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Washington County Planning Commission

Act 167 County-Wide Watershed Stormwater Management Plan for Washington County Phase I – Scope of Study

June 27, 2008

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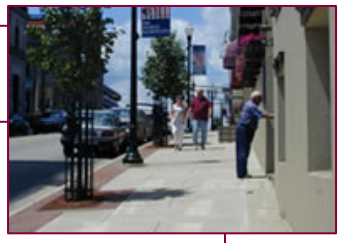

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HRG Project Number: 2071.010

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INTRODUCTION

STORMWATER RUNOFF – ITS PROBLEMS AND ITS SOLUTIONS

The water that runs off the land into surface waters during and immediately following a rainfall event is referred to as stormwater. In a watershed undergoing urban expansion, the volume of stormwater resulting from a particular rainfall event increases because of the reduction of pervious land area (i.e., natural land covered by pavement, concrete, or buildings). That is, the alteration of natural land cover and land contours by residential, commercial, industrial, forestry, and farmland uses results in decreased infiltration of rainfall and an increased rate and volume of stormwater runoff.

The need for stormwater management in Pennsylvania has been demonstrated repeatedly in the past. As the population of an area increases, land development is inevitable, and the alteration of natural ground surfaces results in decreased infiltration of rainfall. As a result of continued development, the volume and rate of stormwater runoff increases causing environmental impacts including flooding, stream channel erosion and siltation, water quality degradation, and reduced groundwater recharge. Cumulative effects of development in some areas of a watershed can result in flooding of natural watercourses with associated costly property damages.

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

PENNSYLVANIA STORMWATER MANAGEMENT ACT (ACT 167)

Recognizing the need to deal with the serious and growing problem of extensive damage from uncontrolled stormwater runoff, the Pennsylvania General Assembly enacted Act 167. The statement of legislative findings at the beginning of the Pennsylvania Stormwater Management Act (Act 167) sums up the critical interrelationship among development, accelerated runoff, and floodplain management.

Specifically, this statement points out that:

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

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

Act 167 changed this approach by instituting a comprehensive program of stormwater planning and management on a watershed level. The Act requires Pennsylvania counties to prepare and adopt stormwater management plans for each watershed located in the County, as designated by the Pennsylvania Department of Environmental Protection (PADEP). Most importantly, these plans are to be prepared in consultation with municipalities located in the County, working through a Watershed Plan Advisory Committee (WPAC). Due to a recent change in PADEP Act 167 policy, in lieu of providing plans for each designated watershed, Act 167 plans are now being created on a county-wide basis. The plans are intended to provide uniform technical standards and criteria throughout the County for the management of stormwater runoff from new land development sites. The new PADEP policy also stresses the opportunity for municipalities to retrofit existing sites to improve existing water quality impairments or existing problem area flooding sources.

The types and degree of control that are prescribed in the stormwater management plan must be based on the expected development pattern and hydrologic characteristics of each individual watershed within the County. The plan, more specifically the standards and criteria, are to be developed from the technical evaluations performed in the analysis process, in order to respond to the "cause and effect" nature of existing and potential storm runoff impacts in each watershed (both urban and rural) . The final product of the Act 167 planning process will be a comprehensive stormwater management plan to be developed and implemented with a firm sensitivity to the overall needs (e.g., financial, legal, political, technical, etc.) of the municipalities in Washington County.

ACT 167 PLANNING FOR WASHINGTON COUNTY

Given the above history and information, the county-wide watershed planning process for Washington County must be designed with the individual watershed characteristics in mind, as well as the resources (technical, political, and economic) of the County. The Phase I - Scope of Study presents the concept and approach that has been developed to fully meet these requirements, as well as the specific requirements of Act 167, for this County-wide watershed stormwater management project.

BENEFITS OF THE PLAN

The purpose and benefit of the study and plan is to provide all of the municipalities in Washington County with an accurate and consistent plan implementation strategy and procedures for comprehensive stormwater management. Currently, there is a great deal of variance within the municipalities regarding implementation and enforcement of stormwater management regulations. Given the nature of storm runoff and its impacts, a critical objective of sound stormwater management planning is to provide for consistency of stormwater management requirements throughout Washington County. Therefore, the primary objective of the technical study and planning process is to develop a technical and institutional support

document to encourage and/or support the consistency of regulations based on county-wide and watershed-wide consideration.

The technical county-wide planning approach recommended by PADEP also provides the municipalities with a considerable amount of useable technical information, such as detailed watershed runoff simulation models, that can be used for other stormwater management purposes. Therefore, as a result of developing the plan, municipalities and Washington County, will realize benefits and/or products that are useable for other planning and engineering purposes. For example, land use updates and environmental data management are necessary for effective planning in a specific watershed. The technical component of the plan will provide unique environmental database management benefits for both the county and municipal use. Another example of the associated benefits of the plan relates to basic public works and/or engineering functions, primarily at the municipal level.

In addition, technical support information provided as a part of specific watershed modeling effort can be used by public works officials in the design and regulatory permitting efforts for bridge replacement and floodplain management analysis. Further, the stream encroachment permit process, which involves the need to supply detailed stream flow data as a part of the application process, can be more efficiently and cost-effectively developed using a calibrated watershed model. Therefore, the benefits of the watershed planning process are extensive, even beyond the important functions of developing comprehensive stormwater management strategies and ordinance provisions.

A new initiative from PADEP indicates that the plan may investigate and provide solutions to correct existing problems. Specifically, the plan will: identify and summarize problem areas (including those related to water quality); provide much of the hydrology that will be required in the design of proposed solutions; provide potential conceptual solutions to correct these problems; and will specify possible funding streams for project implementation.

APPROACH FOR THE DEVELOPMENT OF THE STORMWATER MANAGEMENT PLAN

In order to implement county-wide comprehensive planning and management of stormwater runoff, it was necessary to take a close look at major watersheds within Washington County during Phase I. Since the Act itself is very dependent on municipal coordination to provide for the planning and management of stormwater throughout their respective municipality, it was necessary to get the attention of, endorsement by, and involvement from each municipality early in the planning process.

In order to initiate municipal level involvement in the overall development of the plan, a Watershed Plan Advisory Committee (WPAC) was formed and consists of the Washington County Planning Commission, all municipalities within the County, the Washington County Conservation District, the Pennsylvania Department of Transportation (PennDOT) office and other interested organizations. Two meetings with the WPAC were held during Phase I to obtain general municipal and organizational commitment to the project and to distribute information request forms. Discussions from these meetings and an evaluation of the information request forms, in conjunction with in-house knowledge from Washington County and PADEP, determined to what level this plan should be created.

THE NEED FOR A COMPREHENSIVE APPROACH FOR STORMWATER MANAGEMENT

The goal of Washington County's Act 167 planning process is to provide a county-wide comprehensive program to assist in the planning and management of stormwater. With coordination of the sixty-seven (67) municipalities in Washington County, the resulting stormwater management ordinance will consider severe and ongoing stormwater related problems in critical areas throughout the County. Furthermore, cooperating member municipalities will be able to adopt stormwater management controls that will have a collectively beneficial impact on the waters of Washington County and those "problem" areas that presently remain unmanaged.

The Act itself is divided into two phases of which Washington County has received Phase I funding from PADEP and is highly dependent on gaining support from the municipalities in the early stages of plan development. Phase II will result in the final stormwater management plan and model ordinance. More specifically, the development process for the stormwater management plan is as follows:

Phase I - Scope of Study - Establishing procedures used to prepare the Plan. These procedures are determined by an overall survey of:

- Specific watershed characteristics and hydrologic conditions.
- Stormwater related problems and significant obstructions.
- Alternative measures for control.

Phase II - The Plan - The technical assessment and development of the model ordinance that includes:

- Watershed modeling and planning.
- Development of technical standards and criteria for stormwater management.
- Conceptual solutions to identify problem areas.
- Identification of administrative procedures for implementation of the plan.
- Adoption of Plan by Washington County.
- Approval by PADEP.
- Mandatory adoption of County Plan by all sixty-seven (67) municipalities.
- Municipal implementation (at County and Municipal levels, coordinating strategies related to the Plan and any other integrated water resource planning efforts pursued by the County).

PREVIOUS PLAN EFFORTS

There have been no previous Act 167 Plans prepared for Washington County. However, the following relevant but not all-inclusive documents have been prepared and will provide a valuable source of information for the development of the Plan:

- Washington County Planning Commission, Washington County Comprehensive Plan, November 23, 2005.
- Washington County Watershed Alliance and Chartiers Creek Watershed Association, River Conservation Plan for the Upper Chartiers Creek Watershed, January 2003.
- Borough of New Eagle, Master Stormwater Drainage Study, October 2005.
- Urban Research and Development Corporation (1999), Washington County Economic Development Strategy 2000 to 2010.
- Peters Creek Watershed Association/ Peters Creek Watershed Users Manual.
- Washington County Planning efforts related to "dry" dams located in the County.

GENERAL COUNTY DESCRIPTION

In 1780, the boundary of Pennsylvania was established and the following year, on March 28, 1781, Washington County was formed from parts of Westmoreland County. The County was named after General and President of the United States, George Washington. Washington County is situated on the Allegheny Plateau in the extreme southwest corner of Pennsylvania. The County encompasses 552,704 acres (863.6 square miles) and is approximately 30 miles wide by 30 miles long. Numerous narrow, relatively shallow valleys characterize the topography of Washington County. The northern part of the county has smooth; rolling hills while the southern portion has higher, sharper ridges and more steeply chiseled stream valleys. Elevations range from 1,523 feet on Mt. Wheeler in North Franklin Township to 760 feet in Elrama in Union Township. Washington County can be characterized as a diverse landscape with both natural and built settings. This is reflected by high-density residential, commercial and industrial areas coupled with large land tracts of open space within the County. The rural nature of Washington County is protected as approximately 60,000 acres are enrolled in the Agricultural Security Program, which accounts for 11 percent of the total land area of the County.

POLITICAL JURISDICTIONS

The County is comprised of 67 municipalities. The political jurisdictions include 32 townships, 33 boroughs, and two third class cities (Washington and Monongahela). Washington County is classified as a fourth class county and is ranked 18th in the state of 67 counties, with a population of 202,897 according to the 2000 census. The 67 municipalities in Washington County are as follows:

TOWNSHIPS		BOROUGHS		CITIES
Amwell	*Morris*	*Allenport*	*Finleyville*	*Monongahela*
Blaine	*Mount Pleasant*	*Beallsville*	*Green Hills*	*Washington*
Buffalo	*North Bethlehem*	*Bentleyville*	*Houston*	
Canton	*North Franklin*	*Burgettstown*	*Long Branch*	
Carroll	*North Strabane*	*California*	*Marianna*	
Cecil	*Nottingham*	*Canonsburg*	*McDonald*	
Chartiers	*Peters*	*Centerville*	*Midway*	
Cross Creek	*Robinson*	*Charleroi*	*New Eagle*	
Donegal	*Smith*	*Claysville*	*North Charleroi*	
East Bethlehem	*Somerset*	*Coal Center*	*Roscoe*	
East Finley	*South Franklin*	*Cokeburgh*	*Speers*	
Fallowfield	*South Strabane*	*Deemston*	*Stockdale*	
Hanover	*Union*	*Donora*	*Twilight*	
Hopewell	*West Bethlehem*	*Dunlevy*	*West Alexander*	
Independence	*West Finley*	*East Washington*	*West Brownsville*	
Jefferson	*West Pike Run*	*Elco*	*West Middleton*	
		Ellsworth		

TRANSPORTATION

The County is served by two important major transportation routes. Interstate 70 (I-70) traverses the United States from Baltimore, Maryland to Salt Lake City, Utah. I-70 enters eastern Washington County in Speers and exits the County in Donegal Township. Interstate 79 (I-79), which connects Charleston, West Virginia to Erie, Pennsylvania, enters the southern edge of Washington County in Amwell Township and exits to the north in Cecil Township. Other minor transportation routes include US Route 19, US Route 22, PA Route 88 and PA Route 837, which provide access from surrounding counties to regional business and industrial centers located in Washington County.

Three (3) airports provide service for the Washington County area. These airports and locations are as follows: Washington County Airport (South Franklin Township), Finleyville Airpark (Finleyville), and Bandel Airport (North Bethlehem Township).

