarse variant-Papakating-Red Hook association, found on nearly level floodplains underlain by alluvium. This soil association ranges from very poorly drained to moderately drained. The Chenango-Braceville-Halsey association is found in the south in the floodplain of the creek. This association consists of well drained to very poorly drained soils found on gently sloping to moderately steep stream terraces and moraines underlain by sandy and gravelly deposits. In the north, the Canfield-Ravenna association is common. This association is moderately drained to somewhat poorly drained and is found on gently sloping to

moderately steep uplands underlain by glacial till. The remainder of the watershed contains the Ravenna-Frenchtown association, somewhat poorly drained to poorly drained soils found on nearly level to gently sloping uplands. (Appendix A, Figure 6.) The Neshannock Creek watershed within Mercer County also contains 53,655 acres (83.8 square miles) of prime farmland soils, the majority of which are being farmed, especially in the north. (Appendix A, Figure 5.)

Geology – Underlying Neshannock Creek is approximately 12,046 acres (18.8 square miles) of the Shenango formation. This formation is composed of siltstone and has moderate to low porosity and moderate to low permeability. Approximately 1,358 acres (2.1 square miles) of the Cuyahoga group also underlies a small portion of the creek. This association is composed of sandstone and has low porosity and low permeability. Approximately 60,041 acres (93.81 square miles) of the Pottsville formation underlie this watershed. This formation consists of shale, siltstone, claystone, limestone, and coal. It has variable porosity and moderate to low permeability. Only 1,358 acres (2.1 square miles) of the Cuyahoga formation are found within this watershed. This formation is composed of sandstone and has low porosity, and low permeability. (Appendix A, Figure 3.)

Slope – In general, the part of the Neshannock Creek watershed that lies within Mercer County is somewhat flat with rolling hills having 0%-15% grade. There are some slopes >25% along the southern reach of Neshannock Creek. (Appendix A, Figure 4.)

Land Use – Appendix A, Figure 7 contains a map of the primary land uses within Mercer County, overlain with the watershed boundaries. The following table presents coverage of the most dominant land uses within the watershed:

Land Use	Acres	Square Miles	Percent of Watershed
Farmland	39,832	62	43%
Forested	39,366	62	42%
Wetland	3,244	5.1	<1%
Low Density Urban	1,891	3.0	<1%
High Density Urban	1,512	2.4	<1%
Water	825	1.3	<1%

Stormwater Management Issues Identified as Significant by Each Municipality within the Neshannock Creek Watershed

Coolspring Township

- The maintenance of debris transported and collected by Tributary 35698 to Otter Creek. Coolspring Township has suggested cleaning the creek channel.
- Stabilizing peak flow conditions.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat.

- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Regulate and monitor overbank flows associated with extreme storm events.

Delaware Township

- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Stabilizing peak flow conditions.
- Regulate and monitor overbank flows associated with extreme storm events.
- Property damage, bridge/culvert damage, and street flooding have occurred along Redfoot Road as a result of poor drainage and undersized structures insufficiently transporting stormwater.
- Property damage, bridge/culvert damage, street flooding, and scour at outfalls has occurred along Kelso Road as a result of poor drainage and undersized structures insufficiently transporting stormwater.
- Delaware Township feels that current practices need to be made friendlier when replacing existing structures (i.e. bridges, large culverts); for instance, the permit process needs to be waived or expedited**.**

East Lackwannock Township

- Control the flooding of streams and streets, soil erosion, stream bed and bank erosion, in-stream sedimentation, habitat/resource damage caused by increased runoff from the development of parking lots, yards, streets, and roads.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Monitor and management of increased runoff from Gabany's proposed development near the borough of Mercer.

Findley Township

- The dredging and cleaning of the Pine Run tributary in several areas where they run adjacent to a township or state road.

- Noted a severe runoff issue one mile north of the intersection of Elliott Road and Springfield Church Road, on Springfield Church Road.
- Culverts or bridges are clogged due to increased runoff and poor drainage in Pine Run, Tributary 63829 to Pine Run, and Tributary 35770 to Mill Creek. Findley Township proposes clearing or dredging debris from Pine Run.
- A runoff problem exists on the properties between McMillan Road, Mariacher Road, Clintonville Road, Scrubgrass Road, and Route 58. Findley Township proposes the implementation of a SWMP.
- Stormwater leeching from mismanaged driveways and private property during and after construction.
- Inadequate drainage culverts on state highways causing flooding during severe storm events.
- Stabilizing peak flow conditions.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Stream flooding, increased sedimentation in streams, and bed and bank erosion caused by increased runoff and poor drainage.
- Findley Township would like to discuss the regulations associated with cleaning the streams, and would like to have a copy of the current watershed management procedures.

Borough of Fredonia

- Moderate stream flooding caused by increased runoff.

Jackson Township

- The property adjoining logged areas near intersection of Cape Horn Road and Cottage Road is prone to severe flooding and property damage after storm events. Jackson Township has contacted the PaDEP, the property owner, and the logging company with no result.
- The property surrounding Tributary 35820 to Cool Spring Creek has experienced flooding and property damage after severe storm events. Jackson Township has replaced and enlarged a culvert pipe and redirected the flow of water.
- Sewage drainage from Jackson Center Borough Sewer Plant has entered Yellow Creek creating concerns surrounding fish and wildlife health. Jackson Township has contacted the PaDEP, Pennsylvania Fish and Boat Commission, Pennsylvania Game Commission, and the Jackson Center Borough with no result.
- Flooding, bank erosion, property damage, and surface water/bridge concerns occur on South Foster Road following severe storm events.

- Flooding and bridge concerns occur on Millbrook Road following severe storm events.
- Water runoff following severe storm events causes safety concerns associated with culverts, berms, and ditches along South Foster Road. Jackson Township has attempted to fill ditches with oversized rock for drainage.
- Controlling runoff and stream erosion.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Regulate and monitor overbank flows associated with extreme storm events.

Jefferson Township

- Stabilizing peak flow conditions.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts caused by increased surface runoff during extreme storm events.

Borough of Mercer

- Frequent flooding specific to inadequate state highway drainages exemplified by Maple Street. Storm culverts have been installed by the state in few areas.
- Poor stormwater controls surrounding the school. Stormwater (catchbasin) facilities installed by the school.
- Management of stream, street, and property flooding caused by the natural terrain and topography of the eastern portion of Mercer Borough.
- Stabilizing peak flow conditions.
- Controlling stormwater from bordering municipalities.
- Controlling stormwater from the school district.

Otter Creek Township

- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts caused by increased surface runoff during extreme storm events.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Stabilizing peak flow conditions.
- Regulate and monitor overbank flows associated with extreme storm events.

- Property damage, bridge/culvert damage, stream, street, and property flooding have occurred as a result of poor drainage and undersized structures insufficiently transporting stormwater.

Springfield Township

- Extreme storm events cause stream flooding, property damage, erosion of stream banks and beds, and bridge/culvert damage caused by increased surface runoff and poor drainage.
- Stabilization of peak flow conditions.
- Control the erosion of stream banks and beds, causing undercut roads and utilities, damage to in-stream habitat, clogging to culverts and bridges.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat.

Wilmington Township

- Control the erosion of stream banks and beds, soil erosion, in-stream sedimentation, undercut roads and utilities, damage to in-stream habitat, clogging to culverts and bridges caused by increased runoff, poor drainage, and undersized structures.
- Control the erosion of farmland soils in the vicinity of White Chapel Road.
- Control the erosion of stream banks and beds, and scour at outfalls along Indian Run in the vicinity of Indian Run Road.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Stabilizing peak flow conditions.

Wolf Creek Township

- Maintenance and control of flooding associated with small tributaries during extreme storm events.
- Regulate and monitor overbank flows associated with extreme storm events.
- Control the erosion of stream banks and beds, soil erosion, in-stream sedimentation, undercut roads and utilities, damage to in-stream habitat, clogging to culverts and bridges caused by increased runoff.

Worth Township

- Regulate moderate stream bed and bank erosion.

Agency Comments

- *PA Game Commission*: Acid Mine Drainage on State Game Land #284 east of Pennsy Road in Springfield Township.

- *PA Game Commission*: Possible runoff, pollution from the Old Fredonia Dump on State Game Lands #294 in Fairview Township.
- *PA Game Commission*: Potential Acid Mine Drainage from Old Mine #2 (out of Mercer County) could enter the county.
- *Shenango River Watchers*: Runoff from Auto Auction reached Coolspring Creek and caused trout kill.
- *PA Fish & Boat Commission*: Fertilizer run-off into Coolspring Creek and flowing into Lake Latonka is causing algae in the lake.
- *PA Fish & Boat Commission*: Acid Mine drainage in Neshannock Creek Watershed into Otter Creek near Scrubgrass Road.
- *Mercer County Conservation District:* Un-named tributary of Munnel Run from Lamor Road in East Lackawannock Township to mouth has flooding and sedimentation.
- *Mercer County Conservation District:* Un-named tributary of Neshannock Creek from US 62 to Brandy Springs Park in Mercer Borough has flooding and sedimentation.
- *Mercer County Conservation District:* Munnel Run from US 19 to mouth has flooding and bank erosion.
- *Mercer County Conservation District:* Otter Creek from ITT Reznor to mouth in Mercer Borough has flooding and bank erosion.
- *Mercer County Conservation District:* Coolspring Creek at SR 58 in Mercer Borough has flooding.
- *Mercer County Conservation District:* Neshannock Creek from SR 58 in Mercer Borough to Blacktown Road has bank erosion and flooding.
- *Mercer County Conservation District:* Coolspring Creek upstream of Lake Latonka has sedimentation and bank erosion.

5.1.6 Little Neshannock Creek Watershed

The following municipalities lie within the Little Neshannock Creek watershed: A portion of East Lackawannock Township, a portion of Hermitage, a portion of Jefferson Township, a portion of Lackawannock Township, a portion of Shenango Township, and a portion of Wilmington Township.

The primary stormwater concern within the Little Neshannock Creek watershed was increased runoff. Secondary issues were undersized culverts, and poor drainage. Other issues mentioned included development within floodplains, field flooding, and streambank erosion. (Appendix C, Figures 11 & 12)

The Little Neshannock Creek watershed is located adjacent to and just west of the Neshannock Creek watershed. It drains an area of 32,410 acres (50.6 square miles), of which 26,768 acres (41.8 square miles) are located within Mercer County. This watershed's drainage flows out of Mercer County to the south and into Neshannock Creek which flows into the Beaver River, part of the Ohio River watershed. In general, the Little Neshannock Creek watershed is somewhat flat in topography, becoming steeper

along Little Neshannock Creek. It consists of poorly drained soils with underlying bedrock that has moderate to low porosity and permeability, predisposing the area to excess runoff. Areas of high density urban land use within the watershed include New Wilmington and small areas of high and low density urban land use dotted along Route 518. The remainder of the watershed consists mainly of a mixture of forest and farmland. Wetlands are also noted in the vicinity of Little Neshannock Creek. These wetlands provide flood storage and help water to infiltrate into the groundwater rather than running off into and flooding nearby creeks. Following is a detailed description of the Little Neshannock Creek watershed within Mercer County:

Soils – Little Neshannock Creek is surrounded by the Canfield-Ravenna association, found on gently sloping to moderately steep uplands underlain by glacial till. It is a moderately well drained and somewhat poorly drained soil association. Parts of this watershed also contain a small amount of the Chenango-Braceville-Halsey association, a well drained to very poorly drained soil type found on gently sloping to moderately steep stream terraces and moraines underlain by sandy and gravelly deposits. The remainder of the watershed contains the Ravenna-Frenchtown association, somewhat poorly drained to poorly drained soils found on nearly level to gently sloping uplands. (Appendix A, Figure 6.) This watershed also contains approximately 14,598 acres (22.8 square miles) of prime farmland soils, the majority of which are being farmed. (Appendix A, Figure 5.)

Geology – At the northern tip of the watershed is a small, 32 acre (.05 square mile), section of the Shenango formation, composed of siltstone, and having moderate to low porosity and moderate to low permeability. The majority of the watershed, 23,951 acres (37.4 square miles), is composed of the Pottsville formation, composed of shale, siltstone, claystone, limestone, and coal. This formation has variable porosity and moderate to low permeability. Approximately 2,794 acres (4.4 square miles) of the Allegheny formation is found within the Little Neshannock Creek watershed. This formation has moderate to low porosity and moderate to low permeability. (Appendix A, Figure 3.)

Slope – The majority of the watershed is flat, having 0%-8% grade. The watershed becomes relatively hilly around Little Neshannock Creek and its West Branch, having 16-25% grade. Parts of the land along Little Neshannock Creek, is very steep and has a >25% grade. (Appendix A, Figure 4.)

Land Use – Appendix A, Figure 7 contains a map of the primary land uses within Mercer County, overlain with the watershed boundaries. The following table presents coverage of the most dominant land uses within the watershed:

Land Use	Acres	Square Miles	Percent of Watershed
Farmland	12,642	19.8	47%
Forested	10,065	15.7	38%
Wetland	1,176	1.8	<1%
Low Density Urban	791	1.2	<1%
High Density Urban	326	0.5	<1%
Water	48	0.1	<1%

Stormwater Management Issues Identified as Significant by Each Municipality within the Little Neshannock Creek Watershed.