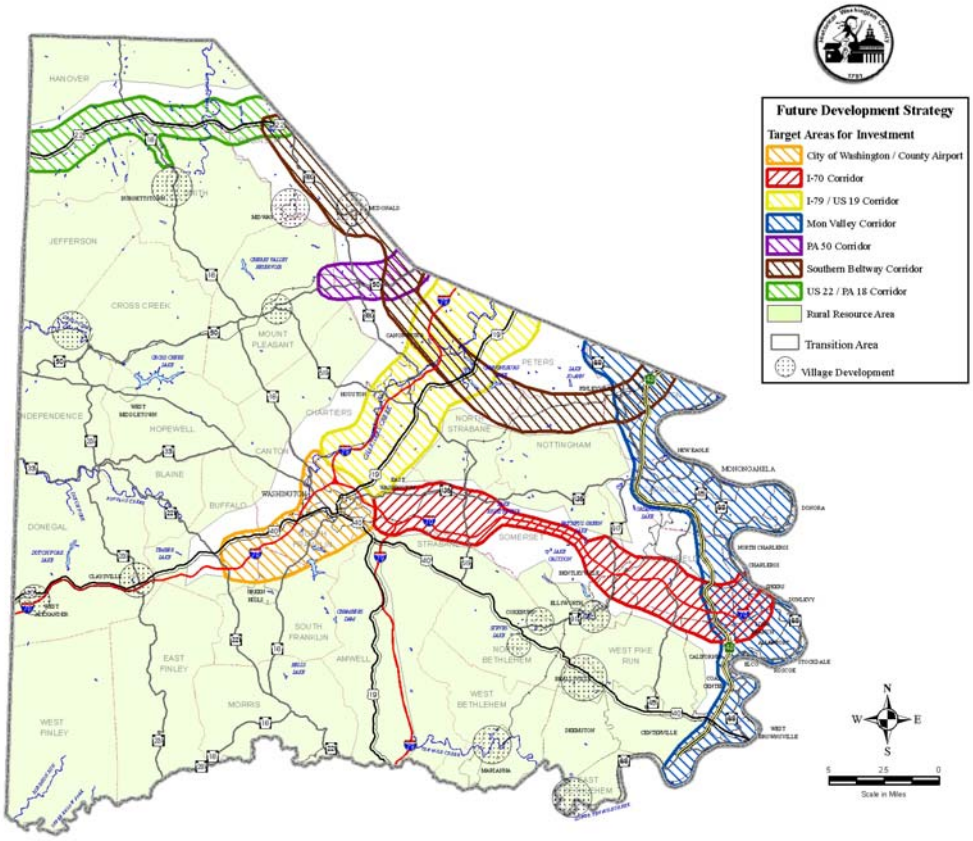
Two (2) Class I rail lines serve the region by connecting Washington County to the rest of the North American market. The Norfolk Southern line extends in a mostly east west direction, connecting Chicago and points west with the New York City area. The CSX line also extends mostly east west from Washington County, and connects the Chicago area with Washington, DC.

The County is served by three (3) regional trail networks. The Montour Trail, and associated Panhandle Trail, serves the northern part of the County. The Arrowhead Trail serves residents of Peters Township and adjoining areas. The Montour Trail forms the western link of the Great Allegheny Passage that will link Pittsburgh with Washington, DC. The trail currently is 47 miles long linking trail systems in Allegheny County and West Virginia. The Panhandle Trail is a 29-mile trail that runs from Walker's Mill, near Carnegie through the northern portion of Washington County and then over to Weirton, West Virginia. The Arrowhead Trail is a 4-mile long trail that runs through Peters Township.

GENERAL DEVELOPMENT PATTERNS

In 1999, the Urban Research and Development Corporation was commissioned to develop the Washington County Economic Development Strategy. The Urban Research and Development Corporation led a group of economic development, business and government agencies to develop a thorough analysis of the existing economic conditions of the County, as well as detailed recommendations to lead the effort for economic sustainability and revitalization.

The Washington County Economic Development Strategy determined that the different attributes of the County resulted in unique economic development advantages and opportunities specific to each area. Such attributes included waterways, major highways, public water and sewerage, air and rail service, agriculture and proximity to the City of Pittsburgh. Such characteristics were to be built upon in each of the seven (7)"growth areas" identified in Washington County in order to realize economic growth that could be sustained across the County. These areas are as follows: City of Washington/County Airport, I-70 Corridor, I-79/US-19 Corridor, Mon Valley Corridor, PA-50 Corridor, Southern Beltway Corridor, and US-22/PA-18 Corridor. The future development growth patterns should be directed in a manner that promotes greater parity by capitalizing on the strengths and minimizing negative impacts of each region. The following Future Development Strategies Figure shows the "targeted areas for investment" (Wash Co. Comprehensive Plan, Nov. 2005) located throughout Washington County.



Future Development Strategy Area Map for Washington County (2005 Comprehensive Plan)

WATER RESOURCES

Washington County lies entirely within the Ohio River watershed, which has a drainage area of 23,487 square miles in Pennsylvania. Rivers, streams and tributaries in the northern and western portions of the County drain directly into the Ohio River; however, watercourses in the eastern and southern portions of the County drain into the Monongahela River, which empties into the Ohio River in Pittsburgh. The Monongahela River watershed (7,386 square miles) is within the Ohio River watershed. Therefore any watercourse that drains into the Monongahela River is not only part of the Monongahela River watershed, but is also part of the larger Ohio River watershed. All precipitation which falls in Washington County is channeled by gravity into eleven (11) designated watersheds. ***The major watersheds are: Chartiers Creek, Cross Creek, the Monongahela River, the Ohio River, Peters Creek, Pigeon Creek, Pike Run, Raccoon Creek, Robinson Run, Ten Mile Creek, and Wheeling Creek.*** Each of these basins drains surface water into the major streams and rivers running through the County.

Washington County contains over 200 ponds, lakes and reservoirs within its boundary. These ponds, lakes and reservoirs vary greatly in size, from the smallest unnamed pond in the Burgetts Fork Watershed with an area of less than 0.1 acre to the largest lake, Cross Creek Lake, in the Cross Creek Watershed with an area of approximately 265 acres.

The PADEP designated watersheds within Washington County and their general Chapter 93 Designations included in this study are listed in the following table. These watersheds include smaller, sub-watersheds and related streams that have or require higher, more stringently protected uses (i.e. High Quality Cold Water streams; etc.).

PADEP DESIGNATED WATERSHEDS			
Watershed	**Chapter 93 Designation**	**Watershed**	**Chapter 93 Designation**
Chartiers Creek	HQ-WWF	Pike Run	*TSF*
Cross Creek	HQ-WWF, WWF	Raccoon Creek	WWF
Monongahela River	WWF, N	Robinson Run	WWF
Ohio River	WWF, N	Ten Mile Creek	TSF, WWF
Peters Creek	TSF	Wheeling Creek	WWF
Pigeon Creek	WWF		

The PADEP watersheds within Washington County are illustrated in Appendix G.

SURFACE WATER QUALITY

The Pennsylvania Chapter 93 Water Quality Standards classify all surface waters according to their water quality criteria and protected water uses. Selected waterbodies that exhibit exceptional water quality and other environmental features are referred to as "Special Protection Waters". Certain activities in those watersheds that could adversely affect surface water are more stringently regulated to protect degradation. Some of these special protection waters are further protected by flood control dams. There are four of these dams located in various places throughout the County.

A list of the streams within the County and their protected use classification are listed in Appendix H.

IMPAIRED STREAMS

Pollution of Washington County's waterways primarily occurs in two forms – point source and non-point source discharges. Point source pollutants are easily identified and can be directly traced to their source. Examples of point source pollution are industrial discharges, municipal discharges, stormwater discharges, combined sewer overflow discharges and concentrated animal feeding operations. Non-point sources include all other forms of pollution such as abandoned mine drainage, agriculture, urban runoff, atmospheric deposition, construction activities, on-lot sewage systems, leachate from landfills and silviculture. The Stream Integrated List represents stream assessments in an integrated format for the Clean Water Act Section 305(b) reporting and Section 303(d) listing. Streams are bodies of flowing surface water that form a network to drain stormwater impoundments such as basins or catchments. PADEP protects four stream water uses: aquatic life, fish consumption, potable water supply, and recreation.

The 305(b) stream segments have been evaluated for those uses. If a stream segment is not attaining any one of the 4 defined uses, it is considered impaired. In Washington County, over 179 miles of stream have been identified as impaired. A complete list of impaired streams and their causes are included in Appendix H. The following table groups the source cause of non-attaining streams in Washington County, as well as the total miles and the percentage of individual causes:

IMPAIRED STREAM CAUSES		
SOURCE CAUSE	**MILES**	**PERCENT**
Abandoned Mine Drainage	45.92	25.7%
Agriculture	30.70	17.1%
Habitat Modification	18.36	10.3%
Unknown Sources – PCBs, Nutrients	18.07	10.1%
Grazing Related Agriculture	13.81	7.7%
Urban Runoff / Storm Sewers	12.62	7.0%
Combined Sewer Overflow	7.94	4.4%
Construction	7.87	4.4%
Subsurface Mining	6.74	3.8%
Small Residential Runoff	4.85	2.7%
On-site Wastewater	3.38	1.9%
Crop Related Agriculture	2.46	1.4%
Road Runoff	2.38	1.3%
Land Development	2.02	1.1%
Other – Siltation	0.99	0.6%
Erosion From Derelict Land	0.64	0.4%
Municipal Point Source	0.26	0.1%
	179.02	

As illustrated above, the most cited cause of impairment is abandoned mine drainage with almost 46 miles of streams identified as impaired. Agriculture is the second leading cause of impairments, but, if all agricultural activities were grouped, they would be the leading cause of impairment. It is important to also recognize a significant amount of impairment caused by development such as urban runoff, construction, etc.

CLIMATE

Washington County is situated on the Allegheny Plateau in southwestern Pennsylvania and the climate is classified as humid continental. Most weather systems that affect the area originate in the Central Plains or Midwest and are steered eastward by the prevailing westerly flow aloft. The primary source of moisture is the Gulf of Mexico. Due to the long overland trajectory, cold Canadian high-pressure air masses are many times considerably modified by the time they reach southwestern Pennsylvania. The mean temperature for Washington County is 53°F with a maximum mean monthly temperature of 74°F in July and mean monthly low of 30°F in January. Cloudiness is rather persistent during the winter months of December through February due to the frequent rotation of weather systems through the area. About 60% of the annual precipitation falls during the spring and summer. Precipitation averages approximately 38 inches per year and is fairly evenly distributed throughout the year. May, July and August are the wettest months with an average of 3.9 inches per year and February is the driest month with approximately 2.2 inches per year of precipitation. Snowfall averages 21.2 inches per year with most of it falling between December and March.

GEOLOGY

Pennsylvania is divided into numerous physiographic provinces. A province is defined as a region in which all parts are similar in geologic structure, climate and relief and have a unified geomorphic history. The northern portion of Washington County is located in the Pittsburgh Low Plateau section and the southern portion is located in the Waynesburg Hills Section of the Appalachian Plateaus Province. This province covers much of western and southwestern Pennsylvania including all of Greene, Armstrong and most of the other counties within the region.

Because no area of Washington County has ever been glaciated, the geologic strata and soils appear to be well stratified and predictable, meaning that the bedding of the rock strata tend

to be nearly horizontal. With most of the strata remaining horizontal, the landscape tends to weather uniformly and reduces erosion between rock strata.

BEDROCK FORMATIONS

Several geological periods underlie the study area of Washington County. Each period contains formations or groups that were formed during the specific period. These groups represent different time periods during the Earth's geologic history. The specific geological classifications and descriptions are listed below for each formation found within the bedrock of Washington County:

Patapsco Formation (Cretaceous Period): Intensely colored, variegated, ferruginous clay and, in places, beds of sand; occurs in isolated patches north of Canonsburg and along the Monongahela River.

Greene Formation (Permian Period): Cyclic sequences of sandstone, shale, red beds, thick limestone and thick, impure coal; base is at top of Upper Washington Limestone; present in southwestern corner of County.

Washington Formation (Permian Period): Cyclic sequences of sandstone, shale, limestone and coal; includes some red shale; base is at bottom of Washington coal; scattered throughout central and southern portions of County.

Waynesburg Formation (Permian and Pennsylvanian Periods): Cyclic sequences of sandstone, shale, limestone and coal; commercial coals present; base is at bottom of Waynesburg coal; scattered throughout central and southern portions of County.