East Lackwannock Township

- Control the flooding of streams and streets, soil erosion, stream bed and bank erosion, in-stream sedimentation, habitat/resource damage caused by increased runoff from the development of parking lots, yards, streets, and roads.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Monitor and management of increased runoff from Gabany's proposed development near the borough of Mercer.

City of Hermitage

- Moderate stream flooding caused by increased runoff.
- Stabilizing peak flow conditions.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat.
- Control the flooding of streams and streets, soil erosion, stream bed and bank erosion, in-stream sedimentation, habitat/resource damage caused by increased runoff from the development of parking lots, yards, streets, and roads.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Maintenance and control of flooding associated with small tributaries during extreme storm events.
- Allocating the funding to maintain the existing stormwater system and to make improvements.

Jefferson Township

- Stabilizing peak flow conditions.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts caused by increased surface runoff during extreme storm events.

Shenango Township

- Control the erosion of stream banks and beds, soil erosion, in-stream sedimentation, undercut roads and utilities, damage to in-stream habitat, clogging to culverts and bridges caused by increased runoff, poor drainage, and undersized structures.
- Monitor and management of increased runoff and field flooding on Fennel Road.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts caused by increased surface runoff during extreme storm events.

Wilmington Township

- Control the erosion of stream banks and beds, soil erosion, in-stream sedimentation, undercut roads and utilities, damage to in-stream habitat, clogging to culverts and bridges caused by increased runoff, poor drainage, and undersized structures, especially along Bend Road, Garrett Road, Orchard Road, Means Road, and Ferris Road.
- East and West branch of Little Neshannock Creek have flooding, erosion, and sediment deposition issues, especially at the Gilliland and Campbell properties.
- Scouring at outfalls along Garrett Road, with soil erosion and culvert problems also noted.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Stabilizing peak flow conditions.
- Monitor and manage the potential for soil runoff, animal waste and fertilizer contamination into streams due to primary land use within the township being agricultural.

Agency Comments

- *Mercer County Conservation District:* Little Neshannock Creek in Wilmington Borough from SR 158 south to county line has bank erosion, sedimentation, and flooding.

5.1.7. Little Shenango River Watershed

The following municipalities lie within the Little Shenango River watershed: A portion of Fairview Township, a portion of Greene Township, a portion of Greenville Borough, a portion of Hempfield Township, a portion of Lake Township, a portion of New Vernon Township, a portion of Otter Creek Township, a portion of Perry Township, a portion of Salem Township, a portion of Sandy Creek Township, and all of Sugar Grove Township.

Within the Little Shenango River watershed, the primary stormwater related concern was increased runoff, with secondary issues being undersized culverts, development in the floodplains, poor drainage, and ponding on roads. Other issues included stream flooding, and sediment buildup in streams. (Appendix C, Figure 13 & 14)

The Little Shenango River watershed is in the north central portion of the county. It drains an area of 69,240 acres (108.2 square miles), of which 47,309 acres (73.9 square miles) are within Mercer County. This watershed's drainage flows into the county from the north and drains into the Shenango River, which merges with the Beaver River to form the Mahoning River, part of the Ohio River watershed. In general, the Little Shenango River watershed is relatively flat in topography with some steep slopes along the river. The watershed consists of poorly drained to moderately drained soils with underlying bedrock that has moderate to low porosity and permeability, predisposing the area to runoff. High density urban land uses are dotted along Route 358 intermixed with small areas of low density urban land use (residential areas). Only a small portion of Greenville lies within the Little Shenango River watershed. Greenville is a moderately sized, high density, urban area. The portion of Greenville within the Little Shenango watershed lies on relatively flat topography; therefore, it does not have the same runoff issues that the western portion of the municipality has. The remainder of the Little Shenango River watershed consists of mainly forested area and farmland. A considerable amount of wetlands can be found in the northwest section of the watershed. These wetlands are important because they provide flood storage and help water to infiltrate into the groundwater rather than running off into and flooding nearby creeks. Following is a detailed description of the Little Shenango River watershed within Mercer County:

Soils – The River itself is surrounded by the Wayland, course variant-Papakating-Red Hook association. This association consists of very poorly drained to moderately drained soils, found on nearly level floodplains and underlain by alluvium. Immediately surrounding that association is the Chenango-Braceville-Halsey association. This association can be well drained to very poorly drained, and is found on gently sloping to moderately steep stream terraces and moraines. It can range from being well drained to very poorly drained. A small amount of the Canfield-Ravenna association is found in the northeast, on gently sloping to moderately steep uplands underlain by glacial till. The remainder of the watershed consists of the Ravenna-Frenchtown association, somewhat poorly drained to poorly drained soils, found on nearly level to gently sloping uplands. (Appendix A, Figure 6.)

Geology – The Little Shenango River is underlain by 5,226 acres (8.2 square miles) of the Berea sandstone through Venango formation, undivided. This bedrock formation is composed of a shale conglomerate and has moderate to low porosity and moderate to low permeability. Approximately 12,371 acres (19.3 square miles) of the Cuyahoga formation can be found underlying the floodplains. This formation is comprised of sandstone and has low porosity and low permeability. Surrounding the Cuyahoga formation is approximately 14,686 acres (23.0 square miles) of the Shenango formation, composed of siltstone and having moderate to low porosity and moderate to low permeability. The east is composed of 14,672 acres (23.0 square miles) of the Pottsville formation. This formation is composed of shale, siltstone, claystone, limestone, and coal and has variable porosity and moderate to low permeability. (Appendix A, Figure 3.)

Slope – This watershed is very flat, having 0%-8% grade throughout the majority of the north. Along the river, the watershed becomes relatively hilly with some steeper slopes 16%-25% grade to the south. Directly around the river can be found some slopes that have >25% grade. (Appendix A, Figure 4.)

Land Use – Appendix A, Figure 7 contains a map of the primary land uses within Mercer County, overlain with the watershed boundaries. The following table presents coverage of the most dominant land uses within the watershed:

Land Use	Acres	Square Miles	Percent of Watershed
Farmland	19,314	30.2	
Forested	21,441	33.5	
Wetland	1,702	2.7	
Low Density Urban	1,058	1.7	
High Density Urban	888	1.4	
Water	124	0.2	

Stormwater Management Issues Identified as Significant by Each Municipality within the Little Shenango River Watershed

Borough of Greenville

- Funding to upgrade existing storm water system.
- Controls and standards for issues that affect the runoff, erosion.
- Erosion of outflow drainage at Penn Power sub station off North Mercer Street – Replace outflow pipe and stabilize outflow area.
- Stabilizing peak flow conditions.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.

- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Regulate and monitor overbank flows associated with extreme storm events.

Hempfield Township

- New commercial development and stormwater runoff from PennDOT owned and maintained roadways.
- Stabilizing peak flow conditions.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.

New Vernon Township

- Stormwater controls and best management practices.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Stabilizing peak flow conditions.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Regulate and monitor overbank flows associated with extreme storm events.

Otter Creek Township

- Control road flooding and ponding north of the intersection of Route 358 and Freeland/Henry Road during heavy rain events.
- Control road flooding and ponding on Hughley Road north of the intersection of Hughley Road and Lyn Tyro Road during heavy rain events.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts caused by increased surface runoff during extreme storm events.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Stabilizing peak flow conditions.
- Regulate and monitor overbank flows associated with extreme storm events.
- Property damage, bridge/culvert damage, stream, street, and property flooding have occurred as a result of poor drainage and undersized structures insufficiently transporting stormwater.

Salem Township

- Because of the hills in Salem Township, the most important issues are wash outs on the roads and keeping the culverts open.
- Regulate stream flooding, soil erosion, stream bed and bank erosion, in-stream sedimentation, and bridge/ culvert damage caused by increased runoff.
- Control the erosion associated with roadways and keeping culverts free of obstructions.
- Stabilizing peak flow conditions.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.

Sandy Creek Township

- Control stream bank erosion along Tributary 36226 to Morrison Run along Pearson Road south of the intersection of Pearson Road and Petersburg Road.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Regulate stream flooding, soil erosion, stream bed and bank erosion, and bridge/ culvert damage caused by increased runoff, undersized structures, and floodplain development.

Agency Comments

- *PA Fish & Boat Commission*: Erosion and flooding on Werner Road and Leech Road. Pasture flooding onto the road.
- *Mercer County Conservation District*: Flooding problems on Log Cabin Road and Leech Road in Sugar Grove Township.

5.1.8. Shenango River Watershed

The following municipalities lie within the Shenango River watershed: A portion of Delaware Township, a portion of Greene Township, a portion of Greenville Borough, a portion of Hempfield Township, all of Jamestown Borough, all of Pymatuning Township, all of West Salem Township, all of Clark, part of East Lackawannock Township, all of the City of Farrell, a portion of the City of Hermitage, a portion of Jefferson Township, a portion of Lackawannock Township, all of the City of Sharon, all of Sharpsville Borough, a portion of Shenango Township, all of South Pymatuning Township, all of West Middlesex Borough, all of Wheatland Borough, and a portion of Wilmington Township.

The primary stormwater concern in the Shenango River watershed was increased runoff. Secondary issues included poor drainage, stream erosion, street flooding, and undersized culverts. Other issues mentioned were development in the floodplains, field flooding, and scouring at outfalls. (Appendix C, Figures 15 & 16).

The Shenango River watershed drains approximately the western 1/3 of the county, an area of 279,107 acres (436.1 square miles) of which 144,500 acres (226.0 square miles) lie within Mercer County. In general, the Shenango River watershed is very flat in topography, becoming steeper along the river, with some very steep slopes along the southern portion of the river. It consists of moderately drained to poorly drained soils with underlying bedrock that has moderate to low porosity and permeability, predisposing the area to runoff. Areas of high density urban land use within the northern half of the watershed include the majority of Greenville, the Transfer/Reynolds area, and small areas dotted along route 18. The highest density of urban and commercial land use in the county is found in the southern half of the watershed in an area called the "Shenango Valley", containing the Cities of Sharon, Hermitage, and Farrell, and the Boroughs of Sharpsville, Wheatland and West Middlesex. This dense urban land use predisposes an area to increased runoff, flooding, sedimentation, and water pollution. Because the Shenango River flows through the western portion of the Borough of Greenville, the topography is steeper along the river than in the remainder of the municipality. Route 18 into Greenville closely follows the Shenango River; therefore, that portion of Greenville has steeper slopes and extreme runoff problems after rain events. The reminder of the northern Shenango River watershed consists mainly of farmland with some forested areas, especially around the Shenango Lake Reservoir. The north western corner of the watershed contains wetlands, some considerable in size. These wetlands provide flood storage and help water to infiltrate into the groundwater rather than running off into and flooding nearby creeks. The area surrounding the Shenango Valley consists mainly of farmland and forest, with some low density urban areas adjacent to the major county and state roads.

Municipal separate storm sewer systems (MS4s) are designed to collect polluted storm water runoff and discharge it, untreated, into local rivers and streams. The Environmental Protection Agency established Phase I of the National Pollutant Discharge Elimination System (NPDES) stormwater program in 1990 to implement a stormwater management program as a means to control polluted discharges. Phase I of NPDES requires the operators of MS4s that serve populations of 100,000 or greater to implement a stormwater management program as a means to control polluted discharges from those MS4s.

The Stormwater Phase II Rule extends coverage of the NPDES stormwater program to certain "small" MS4s but takes a slightly different approach to how the stormwater management program is developed and implemented.

> EPA's Stormwater Phase II Rule establishes an MS4 stormwater management program that is intended to improve the Nation's waterways by reducing the quantity of pollutants that stormwater picks up and carries into storm sewer systems during storm events. Common pollutants include oil and grease from roadways, pesticides from lawns, sediment from construction sites, and carelessly discarded trash, such as cigarette butts, paper wrappers, and plastic bottles. When deposited into nearby waterways through MS4 discharges, these pollutants can

impair the waterways, thereby discouraging recreational use of the resource, contaminating drinking water supplies, and interfering with the habitat for fish, other aquatic organisms, and wildlife (Environmental Protection Agency Website).

The only MS4 Municipalities within Mercer County lie within the Shenango River watershed. They include the Cities of Sharon and Farrell, Hermitage, and the Borough of Sharpsville.

Following is a detailed description of the Little Shenango River watershed within Mercer County:

Soils –The soils surrounding the Shenango River in the north consist mainly of the Canfield-Ravenna association, a soil association that ranges from having moderately well drained to somewhat poorly drained characteristics. This association can be found on gently sloping to moderately steep uplands underlain by glacial till. Surrounding the Shenango River in the south is the Wayland, coarse variant-Papakating-Red Hook soil association, a very poorly drained to moderately drained association found on nearly level floodplains underlain by alluvium. Surrounding is the Canfield-Ravenna association, found on gently sloping and moderately steep uplands underlain by glacial till. This association ranges from being moderately well drained to being somewhat poorly drained. The far northern river and the southern river also are surrounded by the Wayland, course variant-Papakating-Red Hook association. This association consists of very poorly drained to moderately drained soils found on nearly level floodplains underlain by alluvium. The soils around Big Run, and in the floodplains of the southern portion of the Shenango River consist of the Chenango-Braceville-Halsey association, soils that range from being well drained to very poorly drained, and are found on gently sloping to moderately steep stream terraces and moraines and are underlain by sandy and gravelly deposits. The majority of the watershed consists of the Ravenna-Frenchtown association, a composition that is somewhat poorly drained to poorly drained and is found on the nearly level to gently sloping uplands surrounding the rivers. (Appendix A, Figure 6.)