Monongahela Formation (Pennsylvanian Period): Cyclic sequences of limestone, shale, sandstone and coal; commercial coals present; base is at bottom of Pittsburgh coal; concentrated in northern portion of County; along Monongahela River in eastern portion of County.

Casselman Formation (Pennsylvanian Period): Cyclic sequences of shale, siltstone, sandstone, red beds, thick impure limestone and thin, nonpersistent coal; base is at top of Ames limestone; adjacent to and within Monongahela River floodplains.

Glenshaw Formation (Pennsylvanian Period): Cyclic sequences of shale, sandstone, red beds, thin limestone and coal; includes four marine limestone or shale horizons; base is at top of Upper Freeport coal; few scattered pockets in northern portion of County.

SOILS

Washington County's land area is comprised of different soils with varying degrees of slope, ranging from nearly level plateaus to severe sloping along the rivers in the County. The Washington County Soil Survey identifies 46 different soil types within the County. These soil types fall within one of the following four soil associations: Dormont-Culleoka, Guernsey-Dormont-Culleoka, Dormont-Culleoka-Newark and Udorthents-Culleoka-Dormont. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern. The general characteristics and development potentials and limitations for each category of soil are described as follows.

Soil Associations:

Dormont-Culleoka Association; Slopes 3%-50%; 75% of County: Moderately well drained and well drained, deep and moderately deep, gently sloping to very steep soils; on hilltops, ridges, benches and hillsides; most abundant soil association in Washington County. Less sloping areas are suited to farming; most acreage is steep or very steep; most areas suitable for trees; main limitations include slope, erosion, seasonal high water table and moderate depth to bedrock.

Guernsey-Dormont-Culleoka Association; Slopes 3%-25%; 5% of County: Moderately well drained and well drained, deep and moderately deep, gently sloping to moderately steep soils; on hilltops, ridges, benches and hillsides. Most areas are used for cultivated crops or hay; steeper areas on hillsides used for pasture; less sloping soil are suited to farming and trees; main limitations include erosion and seasonal high water tables.

Dormont-Culleoka-Newark Association; Slopes 0%-50%; 13% of County: Well drained to somewhat poorly drained, deep and moderately deep, nearly level to very steep soils; on hilltops, ridges, benches, hillsides and floodplains; located along watercourses. Less sloping soils are suited to farming; majority of upland areas are steep or very steep; main limitations include slope, erosion, seasonal high water table, occasional flooding and depth to bedrock.

Udorthents-Culleoka-Dormont Association; Slopes 3%-50%; 4% of County: Well drained to somewhat poorly drained, very shallow to deep, gently sloping to very steep soils; on hilltops, ridges, benches, hillsides and upland slopes. Less sloping soils are suited to farming and trees; some are suited to farming if properly reclaimed; limitations include slope, erosion and seasonal high water table.

Hydric Soils: The analysis of hydric soils has recently become an important consideration when performing any type of physical analysis of the community. These soils are important to identify and locate due to the fact that they provide the approximate location where wet areas may be found. Thus, the location of hydric soils is one indication of the potential existence of a wetland area. Wetland areas are now protected by the Pennsylvania Department of Environmental Protection and should be examined before deciding on any type of development activity. There is one true hydric soil in the project area – Purdy Silt Loam. However, 21 other soils in the project area could support wetlands if the proper hydrology exists. Refer to the Washington County Soils Survey, which graphically depicts the approximate location of hydric soils throughout Washington County.

Prime Agricultural Soils: There are seven types of soils that are classified as Pennsylvania Prime Farmland soils and 16 types of soils classified as Additional Farmland of Pennsylvania Statewide Importance within the project area. Approximately 36 percent of land in Washington County is classified as prime agricultural soils.

SLOPES

Slopes play a significant role when determining the extent and type of development that is being planned. Land with slopes in excess of 25 percent begins to cause serious problems for development. If these steep slopes are used or vegetation is removed, the soils will become prone to erosion. Washington County's soils have high clay content and with the amount of rainfall in the area, the soils are slip prone. Slopes greater than 25 percent are prevalent throughout Washington County as shown in the Comprehensive Plan.

FLOODPLAIN AND FLOODWAY DATA

A review of the Federal Emergency Management Agency (FEMA) flood insurance maps and digitized database revealed that 100-year floodplains exist within Washington County. The following watersheds and sub-watersheds have delineated floodplains associated with Federal Emergency Management Agency (FEMA) Flood Insurance Studies (FIS). A more complete listing of specific waterbodies, associated watershed and affected Municipalities is contained in Appendix H.

WATERSHEDS ASSOCIATED WITH FEMA FLOOD INSURANCE STUDY			
Monongahela River	Buffalo Creek	Mingo Creek	Raccoon Creek
Ten Mile Creek	Pike Run	Millers Run	Catfish Run
Pigeon Creek	Chartiers Creek	Robinson Run	Cross Creek
Harmon Creek	Kings Creek	Maple Creek	Peters Creek
Wheeling Creek			

LAND USE

Land use is also an important feature of stormwater planning. The way land is used directly impacts the way stormwater is transformed into runoff. As evidenced by the existing land use analysis for Washington County, the nature of the county is characterized as a largely rural area with a strong agricultural background. The following table summarizes the existing land uses in Washington County:

EXISTING LAND USES	
LAND CLASSIFICATION	**% OF TOTAL LAND USE**
Open Space (Game Lands, Open Space, Woodlands)	64.7
Agriculture	25.7
Residential	4.9
Recreation (Golf Course, Parks)	1.8
Mixed Use	1.7
Industrial (Industrial Park, Major Employers)	0.9
Community Facilities (Cemetery, Colleges, Hospitals)	0.2
Commercial (Shopping Centers)	0.1
Totals	100.0

As summarized above, 65% of the County is undeveloped (open space). The remaining 35% of the County is developed. Some of the critical land uses (industry and agriculture) are analyzed below.

INDUSTRY

Southwestern Pennsylvania is typically associated with the traditional industrial pursuits of mining, steel production and manufacturing. Industrial uses occupy 1% of the County land surface. Although it is a relatively small portion of the County, it can be a potential source of pollution. Industries that center on the abundant raw materials (such as mining) have destroyed large portions of the watershed through acid mine drainage.

AGRICULTURE

Agriculture has long been the leading industry for the region and the state. The fertile lands in southwestern Pennsylvania have long been associated with farming. In fact, the agriculture industry continues to be a leading economic sector for Washington County and remains a strong element of the fiscal health of the county. Today, according to the U.S. Department of Agriculture, Washington County has 2,490 farms that comprise a total of 259,500 acres of farmland. This agricultural land accounts for 26 percent of the total land area of the County.

The Agricultural Area Security Law was enacted in 1981 to encourage landowners to commit to preserving agricultural lands and to protect these important land classifications from incompatible uses on neighboring lands. The law establishes the authority for municipalities to identify areas of 250 or more acres to be voluntarily enrolled as an Agricultural Security Area (ASA). As of April 2005, there were approximately 60,000 acres included in the agricultural security areas.

The importance of identifying these areas and planning accordingly is significant. The loss of good farmland is often accompanied by such environmental problems as surface water runoff and interference with the natural recharging of groundwater. Furthermore, when prime agricultural areas are no longer available, farmers will be forced to move to marginal lands, usually on steeper slopes with less fertile soils which are more apt to erode and less likely to produce. Clearly, decision makers must be able to make informed judgments about the development of farmland. Actions that put high quality agricultural areas into irreversible uses should only be initiated if the actions are carefully considered and are clearly for the benefit of public good.

PHASE I PLANNING PROCESS

AGREEMENT BETWEEN PADEP AND WASHINGTON COUNTY

An agreement for a Phase I Watershed Stormwater Management Plan Grant for all watersheds of Washington County was made between the Pennsylvania Department of Environmental Protection and Washington County on August 2, 2007.

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

The Phase I agreement termination date is June 30, 2008.

ENGINEERING CONSULTANT SELECTION

In order to assist in the preparation of Phase I, the Washington County Commissioners selected Herbert, Rowland & Grubic Inc. (HRG) to provide stormwater planning services to Washington County and complete this Phase I report.

CREATION AND DISTRIBUTION OF AN INFORMATION REQUEST FORM

HRG created the "Washington County Phase I Act 167 Stormwater Management Plan Information Request Form" which was distributed by the Washington County Planning Commission at the WPAC meeting No. 1 to those members in attendance and then to those members not in attendance within one month of the WPAC meeting No. 1. All municipalities and other interested citizen groups and public organizations were encouraged to complete the form. The purpose of the 7 page Information Request Form was to gather various pieces of information to help determine the level of commitment from each municipality, to reveal what the major stormwater issues were that affected each municipality, and to determine the location of existing problem areas, significant obstructions, and stormwater management facilities.

ESTABLISHMENT OF A WATERSHED PLAN ADVISORY COMMITTEE (WPAC)

An additional purpose of the Information Request Form was to gather contact information for representatives of each of the municipalities as well as other concerned organizations, groups, or citizens that would be interested in participating in the Watershed Plan Advisory Committee (WPAC). The purpose of the WPAC is to serve as an access for municipal input, assistance, voicing of concerns and questions, and to serve as a mechanism to ensure that the intermunicipal coordination and cooperation is secured.

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

WATERSHED PLAN ADVISORY COMMITTEE			
MEMBER	ORGANIZATION	MEMBER	ORGANIZATION
Bob Kepics	City of Monongahela	Larry Headley	Amwell Twp
Anthony Spossey	City of Washington	Scott Weiss	Blaine Twp
Mark Chucuddy	Allenport Boro	James Mounts	Buffalo Twp
Frank Startare	Beallsville Boro	Sam Bear	Canton Twp
Ken Yankowsky	Bentleyville Boro	Thomas Rapp	Carroll Twp
Richard Alvarez	Burgettstown Boro	Kevin Camerson	Cecil Twp
Jon Bittner	California Boro	Harlan Shober	Chartiers Twp
Daniel Caruso	Canonsburg Boro	Dean Casciola	Cross Creek Twp
Patsy Ricciutti	Centerville Boro	Rick Fidler	Donegal Twp
Mark Alterici	Charleroi Boro	Paul Battaglini	East Bethlehem Twp
Patricia Brown	Claysville Boro	Ernie Moorehead	East Finley Twp
Robert Staley	Coal Center Boro	Herman Pennline	Fallowfield Twp
Carol Basara	Cokeburgh Boro	Donald Winkler	Hanover Twp
William Beck	Deemston Boro	Alexander Hamilton	Hopewell Twp
Karen Polkabla	Donora Boro	Mark Kinney	Independence Twp
Donald Piere	Dunlevy Boro	Chris Lawrence	Jefferson Twp
Blake McCandless	East Washington Boro	Scott Finch	Morris Twp
Larry Pollack	Elco Boro	William Dinsmore	Mount Pleasant Twp
Mark Segedi	Ellsworth Boro	Bob Taylor	North Bethlehem Twp
Tim Kegel	Finleyville Boro	Donald Hazlett	North Franklin Twp
Terry George	Green Hills Boro	Brian Spicer	North Strabane Twp
Charles Fife	Houston Boro	Raymond Barley	Nottingham Twp
Joseph DeBlassio	Long Branch Boro	Frank Arcuri	Peters Twp
Thomas Yesenosky	Marianna Boro	George Lucchino	Robinson Twp
Tim Thomassy	McDonald Boro	Thomas Schilinski	Smith Twp
Edward Salvini	Midway Boro	David Blackburn	Somerset Twp
Scott Honsaker	New Eagle Boro	Tom Hart	South Franklin Twp
Joseph Villella	North Charleroi Boro	John Stickle	South Strabane Twp
Edward Vercoe	Roscoe Boro	Stephen Parish	Union Twp
Roger Grandy	Speers Boro	Robert Mercante	West Bethlehem Twp
Michael Lee	Stockdale Boro	David Martin	West Finley Twp
Paul Minardi	Twilight Boro	George Shemanksy	West Pike Twp
Laurie Riggle	West Alexander Boro	Dominic Sacchotti	PennDOT District 12
Daniel Kendall	West Brownsville Boro	Gary Stokum	WCCD
John Opal	West Middleton Boro	Susan Morgan	Watershed Alliance

WATERSHED PLAN ADVISORY COMMITTEE MEETINGS

Two (2) Watershed Plan Advisory Committee meetings were held during the Phase I process. The purposes of the meetings were to gather information and provide education to the WPAC.