Geology – The northern part of the river and the Shenango Reservoir is underlain by 8,016 (12.5 square miles) of the Berea Sandstone through Venango formation, undivided. This formation is composed of a shale conglomerate and has moderate to low porosity and permeability. The remainder of the river and the streams in this watershed are underlain by 55,315 acres (86.4 square miles) of the Cuyahoga group, composed of sandstone. This formation has low porosity and low permeability. Approximately 30,430 acres (47.6 square miles) of the Shenango formation, composed of siltstone is found surrounding the Cuyahoga group. The Shenango formation has moderate to low porosity and moderate to low permeability. Approximately 50,429 acres (78.9 square miles) of the Pottsville formation is found in this watershed. This formation consists of shale, siltstone, claystone, limestone, and coal. This formation has variable porosity and moderate to low permeability. (Appendix A, Figure 3.)

Slope – The general topography of the watershed is very flat, having 0%-8% grade. The land around the river is hillier, having 16%-25% grade. These slopes become steeper along the Shenango River, especially in the south where slopes can exceed 25% grade in places. (Appendix A, Figure 4.)

Land Use – Appendix A, Figure 7 contains a map of the primary land uses within Mercer County, overlain with the watershed boundaries. The Shenango River watershed contains the highest percentage of urban land use of any watershed in Mercer County as it contains the Shenango Valley, Greenville and the Transfer/Reynolds areas. The majority of the northern portion of the watershed is farmland, intermixed with forested areas, with a forested buffer around the Shenango Lake Reservoir to the south. In the rural areas surrounding the Shenango Valley, sprawl is occurring into farmland and forested areas. The following table presents coverage of the most dominant land uses within the watershed:

Land Use	Acres	Square Miles	Percent of Watershed
Farmland	55,324	86.0	38%
Forested	53,618	83.0	37%
High Density Urban	10,930	17.0	8%
Low Density Urban	4,798	7.5	3%
Wetland	3,298	5.2	3%
Water	4,185	6.6	2%

Stormwater Management Issues Identified as Significant by Each Municipality within the Shenango River Watershed

Clark Borough

- Regulate and monitor overbank flows associated with extreme storm events.
- Stabilizing peak flow conditions.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Monitor and management of increased runoff from upstream municipalities into the Borough and into the Shenango Reservoir.
- Control the flooding of streams and streets, soil erosion, stream bed and bank erosion, in-stream sedimentation, habitat/resource damage caused by increased runoff from the development of parking lots, yards, streets, and roads.
- Finding the funding to pay for necessary improvements.
- Runoff causing channeling on properties between Charles Street and Valley View Road, between Charles Street and Milton Street, and between Nora

Street and Winner Road. Also, noted problems on Route 258 at a culvert crossing (site shown on map).
- Flooding issues along Clay Furnace Road between Route 258 and Neshannock Road.

Delaware Township
- Property damage and soil erosion has occurred along Rock School Road, Beil Road, and Line Road as a result of increased runoff and poor drainage.
- Property damage and flooding has occurred along Stull Road as a result of poor drainage and undersized structures.
- Street flooding, bridge and culvert damage, and scour at outfalls has occurred along Quarry Road as a result of undersized structures.
- Bridge, culvert, and property damage has occurred along Heckman Road as a result of poor drainage and undersized structures.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Stabilizing peak flow conditions.
- Regulate and monitor overbank flows associated with extreme storm events.
- Delaware Township feels that current practices need to be made friendlier when replacing existing structures (i.e. bridges, large culverts); for instance, the permit process needs to be waived or expedited.

East Lackwannock Township
- Control the flooding of streams and streets, soil erosion, stream bed and bank erosion, in-stream sedimentation, habitat/resource damage caused by increased runoff from the development of parking lots, yards, streets, and roads.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Monitor and management of increased runoff from private golf course along Route 62.

City of Farrell
- Stabilizing peak flow conditions.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat

- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events. The Route 60 North storm sewer has a heavy accumulation of debris and partial obstruction of a 60" culvert pipe.
- Monitor and management of increased runoff between Pershing Drive, Landay Lane, and DeBrakeleer Avenue.
- Correction of significant ditch erosion between Pershing Drive and DeBrakeleer Avenue

Borough of Greenville

- Funding to upgrade existing storm water system.
- Controls and standards for issues that affect the runoff, erosion.
- Flooding of Stewart Avenue several times a year. Dredge the Erie Canal detention of runoff during the development of Trinity site.
- Flooding of Lancaster, Lebanon, and York Street area several times a year. Increasing drainage sizing and dredge Erie Canal.
- Flooding and erosion of road drainage in the area of East Greenville Drive and Hempfield Drive. Re-channel water upstream or detention of water, or increase and extend piping.
- Plum and Union Street - sewer cannot be cleared causing flooding. Replace old storm sewer.
- Bracken Alley - storm sewer is undermined and sink holes appear annually. Replace rusted out pipe.
- West Drive - erosion of the road side in the area west of Clarksville Street. Flooding of Clarksville Street. Dredge and drain ditches, riprap or possibility of piping ditch.
- Saul Run at Lancaster Bridge – silt and gravel build up. Could block bridge causing damage and flooding. Dredge Channel.
- Lebanon Avenue Bridge – silt and sand build up. Could block bridge causing damage and flooding. Dredge Channel.
- Saul Run – concrete channel, silt buildup; has to be dredged every couple of years.
- Henry Camp – road floods over banks every couple of years. Dike Saul Run banks to increase capacity.
- Flooding behind the Greenville Municipal building annually. Unknown solution.
- Flooding and silt and gravel build in small streams crossing North Third Street ext. Detention ponds up stream in West Salem Township.
- Flooding at the Borough line along Orangeville Road. Detention ponds up stream in West Salem Township.
- North Second Street 24" storm sewer is caving in. It could clog and cause flooding. Upgrade the old stone and clay pipe.
- Harrison Street Storm is old and undersized. Replace the sewer system in the area of Pringles.