WPAC Meeting #1 was held on June 30, 2007. The meeting provided an overview of the Act 167 process, provided expectations and potential results and outcomes of the Plan, provided an explanation of the Information Request Form, began the formation of the WPAC membership and concluded with a question and answer period.

WPAC Meeting #2 was held on December 3, 2007. Prior to the meeting, draft copies of the Phase I Report were supplied to the County Planning Commission for review. The purpose of this meeting was to summarize the Phase I report, outline the tasks to be completed during Phase II, and address any comments or concerns of the WPAC from their review of the draft Phase I report.

A subsequent third meeting of WPAC members was held on February 25, 2008 by the County Planning Commission to discuss and get informal input on what structure or options the municipalities see as best implementing/managing/enforcing the Plan. At that time the consensus was that the most feasible way to do perform these functions was through the County or County Conservation District. The specific details relating to structure will be addressed as part of the Phase 2 effort.

In addition to performing a County-wide Stormwater Management Plan, the Chartiers Creek Watershed is one of the watersheds in the state targeted by the DEP for pilot testing an Integrated Watershed Resource Planning (IWRP) effort. This watershed straddles Washington and Allegheny Counties. Because the PADEP wishes the County to proceed with this IWRP effort, two additional meetings were conducted by the PADEP at their Pittsburgh Regional office on April 7, and May 15, 2008, respectively. The topics of these meetings were to discuss the potential for coordinating IWRP for the Chartiers Creek watershed and who would over see this effort. The consensus of this meeting was to continue to address the IWRP effort between the two counties as time and budget permit. The Washington County effort related to the IWRP in the Washington County portion of the Chartiers Creek Watershed will be included as part (most likely as an Appendix to the Plan) of the County Act 167 Phase II effort.

INTEGRATED WATERSHED RESOURCE PLANNING

INTRODUCTION AND PURPOSE

PA DEP's Comprehensive Stormwater Management Policy of 2002 recognizes stormwater as a resource. It is also important to acknowledge that stormwater is our primary source of fresh water. There are many challenges to be faced in planning and managing this resource. Stormwater runoff (runoff) quality, stream bank erosion, groundwater recharge, dry weather stream flows and traditional flood control are all typical problems addressed with stormwater planning and management. Recently, there has been an emphasis on addressing and managing runoff from construction sites and, once construction is completed from post-construction activities.

As a resource, stormwater is a factor addressed in many other Federal, State, County, or municipal comprehensive planning efforts. Some of the planning efforts include:

1. Stormwater management plans
2. County comprehensive plans
3. Flood protection / flood plain management plans
4. Hazard mitigation plans
5. Source water protection plans
6. State water plan
7. Recreation plans
8. Transportation plans
9. Utility corridor plans
10. Urban wet weather and Infrastructure (CSS/CSO)
11. Consistency with river basin commission

The lack of coordination between these planning efforts sometimes results in conflict between plans when addressing stormwater.

In addition, there are many legislative acts that effect water resources. The implementation of the provisions of the acts again lack coordination and may also lead to conflicts. Some of the legislative acts include:

1. Federal Clean Water Act
2. Federal Safe Drinking Water Act
3. Pennsylvania Clean Streams Law
4. Pennsylvania Safe Drinking Water Act
5. Pennsylvania Stormwater Management Act
6. Pennsylvania Flood Plain Management Act
7. Pennsylvania Sewage Facilities Act
8. Pennsylvania Dam Safety and Encroachments Act
9. Pennsylvania Water Resource Planning Act
10. Pennsylvania Water Rights Act
11. Pennsylvania Conservation District Law
12. Pennsylvania Municipal Planning Code
13. Pennsylvania Municipal Authorities Act
14. Pennsylvania Nutrient Management Act

APPROACH FOR THE DEVELOPMENT OF INTEGRATED WATERSHED RESOURCE PLAN

Recognizing this lack of coordination, PA DEP has initiated pilot testing an Integrated Watershed Resource Planning (IWRP) policy, using the Act 167 Stormwater Management Plan process as the vehicle. That portion of the Chartiers Creek Watershed located within Washington County has been chosen as one of the pilot test watershed areas. The Chartiers Creek Integrated Watershed Resource Planning will review the existing planning efforts already completed within the Watershed and attempt to address and perhaps provide language related to the coordination and consistency between plans. The IWRP will also review current related legislation and the implementation of their regulations for coordination and consistency.

The Chartiers Creek Watersed straddles both Washington and Allegheny Counties. It is hoped that the information provided by the Washington County, Chartiers Creek IWRP effort may be dove-tailed with the efforts of Allegheny County to encompass the entire watershed.

CONSISTENCY AND COORDINATION DISCUSSION

In addition to the previously cited planning efforts that directly addressed stormwater planning, other planning efforts have been completed by Washington County, its municipalities and some utility providers to meet requirements promulgated through the regulatory agencies. Those planning efforts include:

ACT 220 WATER PLANNING

The Commonwealth of Pennsylvania is currently implementing the Water Resources Planning Act (Act 220 of 2002), which calls for the State Water Plan to be updated by March 2008, and updated every 5 years thereafter. To carry out the planning provisions of the law, a Statewide Water Resources Committee was formed to help guide the development of the State Water Plan through a collaborative process. The Chartiers Creek Watershed is located in the Ohio River Basin, which is represented, by one of the six regional water resources committees.

Act 220 requires the State Water Plan to include several key components that pertain to stormwater, including: Surface and groundwater inventories; floodplain and stormwater management problems, water resources required to serve areas, and alternatives to address identified water avail-ability problems; Identification of potential problems with water availability or conflicts among water uses and users, among others.

SOURCE WATER PROTECTION PLANNING

To expand the benefits realized from Wellhead Protection efforts, the 1996 Safe Drinking Water Act reauthorization requires States to develop a Source Water Assessment and Protection (SWAP) Program. The SWAP program assesses the drinking water sources serving public water systems for their susceptibility to pollution. This information will be used as a basis for building voluntary, community-based barriers to drinking water contamination. Pennsylvania's assessment program will:

(1) Delineate the boundaries of the areas providing source waters for all public water systems; and
(2) Identify (to the extent practicable) the origins of contaminants in the delineated area to determine the susceptibility of public water systems to such contaminants.

These assessments are of the raw water quality, not the finished water compliance. DEP will conduct assessments for community water systems supplied primarily by groundwater and serving a population of 3,300 or more. The groundwater sources of public water systems serving less than 3,300 will be initially assessed using readily available data from the program's Geographic Information System (GIS).

The County is served by several water suppliers, some of which have completed planning activities studying the source of the water and protection needs. The planning activities need to be identified, reviewed, and addressed in the Plan.

NPDES MUNICIPAL SEPARATE STORM SEWER SYSTEMS (MS4)

Polluted storm water runoff is often transported to municipal separate storm sewer systems (MS4s) and ultimately discharged into local rivers and streams without treatment. 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.

In 1990, EPA promulgated rules establishing Phase I of the National Pollutant Discharge Elimination System (NPDES) stormwater program for those that generally serve populations greater than 100,000. The Stormwater Phase II Rule extends coverage of the NPDES stormwater program to "small" MS4s, which are municipalities, located in "urbanized areas" (UAs) as defined by the Bureau of the Census (unless waived by the NPDES permitting authority).

Operators of regulated small MS4s are required to design their programs to:

(1) Reduce the discharge of pollutants to the "maximum extent practicable" (MEP);
(2) Protect water quality; and
(3) Satisfy the appropriate water quality requirements of the Clean Water Act.

Implementation of the MEP standard requires the development and implementation of BMPs and the achievement of measurable goals to satisfy each of the six Minimum Control Measures (MCM). A small MS4 stormwater management program implements the six MCMs in concert to significantly reduce pollutants discharged into receiving waterbodies.

The following table lists all the MS4 communities in the County:

Allenport	Ellsworth	McDonald	Twilight
Bentleyville	Fallowfield	Mount Pleasant	Union
Carroll	Finleyville	North Franklin	West Pike Run
Canonsburg	Houston	North Strabane	Stockdale
Charleroi	Monongahela	Nottingham	Washington
Cokeburg	New Eagle	Robinson	Canton
Donora	North Bethlehem	McDonald	Roscoe
Dunlevy	North Charleroi	Buffalo	Somerset
Elco	Cecil	South Franklin	Speers
East Washington	Chartiers	South Strabane	

FLOODWAY & FLOODPLAIN MANAGEMENT

Most of the provisions contained in local floodplain management regulations are derived from the minimum requirements of the National Flood Insurance Program (NFIP). However, some of the provisions have also come about as a result of the Pennsylvania Flood Plain Management Act, commonly referred to as Act 166. Although similar to the NFIP requirements, state floodplain management requirements differ by applying only to certain specified activities and by requiring additional precautionary measures against flooding.

The Pennsylvania Flood Plain Management Act, signed into law on October 4, 1978, requires all flood prone municipalities to participate in the NFIP. Participating municipalities must enact local floodplain management regulations that at a minimum comply with federal requirements. In addition to complying with federal requirements, Act 166 also directs municipalities to include provisions that comply with the minimum state floodplain management requirements.

As discussed previously, all Washington County municipalities have enacted required ordinances.

EXPANDED FOCUS OF IWRP CONCEPT

During initial discussions, it was recognized a key to successful stormwater management planning, all municipalities need to be involved. In addition, it was also recognized that many of the challenges in the Chartiers Creek Watershed were common in most of the developing communities. With the support of the WPAC, the Plan will explore a single entity or combination of entities that would effectively and efficiently address water management for the many communities within the designated watershed.

During Phase 2 of the Act 167 Planning process, information will be gathered that will form the basis of a feasibility study to identify local needs, economics, benefits, and detractors of creating a central entity or authority to handle:

- MS4 responsibilities.
- Stormwater ordinance plan review and implementation.
- Source water protection planning.
- Floodway and floodplain management.

PHASE I REPORT

The Phase I Report is a scope of study to assist Washington County in the preparation and finalization of a Phase II Act 167 Stormwater Management Plan. This Phase I Report identifies the scope and provides estimated fees to complete the identified Phase II tasks.

SUBMISSION OF PHASE I REPORT TO PADEP

The Phase I Report – Scope of Study is to be submitted to the Pennsylvania Department of Environmental Protection for their review on or before June 30, 2008. Once reviewed by the DEP, their comments will be included in the final Report. Finalization of the Phase I Report will lead to an additional contract between Washington County and PADEP for the completion of the Phase II effort.

INFORMATION REQUEST FORM DISCUSSION

INFORMATION REQUEST FORM RESULTS

The Information Request Form was designed to solicit input from each municipality and other interested organizations, relative to specific problem areas throughout Washington County, as well as the needs they may see for stormwater management in their particular municipality. The Information Request Form was distributed, along with an educational handout initially during the WPAC#1 meeting in Phase I and then to those members who did not attend the WPAC#1 meeting. The Information Request Form included a map of the individual municipality and was used to identify locations of problem areas, significant obstructions, and existing or proposed stormwater management facilities. A copy of the Information Request Form is included as Appendix A of this document. In addition, the information contained within the Information Request Forms was instrumental in determining the scope of Phase II planning.

Because the most important part of the Act 167 planning process is the implementation of the final provisions and standards of the Plan, another reason for utilizing this Information Request Form is to develop interest in stormwater management issues by the municipalities. Attempting to obtain municipal "buy-in" of the project was a key element during the entire Phase I process. Obtaining support from these municipalities early in the process will ensure a better end product and hopefully ease the process of adoption and implementation by each municipality within Washington County.

Information Request Forms were received from 45 out of the 67 municipalities (67%) in Washington County. In addition, an Information Request Form and other generalized information were received from the Washington County Conservation District. Through analysis of the results of the Information Request Forms, it was determined that the two principal stormwater problems are inadequate drainage facilities and stream erosion. The most cited stormwater issues by municipality include peak flows and stream bank erosion with flooding closely following. County observed issues include volume and water quality considerations relating to runoff are not adequately addressed throughout the County and that "rate" control and "volume" control are different issues and not completely understood by he respective municipalities. The responding municipalities also support this project at a 70% rate. It is also interesting to note that 16 of the responding municipalities already cooperate with neighboring municipalities with stormwater related issues.

North Strabane, South Strabane, Chartiers, Peters, Cecil and North Franklin Townships were determined to be receiving the most development pressure in Washington County.

A summary of the results of the Information Request Forms can be found in Appendix B.

PHASE II DISCUSSION

ITEMS TO BE ADDRESSED IN PHASE II

During Phase I, the WPAC made several decisions regarding certain specific items that should be addressed during the Phase II planning process and the Phase II Final Plan. Refer to Appendix C of this report for a detailed breakdown of the Phase II Scope of Work.

A summary of the specific tasks and subtask shall be as follows:

Task A – Data Collection/Review/Analysis
- SubTask A.1 – Data Collection
- SubTask A.2 – Municipal Ordinance Reviews/Evaluations
- SubTask A.3 – Data Preparation for Technical Analysis
- SubTask A.4 – Data Collection for Integrated Water Resource Plan Effort

Task B – Technical Analysis
- SubTask B.1 – Implement Volume Controls
- SubTask B.2 – Implement Rate Controls
- SubTask B.3 – Model Subwatersheds of Designated Watersheds
- SubTask B.4 – Provide Conceptual Solutions for Existing Problem Areas
- SubTask B.5 – Goals, Objectives, and Compilation of All Technical Standards
- SubTask B.6 – Implementation of Technical Standards and Criteria
- SubTask B.7 – Economic Analysis
- SubTask B.8 – Regulations for Activities Impacting Stormwater Runoff
- SubTask B.9 – Water Quality Impairments
- SubTask B.10 – Integrated Water Resource Plan Analysis

Task C – Public/Municipal Participation
- SubTask C.1 – WPAC/MEG/LAG Meetings

Task D – Plan Preparation and Implementation
- SubTask D.1 – Plan Report Preparation
- SubTask D.2 – Model Ordinance Preparation
- SubTask D.3 – Compile and Arrange Integrated Water Resource Plan Information
- Subtask D.4 – Plan Adoption and Implementation

One of the most critical issues during Phase I was the determination of which and how many of the eleven (11) PADEP designated watersheds would be modeled during Phase II. Due to the amount of problem areas provided by the WPAC from the Information Request Forms, it was determined that only portions of the watersheds located in Washington County would be modeled during Phase II. With many existing stormwater facilities, identified problem areas located near the main stem coupled with identified growth, the Chartiers Creek watershed will be modeled. A significant amount of problem areas were also identified in the Raccoon Creek watershed and identified growth in this area will require detailed modeling for these problem areas. All other problem areas will be reviewed in more detail to assess whether detailed modeling is required to support the development of conceptual solutions to those problems. It is estimated that 20 subwatersheds will need to be modeled.

As part of the Phase II work, a Model Ordinance will be created which includes the standards and provisions of the Plan. An important part of the Model Ordinance will be the inclusion of regulations for activities impacting stormwater runoff. These regulations are not meant to

discourage the activities, but instead make sure that they are completed in a proper manner with due regard to stormwater management.

MUNICIPALITIES RESPONSIBILITIES AFTER THE ADOPTION OF THE PLAN

During the preparation of the Plan, each municipality will participate in its creation through the Watershed Plan Advisory Committee (WPAC), Municipal Engineers Group (MEG) and Legal Advisory Group (LAG). In addition, several public meetings will be held to educate the general public about the Plan efforts, methods of implementation and other items deemed needed by the WPAC and County. Therefore, the resulting completed Plan will reflect municipality input and desires in addressing stormwater management consistent with Act 167 requirements.

In accordance with state law, each municipality must implement the Plan. The municipalities will implement the standards of the Plan by adopting the provisions of the Model Ordinance created in the Plan. After the Plan is officially adopted by the County, it will be submitted to the PADEP for approval. Within six months of PADEP's approval, each municipality must adopt the Model Ordinance.

Depending on the level of effort expended, information available, and coincidence of schedules between Counties, the Integrated Water Resource Plan (IWRP) information may be incorporated into the final Plan.

GENERAL WORK PLAN

PHASE II AGREEMENT

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

CONSULTANT SELECTION

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

INFORMATION REQUEST FORM

An Information Request Form was distributed during and subsequent to the first WPAC meeting (7/30/2007) during Phase I. The Information Request Form (see Appendix A) solicited information on problem areas, obstructions, existing and proposed stormwater facilities, and flood control facilities. Other information requested relates to municipal ordinances, support for the plan, relative importance of various plan criteria, and interest in best management practices (BMPs). The municipalities were also asked to appoint a WPAC representative. The data collected through the Information Request Form will assist in technical and non-technical aspects of the planning process and in scoping the overall Plan. The problem areas and significant obstructions indicated in the Information Request Forms will need to be analyzed during Phase II and will become the basis of required subwatershed area modeling.

WATERSHED PLAN ADVISORY COMMITTEE (WPAC)

During the Phase I portion of this project, a WPAC was formed. Many of the WPAC members indicated their willingness to volunteer to join the committee through the Information Request Form. In addition, letters were mailed to each municipality requesting them to appoint at least one person from their individual municipality to become a member of the committee. This letter was in response to Section 6(a) of the Pennsylvania Management Act (Act 167), which states "The county shall establish, in conjunction with each watershed stormwater planning program, a watershed plan advisory committee composed of at least one representative from each municipality within the watershed, the county soil and water conservation district and such other agencies or groups as are necessary and proper to carry out the purposes of the committee". Also stated in the letter was PA DEP's position that if a representative from a municipality was not appointed, then the head of the governing body will be appointed to the WPAC.

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

Through the Information Request Form, the WPAC identified the following organizations as possible WPAC participants:

- The Pennsylvania Department of Transportation, District 12-0
- Washington County Emergency Management Association
- Flood Task Force
- Washington County Watershed Alliance
- California University and Washington & Jefferson College
- United States Army Corps of Engineers (Pittsburgh District)
- PA Fish and Boat Commission

These organizations and entities were contacted and invited to join the WPAC during Phase I. Additional stakeholders, such as PADEP regulation writers and other private Conservation groups, may be identified during Phase II. If appropriate, an invitation to join the WPAC will be extended to these entities.

MUNICIPAL ENGINEERS GROUP (MEG)

During Phase II, an MEG would be formed. The role of the MEG would be to meet and discuss and comment on the more technical aspects of the Plan as they are presented. These aspects include modeling, technical analysis, and development of management criteria. This committee should be comprised only of municipal engineers and will focus solely on the engineering aspects of the Plan as opposed to the more general objectives and overall contents of the Plan. Partial costs for meeting attendance would be considered an eligible reimbursable expense under the Plan.

LEGAL ADVISORY GROUP (LAG)

Also during Phase II, a LAG would be formed. The purpose of the LAG would be to review and incorporate information between municipal solicitors into the Plan. This committee will focus on implementation of the Model Ordinance from a legal and regulatory framework standpoint. Partial costs for meeting attendance would be considered an eligible reimbursable expense under the Plan.

STANDARDS

The Plan will include criteria for a comprehensive stormwater management strategy that includes three elements:

- Peak Rate Control Management
- Volume Control Management
- Water Quality Control Management

Peak Rate Control Management – Implementation of Release Rates for various subwatersheds will be developed based on collected data, modeling, engineering judgment, and committee input.

Volume Control Management – Implementation of Control Guidance 1 and Control Guidance 2 from the *Pennsylvania Stormwater Best Management Practices Manual*.

Water Quality Control Management – Implementation of items addressing water quality aspects of the *Pennsylvania Stormwater Best Management Practices Manual*.

ROLES OF COUNTY AND CONSULTANT

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

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

WORK SCHEDULE

A work schedule was developed during the Phase I process in conjunction with Washington County and the Consultant. The work schedule was formulated to set target dates for various tasks with the intention of completing the project for PADEP review within the Phase II contract period. The proposed Washington County work schedule is illustrated in Appendix E.

REFERENCES

1. Washington County Planning Commission, Washington County Comprehensive Plan, November 23, 2005.

2. United States Department of Agriculture Soil Conservation Service, Soil Survey of Washington County, Pennsylvania, December 1975.

3. Maryland Department of the Environment, 2000 Maryland Stormwater Design Manual Volumes I & II, 2000.

4. Pennsylvania Association of Conservation Districts, Pennsylvania Handbook of Best Management Practices for Developing Areas, November 14, 1997.

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

6. Pennsylvania Department of Environmental Protection – Bureau of Watershed Management, Pennsylvania Model Stormwater Management Ordinance, January 2007.

7. Borough of New Eagle, Master Stormwater Drainage Study, October 2005.

8. Urban Research and Development Corporation (1999), Washington County Economic Development Strategy 2000 to 2010.

9. Washington County Watershed Alliance and Chartiers Creek Watershed Association, River Conservation Plan for the Upper Chartiers Creek Watershed, January 2003.

APPENDIX A.
INFORMATION REQUEST FORM

ACT 167, WASHINGTON COUNTY WATERSHEDS

Stormwater Management Plan

Information Request Form

PLEASE COMPLETE THE FOLLOWING AND RETURN THE FORM AND MARKED UP MAP TO:	
JOHN RUSNAK, PE	(An addressed envelope with postage is provided for your convenience.)
Herbert, Rowland & Grubic, Inc.	
200 West Kensinger Drive, Suite 400	
Cranberry Township, PA 16066	

person completing FORM	
Municipality	
Name	
Phone	
e-mail	

1. Does your municipality HAVE?			
***For the Regulations / Ordinances listed, please list where the Regulation / Ordinance is found in the "Location" column.**			
Use the following abbreviations for the "Location" column: CP = comprehensive plan BC = building code SL = subdivision/land development ordinance ZO = zoning ordinance SO = separate ordinance			
	Yes	No	Location/Date
Comprehensive Plan	☐	☐	
Zoning Ordinance	☐	☐	
Subdivision/Land Development Ordinance	☐	☐	
Floodplain Regulations *	☐	☐	
Stormwater Management Regulations *	☐	☐	
Erosion Control Regulations *	☐	☐	
Drainage Regulations *	☐	☐	

2. Is your Municipality considered a small MS4 Municipality under the current NPDES Phase II stormwater regulations? (CIRCLE ONE)	
Yes	No
If yes, is your small MS4 Municipality currently in compliance with the NPDES Phase II Permit?	
Yes	No

3. The Watershed Plan will address five key stormwater considerations. These five are listed below. Please indicate how important you believe it is to address each consideration.						
CONSIDERATION		Very Important				Not Important
		5	4	3	2	1
Peak Flows	Increased flows from stormwater runoff contribute to stream erosion, localized ponding and flooding, may cause damage to infrastructure (roads, sewers, etc.).	☐	☐	☐	☐	☐
Water Quality	Dissolved and un-dissolved pollutants washed off the land surface – negative impacts to recreation, aesthetics and in-stream habitat.	☐	☐	☐	☐	☐
Groundwater Recharge	Increased runoff decreases amount of rain that becomes groundwater; decreased groundwater supplies may have negative effects on well water supplies and decrease or dry up stream base flow in dry periods.	☐	☐	☐	☐	☐
Stream Erosion	Eroding banks and beds may undercut roads and utilities, damages in-stream habitat, clog culverts and bridges.	☐	☐	☐	☐	☐
Flooding	Larger scale overbank flows such as the 100-year flood associated with extreme storm events	☐	☐	☐	☐	☐

4. Would you like to see information on any of the following presented at a Watershed Plan Advisory Committee meeting?			
	Yes	Maybe	No
Best Management Practices	☐	☐	☐
Model/Implemented Ordinances	☐	☐	☐
Information on Act 167 reimbursements	☐	☐	☐
Other topics you would like to have considered: _____			

5. What is the most important stormwater related issue to your municipality?

5A. DO YOU WORK WITH NEIGHBORING MUNICIPALITIES REGARDING STORMWATER ISSUES / PROBLEMS? IF SO, WHICH ONES?

6. THE FOLLOWING LISTS THE TYPES OF STORMWATER RELATED PROBLEMS YOUR MUNICIPALITY MAY BE EXPERIENCING. FOR EACH PROBLEM TYPE, PLACE A CHECK MARK IN THE COLUMN THAT BEST DESCRIBES THE SEVERITY, FREQUENCY AND CAUSE. IF YOUR MUNICIPALITY IS EXPERIENCING A PROBLEM NOT LISTED, PLEASE LIST IT IN THE SPACE MARKED "OTHER".