- York Street Flooding. This will increase as the Trinity site is developed. Dredge the Erie Canal biannually; incorporate detention measures in any new development.
- Billing Alley drainage – The drainage goes onto private property in an undersized broken pipe. The pipe needs upgraded and put on a public easement.
- Stewart Avenue and Columbia Avenue – Ponding on Columbia every time it rains.
- East Avenue and Columbia Avenue – Ponding every time it rains.
- Main Street and Grant Street Ponding – Up size the pipe under the railroad crossing.
- Clinton Street and Canal Street - Up size the pipe under the railroad crossing.
- Stabilizing peak flow conditions.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Regulate and monitor overbank flows associated with extreme storm events.

Hempfield Township

- New commercial development and stormwater runoff from PennDOT owned and maintained roadways.
- On Cedar Drive and Birch Drive: PennDOT has culverted the water off of Conneaut Lake Road under municipal roads and into municipal culverts. This has caused increased runoff of water into the ditches and is causing erosion of the ditches along these two residential roads. Residents are losing portions of their front yards due to wash-outs.
- Control the problem associated with the intersection of Donation and Eighth Avenue caused by an undersized pipe.
- Control ponding in the vicinity of Saul Avenue and Woodbine Avenue.
- Waugh Avenue is located in the flood plain of the Shenango River and is prone to flooding during extreme storm events.
- An undersized culvert causes problems along Saint Glory Road.
- Stabilizing peak flow conditions.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.

City of Hermitage

- Flooding, sedimentation and erosion of stream banks of Baker Run, washing out residential yards.
- Moderate stream flooding caused by increased runoff.
- Stabilizing peak flow conditions.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat
- Control the flooding of streams and streets, soil erosion, stream bed and bank erosion, in-stream sedimentation, habitat/ resource damage caused by increased runoff from the development of parking lots, yards, streets, and roads.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Erosion of stream banks of Bobby Run.
- Maintenance and control of flooding associated with small tributaries during extreme storm events.
- Allocating the funding to maintain the existing stormwater system and to make improvements.

Jefferson Township

- Stabilizing peak flow conditions.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts caused by increased surface runoff during extreme storm events. Erosion and culvert problems on Ballpark Road, Charleston Road, Skyline Drive, and Bend Road. Ponding on Ballpark Road and Skyline Drive.

City of Sharon

- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat
- Maintenance and control of flooding associated with small tributaries during extreme storm events.
- Stabilizing peak flow conditions.
- Ponding noted at the Fire Station, at the corner of Dock Street and the entrance to the former Flower Lumber, on South Irvine Avenue, and at corner of East State Street and Forker Blvd. Erosion along Bay Way, along Pine Run, and beneath the 24” pipe at St. Joe’s parking lot.
- A fallen tree lays across the outfall at Budd Street and Sterling Avenue.

Sharpsville Borough

- Monitor and management of increased runoff from upstream municipalities.
- Monitor and management of water quality at Buhl Farm Lakes.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts caused by increased surface runoff during extreme storm events. Undersized culverts at Twitmeyer Avenue and along Thornton Run, and erosion along the channel at High Street.
- Stabilizing peak flow conditions.
- Regulate and monitor overbank flows associated with extreme storm events.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat
- Allocating the funding to maintain the existing stormwater system and to make improvements.

Shenango Township

- Control the erosion of stream banks and beds, soil erosion, in-stream sedimentation, undercut roads and utilities, damage to in-stream habitat, clogging to culverts and bridges caused by increased runoff, poor drainage, and undersized structures.
- Monitor and management of increased runoff and field flooding on Koncar Road and road flooding on Frampton Road where a culvert is washing out.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts caused by increased surface runoff during extreme storm events.

South Pymatuning

- Flooding and erosion issues: Buckeye Drive between Tamarack Drive and Hunter Street, Springwood Drive, erosion on Colt Road and Town Line, Buckeye Drive and Calahan, McCullough Run flooding onto Tamarack Drive and onto private properties, flooding from fields onto Tamarack Drive, flooding on Buckeye Drive, erosion at Saranac Drive and Huron, flooding on Hartford Road, flooding on Seneca Road, undersized culverts on Kane Road Seneca Drive, Tamarack Drive, Hummingbird Way, Blue Jay Way, and Maplewood Drive.
- Stabilizing peak flow conditions.
- Control the erosion of stream banks and beds, soil erosion, in-stream sedimentation, undercut roads and utilities, damage to in-stream habitat, clogging to culverts and bridges caused by increased runoff, poor drainage, and undersized structures.

- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat
- Regulate and monitor overbank flows associated with extreme storm events.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.

West Middlesex Borough

- Stabilizing peak flow conditions.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat
- Regulate and monitor overbank flows associated with extreme storm events.
- Control the erosion of stream banks and beds, soil erosion, in-stream sedimentation, undercut roads and utilities, damage to in-stream habitat, clogging to culverts and bridges caused by increased runoff, poor drainage, and undersized structures. Cited problems with erosion of the drainage ditch at Penn Avenue, drainage problems at the West Middlesex United Methodist Church parking lot, problems on Rt. 318 between School Street and Kiwanis Road, drainage problems on Route 18 in front of the High School, and increased flow on Hogback Run.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Monitor and management of increased runoff from upstream municipalities.
- Allocating the funding to maintain the existing stormwater system and to make improvements.

West Salem Township

- Stabilizing peak flow conditions.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Control the erosion of stream beds and banks, undercut roads and utilities, damage to in-stream cover, and clogging of bridges and culverts during extreme storm events.

- Control stream and property flooding, soil erosion, in-stream sedimentation, stream bed and bank erosion, and scour at outfalls caused by increased runoff.
- Control habitat/ resource damage from unknown causes.

Wheatland

- Stabilizing peak flow conditions.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat
- Regulate and monitor overbank flows associated with extreme storm events.
- Control flooding on Council Avenue just north of the Shenango River.

Wilmington Township

- Stabilizing peak flow conditions.
- Decrease watershed pollution including dissolved and un-dissolved pollutants from increased runoff causing negative impacts to recreation, aesthetics, and in-stream habitat
- Regulate and monitor overbank flows associated with extreme storm events.
- Control the erosion of stream banks and beds, soil erosion, in-stream sedimentation, undercut roads and utilities, damage to in-stream habitat, clogging to culverts and bridges caused by increased runoff, poor drainage, and undersized structures.
- Maintain groundwater supplies as increasing runoff decreases the amount of rain that becomes groundwater. Decreased groundwater supplies may have negative effects on well water supplies or dry up stream baseflow in dry periods.
- Allocating the funding to maintain the existing stormwater system and to make improvements

Agency Comments

- *Shenango River Watchers*: Flooding across Route 18 North into Greenville after rain events.
- *Mercer County Conservation District:* Un-named tributaries to Big Run in Reynolds between 10^{th} and 20^{th} streets have flooding issues.
- *Mercer County Conservation District:* Lowango Run in New Hamburg from the mouth to SR 58 has sedimentation and bank erosion.
- *Mercer County Conservation District:* Saul Run in Greenville from CN RR to mouth has bank erosion, sedimentation, and flooding.
- *Shenango River Watchers*: Increased runoff – road flooding on State Street between Taylor Avenue and Stambaugh Avenue during rain events.
- *Shenango River Watchers*: Bank erosion issues on Shenango River near Budd Street and Shenango Valley Freeway.
- *Shenango River Watchers*: Sedimentation into river from construction of new waste water treatment plant in Sharon.