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Street Flooding	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Property Flooding	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Soil Erosion	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sediment in Streams	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Stream Bed/Bank Erosion	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Scour at Outfalls	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Property/Infrastructure Damage	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Pollution	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Habitat/Resource Damage	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

7. Stormwater Management plans are required under the Pennsylvania Stormwater Management Act, Act 167. Authorization to proceed with this plan as required by Act 167 has been given by the County Commissioners. The long-term goal of this plan will be to maintain existing hydrologic conditions including groundwater levels, water quality, stream base flow and stream storm flows. With this in mind, what level of support will your municipality or agency provide for this project?				
Strongly Support				Strongly Oppose
5	4	3	2	1
☐	☐	☐	☐	☐

8. Watershed Plan Advisory Committee meetings are expected to be held approximately 4 times per year for approximately 2 years.	
Who will attend meetings on behalf of your municipality or organization?	
Name	
Address	
Phone	
e-mail	

9. Would you suggest any other agencies or organizations that should be included on the Watershed Plan Advisory COMMITTEE? If so, please give contact information below:	
Name	
Organization	
Address	
Phone	
e-mail	

10. Do you know of any existing or proposed flood control projects in your municipality? (please circle one)	
Yes	No
If yes, please describe the project(s) below:	

11. are existing (public or private) stormwater management facilities (outfalls, basins, etc.) being maintained (i.e. removal of debris from outlet structures, adequate control of vegetation, capacity maintenance, etc.)? (please circle one)	
Yes	No
If yes, please describe the locations(s) below:	

12. PLEASE PROVIDE ANY INPUT YOU FEEL IS RELEVANT REGARDING CURRENT WATERSHED MANAGEMENT PROCEDURES.

13. THE FOLLOWING TABLE REQUESTS INFORMATION ON PROBLEM AREAS AND OBSTRUCTIONS. PLEASE PLACE A CHECK MARK IN THE "P" COLUMN IF THE SITE IS A PROBLEM AREA OR PLACE A CHECK MARK IN THE "O" COLUMN IF THE SITE IS AN OBSTRUCTION.

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

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

In the "Description" column describe the type, location, & size of the Problem Area or Obstruction, (i.e. "undersized 36-inch CMP where Main Street crosses Sandy Creek". For each site listed, place the Number of the site at the appropriate location on the enclosed map of your Municipality (attached at the end of this packet). If a solution to the Problem Area or Obstruction is proposed, describe the solution in the "Solution" column. Please copy this sheet if additional space is needed.

Number	Problem	Obstruction	Description	Solution
EXAMPLE	☐	**x**	**Undersized 36-Inch CMP where Main Street crosses Plum Run causes ponding upstream**	**Replace with larger pipe**
1	☐	☐		
2	☐	☐		
3	☐	☐		
4	☐	☐		
5	☐	☐		
6	☐	☐		
7	☐	☐		
8	☐	☐		
9	☐	☐		
10	☐	☐		

Please copy this sheet if additional space is needed.

14. The following requests information on existing or proposed storm sewer systems or management facilities. These are storm sewer systems, permanent stormwater detention ponds, underground detention facilities or other systems or facilities intended to collect, convey or detain stormwater. Please letter each site sequentially and place the letter corresponding to each site at the appropriate location on the enclosed map of your municipality. Please copy this sheet if additional space is needed.

Letter	Description
A	
B	
C	
D	
E	
F	
G	
H	
I	
J	
K	
L	

Please copy this sheet if additional space is needed.

APPENDIX B.
INFORMATION REQUEST FORM SUMMARY

Summary Table of information provided by the WPAC through the Information Request Form:

Organization	Q1							Q2	Q3					Q5	Q5A	Q7	Q10	Q11
	Comp Plan	Zoning Ord	SALDO	Floodplain Regs	SWM Regs	E&S Regs	Drainage Regs	MS4	Peak Flow Rates	Water Quality	Groundwater Recharge	Stream Erosion	Flooding	SW Issues	Work with Neighboring Munic.	Support Project	Flood Control Projects	Maint. SW Facilities
Robinson Township	Y	Y	Y	Y	Y	Y	Y	Y	5	4	3	5	5	Y	Y	4	N	
Blaine Township	Y	Y	Y	N	N	N	N	N	5	5	5	5	5	Y	N	5		
Washington Co. C. D.					Y	Y			5	5	4	5	5	Y	Y	5	Y	Y
West Pike Run Township	N	Y	Y	Y	Y	Y	Y	Y	5	4	5	5	5	Y	N	5	N	Y
East Finley Township	Y	Y	N	N	N	N	N	N	4	4	4	4	5	Y	N	3	Y	N
Midway Borough	Y	Y	N	Y	N	N	N	N	5	4	1	4	4	Y	N	4	N	N
Chartiers Township	Y	Y	Y	Y	Y	Y	Y	Y	5	4	3	5	5	Y	Y	4	N	Y
West Middleton Borough		Y	Y	Y	Y	Y	Y		3	1	2	2	3	Y	Y	1	N	Y
Peters Township	Y	Y	Y	Y	Y	Y	Y	Y	5	3	2	3	3	Y	Y	3	N	Y
Burgettstown Borough	Y	Y	N	Y	N	N	N	Y	5	5	4	5	5	Y	N	3	N	N
Cross Creek Township	Y	Y	Y	N	Y	Y	Y	N	5	4	2	2	5	Y	Y	5	Y	Y
Amwell Township	Y	Y	Y	Y	Y	N	N	Y	5	3	5	5	5	N	N	3	N	
Donegal Township	Y	N	Y	Y	N	N	N	N								3	N	N
New Eagle Borough	N	N	N	N	Y	N	Y	Y	5	4	4	5	5	Y	Y	4	N	Y
West Brownsville Borough	N	N	N	Y	N	N	N	Y	5	4	5	5	5	Y	N	4	N	N
California Borough	Y	Y	Y	Y	Y	Y	Y	N	5	5	2	5	3	Y	N	5	Y	Y
Speers Borough	Y	Y	Y	Y	Y	Y	Y	Y	5	5	5	5	5			5	N	Y
Washington City	Y	Y	Y	Y	Y	Y	Y	Y	5	5	3	5	5	Y	N	4	Y	Y
Buffalo Township	Y	Y	Y	N	N	N	N	N	5	5	4	4	4	Y	N	4	N	Y
South Strabane Township	Y	Y	Y	Y	N	N	N	Y	4	3	4	4	4	Y	N	5	N	Y
Jefferson Borough	Y	Y	Y	N	N	N	N		3	1	1	4	2	Y	N	3	N	Y
North Strabane Township	Y	Y	Y	Y	Y	Y	Y	Y	5	5	5	5	5	Y	Y	5		
Claysville Township		Y	Y					N	4	3	3	3	2	Y	Y	5	N	Y
Hanover Township	Y	Y	Y	Y	N	N	Y	N	3	3	4	4	4	Y	N	3	Y	Y
Mount Pleasant Township	Y	Y	Y	Y	Y	Y	Y	Y	3	3	4	4	3	Y	Y	3	N	N
West Alexander Borough		N	N	N	N	N	N	N								5	N	
Roscoe Borough	Y	Y	Y	Y	Y		Y	Y	2	2	1	4	3	Y	Y	5	N	Y
Nottingham Township	Y	Y	Y	N	Y	N	N	Y	5	3	3	5	5	Y	Y	3	N	Y
Allenport Borough	Y	Y	Y	Y	Y			Y	5	5	5	5	4	N	N	3	N	Y
Deemston Borough	Y	N	Y	Y	N	N	N	N	3	3	4	4	4	Y	N	4	N	
Donora Borough	Y	Y	Y	N	N	N	N	Y	4	5	4	4	4	Y	Y	5	N	Y
Bentleyville Borough	Y	Y	Y	N	N	N	N	Y	5	3	3	5	5	Y	Y	3	N	Y
Hopewell Township	Y	Y	Y	Y	N	N	N	N	2	1	5	4	5	N	N	5	N	N
West Finley Township	Y	N	Y	Y	N	N	N	Y	3	1	1	2	2	N	Y	1	N	N
Somerset Township	Y	Y	Y	N	N	N	N	Y	4	3	5	5	4	Y	N	4	N	Y
Canonsburg Borough	Y	Y	Y	Y	Y	Y	Y	Y	5	4	2	4	5	Y	Y	5	Y	Y
Carroll Township	Y	Y	Y	Y	Y	Y	Y	Y	3	3	3	5	3	Y	N	2	Y	N
North Bethlehem Township	Y		Y	Y				Y	5	4	5	4	5	Y	N	4	N	N
Beallsville Borough	N	N	N	N	N	N	N	N	5	1	1	5	1	Y	N		N	Y
Houston Borough	Y	Y	Y	N	N	N	N	Y	5	3	3	5	5	Y	Y	3	N	Y
Morris Township	Y	Y	Y	Y	Y	Y	Y	Y	2	1	1	4	2	Y	N	2	N	N
Smith Township	Y	Y	Y	Y	Y	Y	Y		5	5	5	5	5	Y	Y	5	N	Y
Canton Township	Y	Y	Y	Y	N	N	N	Y	4	3	3	3	4	Y	Y	5	N	
Charleroi Borough	Y	Y	Y	Y	Y	Y	Y	Y	5	5	2	4	4	Y	Y	4	N	Y
East Washington Borough	Y	Y	Y	N	Y	N	Y	Y	4	4	4	5	5	Y	N	2	N	Y
South Franklin Township	Y	Y	Y	Y	N	Y	Y	Y	5	4	4	5	5	Y		4	N	Y
Ellsworth Borough	Y	Y	N	N	Y	Y	Y	Y	1	1	1	1	1			5	N	Y
Fallowfield Township	Y	Y	Y	Y	N	Y	N	Y	4	4	3	4	4		N	4	N	Y
Centerville Borough	Y	Y	Y	N	N	N	N		5	5	5	5	5	Y	Y	3	N	Y

Organization	Q1							Q2	Q3					Q5	Q5A	Q7	Q10	Q11
	Comp Plan	Zoning Ord	SALDO	Floodplain Regs	SWM Regs	E&S Regs	Drainage Regs	MS4	Peak Flow Rates	Water Quality	Groundwater Recharge	Stream Erosion	Flooding	SW Issues	Work with Neighboring Munic.	Support Project	Flood Control Projects	Maint. SW Facilities
Elco Borough		Y							5	5	3	4	5	Y		4	N	N
Independence Township	Y	N	N	Y	N	N	N	N	5	3	3	5	5	Y		5	N	Y
Cecil Township	Y	Y	Y	Y	Y	Y	Y	Y	5	4	4	5	5	Y	Y	5	N	Y
East Bethlehem Township			N	N	N	N	N	Y	4	3	3	5	5	Y	N	3	N	Y
Marianna Borough	Y	Y	Y	N	N	N	N	Y	5	3	3	5	5	Y	Y	3	N	Y
Coal Center Borough																		
Cokeburgh Borough																		
Dunlevy Borough																		
Finleyville Borough																		
Green Hills Borough																		
Long Branch Borough																		
McDonald Borough																		
Monongahela City																		
North Charleroi Borough																		
North Franklin Township																		
Stockdale Borough																		
Twilight Borough																		
Union Township																		
West Bethlehem Township																		
PennDOT District 12																		
Public Safety																		
Flood Task Force																		
DEP, Bureau of Watershed Management																		
Watershed Alliance																		
California University																		
Washington Jefferson College																		
Fish and Boat Commission																		
Army Corps of Engineers																		

Question 1. Does your Municipality HAVE?
Question 2. Is your Municipality considered a small MS4 Municipality under the current NPDES Phase II stormwater regulations? (Yes or No)
Question 3. The Watershed Plan will address five key stormwater considerations. These five are listed below. Please indicate how important you believe it is to address each consideration. (5 – Very Important) to (1- Not Important)
Question 5. What is the most important stormwater related issue to your municipality?
Question 5a. Do you work with neighboring municipalities on stormwater issues/problems? (Yes or No)?
Question 7. What level of support will you provide for this project (5 – Strongly Support) to (1 – Strongly Oppose)?
Question 10. Do you know of any existing or proposed flood control project in your municipality (Yes or No)?
Question 11. Are their existing (public or private) stormwater management facilities being maintained (Yes or No)?