- *Shenango River Watchers*: Scrap metal along banks of river and runoff of oil into river from Mercer Company property in Sharon.
- *Shenango River Watchers*: Flooding at parking lot over Baker Run in Hermitage after every rain event.
- *Shenango River Watchers*: Flooding, bank erosion to Pine Hollow Run along Shenango Valley Freeway in Sharon.
- *Shenango River Watchers*: Flooding down streets on West Hill in Sharon during rain events.
- *Shenango River Watchers*: Flooding after every rain event at corner of Connelly Blvd. and Chestnut Street.
- *PA Fish & Boat Commission*: Flooding issues on Lamor Road in Jefferson Township.
- *PA Fish & Boat Commission*: River Road in Jefferson Township is washed out.
- *PA Fish & Boat Commission*: High sediment load in Booth Run, South Pymatuning Township.
- *PA Fish & Boat Commission*: Storm drain flows directly into stream causing erosion and pollution, especially at I-80 and Route 60 interchange, and on Dutch Lane in Hermitage.
- *PA Fish & Boat Commission*: Flooding on Edgewood Drive in Pymatuning Township.
- *Mercer County Conservation District*: Un-named tributary to the Shenango River in the west side of the campground in West Middlesex has increased sediment load, bank erosion and flooding.
- *Mercer County Conservation District:* Turkey Run in Shenango Township at Campground Road has bank erosion and increased sedimentation.
- *Mercer County Conservation District:* Hogback Run from source in Hermitage to mount has bank erosion, increased sediment load, and flooding.
- *Mercer County Conservation District:* Bobby Run from source to mount has bank erosion, sediment, and flooding.
- *Mercer County Conservation District:* In South Pymatuning Township east of Tamarack Road and Seneca Road down slope from Dean Dairy and Brookfield Farms, flooding and sedimentation noted along roadway.
- *Mercer County Conservation District:* Booth Run in West Salem Township and South Pymatuning Township from source to mouth has sedimentation, bank erosion, and flooding.
- *PA Fish & Boat Commission*: Increased sedimentation in Pine Hollow Run in Hermitage.
- *US Army Corps of Engineers (Shenango Lake Reservoir)*: Extreme sedimentation problem entering reservoir from Pine Hollow Run in Hermitage.
- *Shenango River Watchers*: Ponding on Highland Road near corner of Highland Road and Boyd Drive.

- *Mercer County Conservation District*: Flooding of Pine Hollow Run at Shenango Valley Freeway near the Honda Shop.
- *Mercer County Conservation District*: Flooding on Dutch Lane near the entrance to the trailer park.

6.0 PHASE II DISCUSSION

6.1 Items to be addressed in Phase II

Throughout the Phase I process the WPAC identified items for investigation during the Phase II planning process and in the final plan. The following list identifies the general outline of the tasks that would be address during Phase II. A detailed breakdown of the Phase II Scope of Work can be found in Appendix D.

Task A – Data Collection, Review, Analysis

A.1 – Data Collection
A.2 – Municipal Ordinance Reviews/Evaluations
A.3 – Data Preparation for Technical Analysis
A.4 – Timber Harvesting Regulations
A 5 – Well Development Regulations
A 6 – Mining Regulations

Task B – Technical Analysis

B.1 – Technical Standards and Criteria
B.2 –Watershed Modeling
B.3 – Existing Problem Areas and Solutions
B.4 – Economic Analysis
B.5 – Water Quality Impairments

Task C – Public/Municipal Participation

C.1 – Project Team Meetings
C.2 – WPAC Meetings
C.3 – Municipal Engineers Committee Meetings
C.2 – Legal Advisory Committee Meetings
C.3 – Municipal Coordination, Education, Assistance

Task D – Stormwater Management Plan Preparation

D.1 – SWMP Report Preparation
D.2 – Project Mapping and GIS Preparation
D.3 – SWMP Reproduction

The Phase II project would include a detailed hydrologic and hydraulic modeling of seven (7) major streams and approximately twenty (20) smaller streams within Mercer

County. The selection of the seven (7) major streams was based on several factors, including land use and the number of existing problematic areas reported by the WPAC members. The following presents a short description of each of the eight (8) major streams within Mercer County.

French Creek: Only a small portion of the relatively large French Creek watershed lies within Mercer County. There were relatively few problems in this watershed compared to others in the County. This watershed's flow does not contribute to problems in other watersheds within the County. Therefore, it has been determined that it would not be beneficial to model this watershed.

Sandy Creek: The WPAC identified many runoff, erosion, and obstruction areas within this watershed. A large part of this watershed lies within the Mercer County boundary. Since this watershed contains some steep slopes surrounding an urban area and a significant amount of flooding issues, it has been determined that it would be beneficial to model this watershed.

Wolf Creek: The WPAC identified many runoff, erosion and obstruction problems within this watershed. The majority of this watershed lies within Mercer County, so many of its runoff issues stay within the county. It has been determined that it would be beneficial to model this watershed.

Slippery Rock Creek: The portion of this watershed within Mercer County is the headwaters, and is a relatively small portion of the entire watershed. There were no significant problems identified by municipalities within this watershed; therefore, it has been determined that it would not be practical to model this watershed.

Neshannock Creek: Due to the overall size of the Neshannock Creek watershed, it was determined to be feasible to model only sub-watersheds where areas of concern were addressed by the WPAC. Sub-watersheds to model may include: Otter Creek, Pine Run, Mill Creek, Coolspring Creek, Yellow Creek, parts of Neshannock Creek, and Munnel Run.

Little Neshannock Creek: The majority of this watershed lies within the Mercer County area. Relatively few problems were identified within this watershed. However, since a large portion of this watershed lies within the County, it has been determined to be feasible to model only the sub-watersheds directly associated with the identified problems, such as the East Branch of Little Neshannock Creek, the West Branch of Little Neshannock Creek, and parts of Little Neshannock Creek.

Little Shenango River: The majority of this watershed lies within the Mercer County area, and this watershed's drainage directly affects the downstream municipalities within Mercer County. Many flooding, ponding and runoff issues were identified by the WPAC within this watershed; therefore, it has been determined that it would be important to model this watershed.

Shenango River: This watershed is where the most problems were identified by the WPAC. Runoff and erosion problems, flooding and ponding issues, and undersized culverts were identified throughout this watershed; therefore it has been determined to be necessary to model several sub-watersheds within this section of the Shenango River watershed. The City of Hermitage recently completed an assessment of the watersheds within their municipality. This plan will be incorporated into Phase II; therefore, those sub-watersheds will not need to be modeled.

As part of the Phase II planning, a Model Ordinance will be created. This ordinance will incorporate the standards and provisions of the SWMP and will ensure that future growth and development within the County would not exacerbate the problem areas noted in Phase I or create new problematic areas.

7.0 GENERAL WORK PLAN

7.1 Phase II Agreement

After Phase I report is submitted and approved by the PaDEP, they will enter into an agreement with Mercer County to complete Phase II of the project. The PaDEP will allocate funding for the project prior to the start of any of the Phase II tasks. A 75% reimbursement procedure will be implemented during the Phase II project. See Appendix D – Phase II Scope of Work.

7.2 Consultant Selection

An engineering consulting firm will assist Mercer County to complete the Phase II work plan and prepare the final SWMP. The consultant must have demonstrated knowledge and expertise working with stormwater related issues, has intimate knowledge of the municipalities within the County, and experience with the Act 167 process.

7.3 Questionnaire

The questionnaire distributed during Phase I of the project at WPAC meetings will be used to assist in the technical and non-technical planning process of Phase II. The problem areas identified on the questionnaire will be analyzed and the sub-watersheds will be modeled reviewed and/or modeled to determine possible solutions to the reported problems. These data will also be analyzed to help determine which Best Management Practices (BMPs) to recommend in the model ordinance.

7.4 Watershed Plan Advisory Committee

The *Watershed Plan Advisory Committee* (WPAC) was formed during Phase I and will continue to meet throughout Phase II planning process. WPAC meetings would initially be held at regular intervals to obtain input and provide project updates to the municipal representatives. As Phase II progresses the need for a regularly scheduled meeting may

be changed to accommodate project progress and reduce the need for unnecessary meetings. It is assumed that twelve (12) WPAC meetings would be held.

7.5 Municipal Engineers Committee

The *Municipal Engineers Committee* (MEC) will be composed of municipal engineers representing the municipalities or doing work within Mercer County. This committee will be established during Phase II and will serve the purpose of discussing the technical aspects of the plan, including watershed modeling and technical analysis. This committee will assist in the development of stormwater management methods based on problems identified within the municipalities.

7.6 Legal Advisory Committee

The *Legal Advisory Committee* (LAC) would include municipal solicitors representing the municipalities within Mercer County. This committee would be established during Phase II and would seek input and review of the model ordinance and the overall SWMP.

7.7 Technical Standards and Criteria

A comprehensive analysis would be conducted to identify and evaluate existing stormwater management ordinances, Act 167 Plans for other counties, and the Pennsylvania Stormwater Best Management Practices Manual, December 30, 2006 (BMP Manual).

The underlying goal of implementing BMPs for stormwater control is to preserve and enhance the water quality of the Waters of the Commonwealth. Historically, the PaDEP approached the control of stormwater runoff by regulating the peak runoff flow rates from project sites to meet a post-construction runoff be less than or equal to the pre-construction runoff criteria. Research and analysis conducted by the PaDEP has shown that while the post-construction peak flow rate for stormwater runoff may be less than or equal to the pre-construction conditions, damage continued to occur to the receiving streams and waterways. The PaDEP BMP Manual now includes the control of the stormwater runoff volume in addition to the peak flow rates and suggests many techniques to manage the runoff volume.

Phase II will collaborate with county, state and federal agencies (e.g. Mercer County Conservation District, U.S. Department of Agriculture Natural Resource Conservation Service (NRCS), PaDEP, and engineering professionals) to analyze the various BMPs for their effectiveness in Mercer County. Recommendations of BMPs that are most effective in Mercer County will be made within the SWMP.

This task also includes the review of stormwater management ordinances and other Act 167 Plans to identify any unique and effective stormwater control techniques used in other counties.

A main emphasis of the SWMP includes the evaluation and establishment of stormwater control criteria on a watershed basis. The eight (8) major watersheds with Mercer County include a wide range of factors that effect stormwater runoff and level of protection of water quality with the streams. These factors include the degree of urbanization, impervious surface, forests and woodlands, farming practices, geology and soil types, etc. Phase II will attempt to identify the sensitivity of a watersheds streams to stormwater runoff and the needs for more aggressive BMP implementation and stormwater controls. An important goal of the SWMP is to improve water quality and the overall health of Mercer County streams.

7.8 Roles of County and Consultant

The division of work and responsibilities between Mercer County and the Consultant should be determined prior to the beginning of Phase II tasks. Generally, the County will serve as project coordinator and be responsible for non-technical aspects of the Plan. This may include appropriate data collection, plan composition, and ordinance analysis. The Consultant would be responsible for the technical aspects of the SWMP preparation. In general the Consultant would be responsible for data collection/review/analysis, technical analysis of problem areas, hydraulic and hydrologic modeling, development of technical criteria, and economic analysis. The Consultant would take the lead in preparing the main components of the SWMP, including technical analysis, map preparation, report text, and assist with the public participation.

7.9 Work Schedule

A work schedule setting target dates for the completion of various tasks would be developed at the beginning of the Phase II project. The schedule would be developed by Mercer County and the Consultant with the completion of the project in time for PaDEP review prior to the end of the contract period, generally within two years of commencing Phase II. Refer to Appendix F for a proposed work schedule.

8.0 REFERENCES

1. *Mercer County Comprehensive Plan*. Adopted April, 2006.

2. *Shenango River Watershed Comprehensive Plan*, Western Pennsylvania Conservancy. July, 2005.

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4. Pennsylvania Department of Environmental Protection – Bureau of Watershed Management, *Pennsylvania Stormwater Best Management Practices Manual*, December, 2006.

5. United States Department of Agriculture Natural Resources Conservation Service, *Land Resource Regions and Major Land Resource Areas of the United States* – Lake Erie Glaciated Plateau, 2006.

6. United States Army Corps of Engineers, Pittsburgh District webpage. Lakes and Dams Statistics – Shenango River Lake. May, 2007.

7. Pennsylvania State University Department of Meteorology and Atmospheric Science, Climate of Pennsylvania. 2005.

8. Commonwealth of Pennsylvania - *The Pennsylvania Code, Chapter 93, Section 93.9w*. Drainage List W. February, 2008.

9. City of Hermitage, *Eight Headwaters Watershed Assessment and Protection Plan*. August, 2004.

10. *Mercer County Natural Heritage Inventory*, Western Pennsylvania Conservancy. June, 2003.