Summary Table of Problem Areas provided by the WPAC through the Information Request Form:

ID	MUNICIPALITY	LOCATION	DESCRIPTION
P1	Robinson Township	Creek Road	Bank erosion undercutting guide rails
P2	Robinson Township	Robinson Church Road	Sediment buildup
P3	Robinson Township	Beagle Club Road	Sediment buildup
P4	Robinson Township	Valley Street	Flooding
P5	Robinson Township	Noblestown Road	Inadequate storm sewer
P6	Robinson Township	North Branch Road	Flooding and Pooling
P7	West Pike Run Township	Whitehall Road	Bridge abutment weakening
P8	West Pike Run Township	Deems Park Rd near Spring RD	Undersized pipe
P9	East Finley Township	Rocky Run	Ponding
P10	East Finley Township	Templeton Avenue	Ponding
P11	East Finley Township	Buffalo Creek	Ponding
P12	Peters Township	Bower Hill Road	Stream bank erosion
P13	Burgettstown Borough	Center Avenue	Stream bank erosion
P14	Burgettstown Borough	Bridge Street	Obstruction
P15	Burgettstown Borough	Shady Avenue Bridge	Undercut by stream
P16	Burgettstown Borough	Burgetts Fork	Stream bank erosion
P17	Burgettstown Borough	Shady Avenue Bridge	Undercut by stream
P18	Burgettstown Borough	?	Stream bank erosion
P19	Burgettstown Borough	Smith Twp border	Storm runoff
P20	Burgettstown Borough	?	Mine runoff
P21	Burgettstown Borough	Adjacent Township	Runoff
P22	Burgettstown Borough	?	Mine runoff
P23	Burgettstown Borough	Adjacent Township	Storm runoff
P24	Cross Creek Township	Parker Rd near Sugar Camp	Bank Erosion
P25	Cross Creek Township	Cooke Road	Bank Erosion
P26	Cross Creek Township	Sugar Camp Road	Bank Erosion
P27	Cross Creek Township	Cross Creek Road	Sediment buildup/Debris
P28	Cross Creek Township	Clark Avenue Intersection	Flooding
P29	West Brownsville Borough	400 Mainstreet & Woodlawn	Drains blocked by railroad
P30	West Brownsville Borough	Route 40/88	Sediment buildup, flooding and ponding
P31	California Borough	Second Street & Peach Alley	Undersized pipe
P32	Speers Borough	Oak St at Charles & Elizabeth	Drainage issue
P33	Washington City	Catfish Creek	Stream remediation
P34	Washington City	S Main St & Park Ave	Stream debris
P35	Washington City	Ford Avenue	Debris, flooding
P36	South Strabane Township	Country Club at Enterprise St	Flooding
P37	South Strabane Township	Country Club at Locust Ave	Flooding
P38	South Strabane Township	Manifold Rd near Pine Valley Rd	Flooding
P39	South Strabane Township	Lakeview Dr at Hilltop Rd & Quarry Rd	Flooding
P40	South Strabane Township	Mitchell Road between Rt 136 & bridge	Flooding
P41	Claysville Township	Main Street	Undersized pipe, flooding
P42	Claysville Township	throughout township	Undersized pipe, poor quality pipes
P43	Hanover Township	South Township border	Flooding
P44	Mount Pleasant Township	Agape Rd at Caldwell Rd	Flooding
P45	Roscoe Borough	Route 88 and Mount Tabor	Sediment buildup
P46	Roscoe Borough	Latta Hollow and Route 88	Sediment buildup
P47	Roscoe Borough	Corwin Street	
P48	Roscoe Borough	High Road and Howard Road	
P49	Roscoe Borough	High Road	
P50	Roscoe Borough	High Road to Eiver's Edge	
P51	Bentleyville Borough	Wash.St at 7th to Pigeon Creek	Debris, flooding
P52	Bentleyville Borough	Pittsburgh Rd below Smith St	Flooding
P53	Somerset Township	SR 2019	Ponding
P54	Canonsburg Borough	North Jefferson & West Pike St	Flooding
P55	Canonsburg Borough	Walter's Alley at Craig Head St	Flooding
P56	Canonsburg Borough	Chartiers Creek at West Pike St	Flooding
P57	Houston Borough	Plum Run & Chartiers Run	Erosion & Flooding

ID	MUNICIPALITY	LOCATION	DESCRIPTION
P58	South Franklin Township	Bedillion Rd & Vista Valley Rd	Flooding
P59	South Franklin Township	Vista Valley Rd	Flooding
P60	South Franklin Township	Crestmont Rd	Flooding
P61	Independence Township	Run Road & S.R. 531	Debris in Stream Channel
P62	Cecil Township	Park Road	Bank Erosion
P63	Cecil Township	Georgetown Road	Flooding of Roadway
P64	Marianna Borough	Main Street	Stream Bank Erosion
P65	Somerset Township	Unknown	Erosion

Summary Table of Stormwater Facilities provided by WPAC through Information Request Form:

ID	MUNICIPALITY	LOCATION	DESCRIPTION
S1	East Finley Township	?	Storm system detention ponds
S2	East Finley Township	?	Storm system detention ponds
S3	East Finley Township	?	Storm system detention ponds
S4	Cross Creek Township	Cross Creek Lake County Park	
S5	Cross Creek Township	Atlasburg Road	
S6	New Eagle Borough	Mader Street & Neville	Stormwater pond
S7	New Eagle Borough	Borough Maintenance Facility	Stormwater pond
S8	New Eagle Borough	Tracks	Stormwater pond
S9	New Eagle Borough	Oakwood Avenue	Stormwater pond
S10	New Eagle Borough	Johnny Bull Hollow	Stormwater pond
S11	California Borough	Entire Storm-sewer system	Storm System
S12	California Borough	Technology Park	Pond
S13	California Borough	Jefferson at California Apts	Pond
S14	California Borough	Blaine Road & Highland Drive, Fire Training Ctr.	System
S15	California Borough	Route 43,Turnpike Maintenance Bldg	Pipe System
S16	Washington City	Catfish Creek at Washington Street	Underground detention facility
S17	South Strabane Township	Oak Spring Road, Oak Spring Shopping Center	Detention Facility
S18	South Strabane Township	North Avenue, Motel 6	
S19	South Strabane Township	Oak Spring Road, Washington Mall	Detention Facility
S20	South Strabane Township	Raymond Boulevard, Washington Chevrolet	
S21	South Strabane Township	Washington Road, Strabane Square Shopping Center	
S22	South Strabane Township	Trinity Point Drive, Trinity Point Shopping Center	
S23	South Strabane Township	Washington Road, The Foundry Shopping Ctr.	
S24	South Strabane Township	Washington Road, Tractor Supply Company	
S25	South Strabane Township	Eastpointe Drive Off Route 136, Eastpointe	
S26	South Strabane Township	Cameron Road, Cameron Estates	
S27	South Strabane Township	Cameron Road, Washington Woods	
S28	South Strabane Township	Manifold Road, Cameron Wellness Center	
S29	South Strabane Township	Munce Ridge Road, Kingswood Farm Manor	
S30	South Strabane Township	Fischer Road, Stonecreek Apartments	
S31	South Strabane Township	Fischer Road, Strabane Manor Townhouse	
S32	South Strabane Township	Racetrack Road, Tanger Shopping Center	
S33	Jefferson Borough	?	Flood Control Dam
S34	Jefferson Borough	?	Flood Control Dam
S35	North Strabane Township	West McMurray Road, Woodridge Meadows	Detention Pond
S36	North Strabane Township	West McMurray Road, Concord Green	Detention Pond
S37	North Strabane Township	Morganza Road, Morgans Point	Detention Pond
S38	North Strabane Township	McDowell Lane, Foxchase	Detention Pond
S39	North Strabane Township	Route 19 and McClelland Road, Glen Canon and Glen Canon Heights	Detention Pond/Retention Pond
S40	North Strabane Township	McClelland Road, McClelland Farms	Detention Pond/Retention Pond
S41	North Strabane Township	Weavertown Road and Demar Boulevard, Highland Estates	Detention Pond
S42	North Strabane Township	Demar Boulevard and Giffinn Avenue, North Strabane Intermediate School	Detention Pond
S43	North Strabane Township	Weavertown Road, Weavertown Woodlands and Route 19 at Weavertown Road, Sheetz	Detention Ponds and Underground Storage
S44	North Strabane Township	Route 19 at Galley Road, Summerbrooke/ 5/3 Bank/ Bobby Rahal BMW	Detention Ponds and Underground storage
S45	North Strabane Township	Linden Creek Road, Tandem Healthcare	Private Detention Pond
S46	North Strabane Township	Linden Creek Road and Surrey Drive, Surry Woods	Detention Pond
S47	North Strabane Township	Linden Creek Road, Lindenview	Detention Pond
S48	North Strabane Township	Linden Creek Road, Majestic Hills	Detention Pond
S49	North Strabane Township	Waterdam Road, Waterdam Farms	No harm and Detention Ponds
S50	North Strabane Township	Waterdam Road, Stonegate	No harm and Detention Ponds
S51	North Strabane Township	Route 519 and Boone Avenue, Village of Strabane	Storm Sewer System
S52	North Strabane Township	Route 519, Fyda Freightliner	Detention Pond

ID	MUNICIPALITY	LOCATION	DESCRIPTION
S53	North Strabane Township	Route 519 at I-79, Wal-Mart/Falconi	Detention Pond
S54	North Strabane Township	Route 519 and I-79 Interchange, Cullom Prop.	Detention Pond and Underground Storage
S55	North Strabane Township	Route 519 at I-79, Strabane Square	Detention Pond
S56	North Strabane Township	Route 519, Carriage Brook	Detention Pond
S57	North Strabane Township	Route 519 and Boone Avenue, Sandy Brae Meadows	Detention Pond
S58	North Strabane Township	Race Track Road, Meadowlands Industrial Park/ Candlewood Suites/ Comfort Inn/ Burger King/ Washington Community Federal Credit Union	Detention Ponds and Underground Storage
S59	North Strabane Township	Johnson Road at Race Track Road, Hampton Inn and Suites	Underground Storage
S60	North Strabane Township	Race Track Road, Meadows Racetrack and Casino	Detention Ponds and Groundwater Recharge
S61	North Strabane Township	McBride Road and Route 19, Meadowbrook	Detention Ponds
S62	North Strabane Township	Route 19, Meadow Lake	Detention Ponds
S63	North Strabane Township	Johnson Road, Trotwood Acres	Detention Ponds
S64	North Strabane Township	Route 519 and Wilson Road, International Paper	Detention Ponds
S65	North Strabane Township	Route 519, 84 Lumber Office Building	Detention Pond and Rain Gardens
S66	North Strabane Township	Linnwood Road and Route 136, 84 Industrial Park	Detention Pond
S67	North Strabane Township	Route 136, Estes Express Lines	Detention Basin
S68	Claysville Township	Main Street	Storm System
S69	Claysville Township	Lang Hill (?)	
S70	Claysville Township	Wayne Street and Green Street	Storm System
S71	Hanover Township	Starpointe Industrial Park	Detention Pond
S72	Hanover Township		Flood Control Dam
S73	Hanover Township	Star Lake	Detention Ponds
S74	Hanover Township	Riverside Medical	Detention Pond
S75	Nottingham Township	Nottingham Forest Development	Detention Pond
S76	Nottingham Township	Walnut Ridge Development	Detention Pond
S77	Canonsburg Borough	Apple Hill	Detention Facility
S78	Canonsburg Borough	Apple Hill	Detention Facility
S79	Canonsburg Borough	Shamrock Estates	Detention Facility
S80	Canonsburg Borough	Charles Place Plan	Pipe Detention Facility
S81	Canonsburg Borough	Parkside Estates Townhouses	Detention Facility
S82	Canonsburg Borough	Shop & Save Shopping Center	Detention Facility
S83	Charleroi Borough	Throughout Borough	Separation of Storm Sewer Systems

Summary Table of Obstructions provided by the WPAC through the Information Request Form:

ID	MUNICIPALITY	LOCATION	DESCRIPTION
O1	Robinson Township	Washington Road	Beaver dam causing ponding
O2	Robinson Township	Robinson Church Road	Sediment Buildup
O3	Robinson Township	Maple Grove Road	Sediment Buildup
O4	Robinson Township	Valley View	Pooling
O5	Robinson Township	Beagle Club Road	Sediment Buildup
O6	Robinson Township	Valley Street	Flooding
O7	Robinson Township	Noblestown Road	Inadequate storm sewer
O8	Robinson Township	North Branch Road	Flooding and pooling
O9	West Pike Run Township	Deems Park Rd near S. California Dr	Ponding
O10	Chartiers Township	Pike Street and Country Club Road	Undersized pipe
O11	Chartiers Township	East Indiana Ave & North Shady Ave	Undersized pipe
O12	Peters Township	Greenbriar Drive	Obstruction
O13	Peters Township	Lutes Road	Undersized pipe
O14	Burgettstown Borough	Bridge Street	Obstruction
O15	Burgettstown Borough	Shady Avenue Bridge	Undercut by stream
O16	Cross Creek Township	Parker Road	Undersized pipe
O17	Cross Creek Township	Browntown Bridge	Sediment Buildup
O18	Cross Creek Township	Clark Avenue Bridge	Sediment Buildup
O19	Amwell Township	Big Ten Mile Creek	Sediment Buildup
O20	Amwell Township	Little Ten Mile Creek	Sediment Buildup
O21	Donegal Township	Buck Run	Sediment Buildup
O22	Donegal Township	Valley Road & Lake Road	Sediment Buildup
O23	West Brownsville Borough	Main St at 400 Block & Woodlawn Ave	Debris buildup from railroad property
O24	Washington City	Fairhill Drive	Undersized pipe, flooding
O25	Washington City	Houston Street	Undersized pipe, flooding
O26	Washington City	Sammy Angoit Way & East Wylie Avenue	Debris, flooding
O27	Buffalo Township	State Route 221	Debris
O28	Buffalo Township	North Sunset Beach Road	Debris
O29	Mount Pleasant Township	Sabo Road	Flooding
O30	Mount Pleasant Township	Zuk Lane	Flooding
O31	Mount Pleasant Township	Skyline Drive	Flooding
O32	Mount Pleasant Township	Skyline Drive	Flooding
O33	Deemston Borough	Hull Road at Plum Run	Flooding
O34	Donora Borough	Third Street and Meldon Street	Flooding
O35	Somerset Township	Chartiers Creek	Debris
O36	Somerset Township	Pigeon Creek	Sediment Buildup
O37	North Bethlehem Township		Runoff
O38	North Bethlehem Township		Sediment Buildup
O39	North Bethlehem Township		Debris
O40	North Bethlehem Township	Roberts Road	Undersized pipe
O41	Canonsburg Borough	Chartiers Creek behind West Pike Street	Flooding
O42	Morris Township	Ten Mile Creek	Debris
O43	Houston Borough	Chartiers Creek	RR Pier
O44	Beallsville Borough	Stream	Undersized pipe
O45	Smith Township	Burgett-Forke	Sediment Buildup
O46	Smith Township	Burgett-Forke	Sediment Buildup
O47	Elco Borough	Hollow Road	Undersized Pipe/Catch Basin
O48	Independence Township	Run Road & S.R. 531	Debris in Stream Channel
O49	Cecil Township	Hahn Road	Undersized 24" CMP

Problem Areas and Significant Obstructions

Legend

- Problem Areas
- Significant Obstructions
- Stormwater Facility

HRG
Herbert, Rowland & Grubic, Inc.
Engineering & Related Services
200 West Kensinger Drive, Suite 400
Cranberry Township, PA 16066
(724) 779-4777
Fax (724) 779-4711
hrg@hrg-inc.com
www.hrg-inc.com

Summary Tables of Stormwater Problems from WPAC Information Request Form:

Allenport Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding			X									
Street Flooding			X									
Property Flooding		X		X					X			
Soil Erosion				X								
Sediment in Streams		X										X
Stream Bed/Bank Erosion		X		X								X
Scour at Outfalls			X	X								
Property/Infrastructure Damage			X	X								
Pollution			X	X								
Habitat/Resource Damage			X	X								
Other			X									

Amwell Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding	X					X		X				
Street Flooding												
Property Flooding	X				X			X				
Soil Erosion												
Sediment in Streams	X							X				
Stream Bed/Bank Erosion												
Scour at Outfalls												
Property/Infrastructure Damage					X			X				
Pollution												
Habitat/Resource Damage												
Other												

Beallsville Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X					X	X				
Street Flooding	X					X			X			
Property Flooding		X			X			X				
Soil Erosion		X					X	X				
Sediment in Streams												
Stream Bed/Bank Erosion		X				X		X				
Scour at Outfalls												
Property/Infrastructure Damage												
Pollution												
Habitat/Resource Damage												
Other												

Bentleyville Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Developmen t	Unknown
Stream Flooding	X			X				X				
Street Flooding		X		X					X			
Property Flooding		X		X								X
Soil Erosion	X			X				X				
Sediment in Streams	X			X				X				
Stream Bed/Bank Erosion	X				X			X				
Scour at Outfalls	X					X		X				
Property/Infrastructure Damage		X				X		X				
Pollution			X				X	X				
Habitat/Resource Damage			X				X	X				
Other												

Blaine Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Developmen t	Unknown
Stream Flooding		X				X						X
Street Flooding			X									
Property Flooding			X									
Soil Erosion			X									
Sediment in Streams		X				X						X
Stream Bed/Bank Erosion		X				X						X
Scour at Outfalls			X									
Property/Infrastructure Damage			X									
Pollution		X			X							X
Habitat/Resource Damage			X									
Other			X									

Buffalo Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Developmen t	Unknown
Stream Flooding		X		X						X		
Street Flooding			X									
Property Flooding		X		X					X			
Soil Erosion			X									
Sediment in Streams			X									
Stream Bed/Bank Erosion			X									
Scour at Outfalls			X									
Property/Infrastructure Damage			X									
Pollution			X									
Habitat/Resource Damage			X									
Other			X									

Burgettstown Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Developmen t	Unknown
Stream Flooding	X					X		X	X	X	X	
Street Flooding	X					X		X	X	X		
Property Flooding	X					X		X	X	X		
Soil Erosion		X					X	X	X	X	X	
Sediment in Streams	X			X				X	X	X		
Stream Bed/Bank Erosion	X			X				X	X	X		
Scour at Outfalls	X				X				X	X		
Property/Infrastructure Damage	X			X					X	X		
Pollution	X			X					X	X		
Habitat/Resource Damage			X									
Other	X			X				X	X	X		

California Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Developmen t	Unknown
Stream Flooding		X		X				X				
Street Flooding	X			X				X				
Property Flooding		X			X			X				
Soil Erosion			X									
Sediment in Streams		X		X				X	X			
Stream Bed/Bank Erosion		X			X			X	X			
Scour at Outfalls			X									
Property/Infrastructure Damage			X									
Pollution		X			X							
Habitat/Resource Damage			X									
Other: (Sub Surface Water)												

Canonsburg Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Developmen t	Unknown
Stream Flooding	X			X							X	
Street Flooding		X			X					X		
Property Flooding		X			X					X		
Soil Erosion	X			X							X	
Sediment in Streams	X			X							X	
Stream Bed/Bank Erosion	X			X							X	
Scour at Outfalls		X			X					X		
Property/Infrastructure Damage		X				X					X	
Pollution		X			X			X				
Habitat/Resource Damage		X			X			X				
Other: (Sub Surface Water)												

Canton Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X										X
Street Flooding		X										X
Property Flooding		X										X
Soil Erosion			X									
Sediment in Streams												
Stream Bed/Bank Erosion			X									
Scour at Outfalls		X						X				
Property/Infrastructure Damage			X									
Pollution			X									
Habitat/Resource Damage			X									
Other: (Sub Surface Water)												

Carroll Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X					X					X
Street Flooding		X					X		X			
Property Flooding			X									
Soil Erosion		X					X					X
Sediment in Streams		X				X						X
Stream Bed/Bank Erosion		X					X	X				
Scour at Outfalls			X									
Property/Infrastructure Damage		X					X					X
Pollution			X									
Habitat/Resource Damage			X									
Other: (Sub Surface Water)												

Cecil Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X			X			X				
Street Flooding		X			X			X	X			
Property Flooding		X			X			X	X			
Soil Erosion		X			X							
Sediment in Streams		X			X			X				
Stream Bed/Bank Erosion		X			X			X				
Scour at Outfalls		X			X					X		
Property/Infrastructure Damage		X			X			X	X	X		
Pollution		X			X			X				
Habitat/Resource Damage			X					X				
Other: (Sub Surface Water)												

Centerville Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X				X		X				
Street Flooding		X				X		X				
Property Flooding		X				X		X				
Soil Erosion			X									
Sediment in Streams			X									
Stream Bed/Bank Erosion			X									
Scour at Outfalls			X									
Property/Infrastructure Damage		X					X	X	X			
Pollution			X									
Habitat/Resource Damage			X									
Other: (Sub Surface Water)	X						X	X				

Charleroi Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X				X		X				
Street Flooding		X					X	X				
Property Flooding		X				X		X				
Soil Erosion			X									
Sediment in Streams		X			X			X				
Stream Bed/Bank Erosion			X									
Scour at Outfalls			X									
Property/Infrastructure Damage			X									
Pollution		X				X		X				
Habitat/Resource Damage			X									
Other: (Sub Surface Water)			X									

Chartiers Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Other
Stream Flooding		X			X			X				
Street Flooding			X									
Property Flooding		X			X			X				
Soil Erosion		X			X				X			
Sediment in Streams	X							X				
Stream Bed/Bank Erosion		X			X			X				
Scour at Outfalls		X			X			X				
Property/Infrastructure Damage		X		X					X	X		
Pollution			X									
Habitat/Resource Damage			X									
Other												

Claysville Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X		X				X	X	X		
Street Flooding		X		X				X	X	X		
Property Flooding		X		X				X	X	X		
Soil Erosion			X									
Sediment in Streams			X									
Stream Bed/Bank Erosion			X									
Scour at Outfalls			X									
Property/Infrastructure Damage		X			X							
Pollution			X									
Habitat/Resource Damage			X									
Other												

Coal Center Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding												
Street Flooding												
Property Flooding												
Soil Erosion												
Sediment in Streams												
Stream Bed/Bank Erosion												
Scour at Outfalls												
Property/Infrastructure Damage												
Pollution												
Habitat/Resource Damage												
Other: (Sub Surface Water)												

Cokeburgh Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding												
Street Flooding												
Property Flooding												
Soil Erosion												
Sediment in Streams												
Stream Bed/Bank Erosion												
Scour at Outfalls												
Property/Infrastructure Damage												
Pollution												
Habitat/Resource Damage												
Other: (Sub Surface Water)												

Cross Creek Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X			X			X				
Street Flooding		X			X					X		
Property Flooding		X			X			X				
Soil Erosion		X			X			X				
Sediment in Streams	X				X					X		
Stream Bed/Bank Erosion	X				X			X				
Scour at Outfalls			X									
Property/Infrastructure Damage		X			X			X				
Pollution		X			X			X				
Habitat/Resource Damage		X			X			X				
Other												

Deemston Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X			X							
Street Flooding		X		X								
Property Flooding		X			X							
Soil Erosion		X			X							
Sediment in Streams		X			X							
Stream Bed/Bank Erosion		X		X								
Scour at Outfalls		X			X							
Property/Infrastructure Damage		X			X							
Pollution		X			X							
Habitat/Resource Damage		X			X							
Other												

Donegal Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X				X						
Street Flooding			X									
Property Flooding												
Soil Erosion		X										X
Sediment in Streams		X							X			
Stream Bed/Bank Erosion		X						X				
Scour at Outfalls			X									
Property/Infrastructure Damage			X									
Pollution			X									
Habitat/Resource Damage			X									
Other			X									

Donora Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding			X									
Street Flooding			X									
Property Flooding			X									
Soil Erosion			X									
Sediment in Streams			X									
Stream Bed/Bank Erosion			X									
Scour at Outfalls			X									
Property/Infrastructure Damage		X			X					X		X
Pollution		X		X				X				X
Habitat/Resource Damage			X									
Other			X									

Dunlevy Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding												
Street Flooding												
Property Flooding												
Soil Erosion												
Sediment in Streams												
Stream Bed/Bank Erosion												
Scour at Outfalls												
Property/Infrastructure Damage												
Pollution												
Habitat/Resource Damage												
Other: (Sub Surface Water)												

East Bethlehem Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding			X									
Street Flooding							X					
Property Flooding					X							
Soil Erosion												
Sediment in Streams												
Stream Bed/Bank Erosion												
Scour at Outfalls												
Property/Infrastructure Damage												
Pollution			X									
Habitat/Resource Damage			X									
Other: (Sub Surface Water)												

East Finley Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X				X					X	
Street Flooding		X				X					X	
Property Flooding		X				X					X	
Soil Erosion		X			X			X				
Sediment in Streams		X			X			X				
Stream Bed/Bank Erosion		X				X				X		
Scour at Outfalls		X					X	X				
Property/Infrastructure Damage			X									
Pollution		X						X				
Habitat/Resource Damage			X									
Other												

East Washington Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding			X									
Street Flooding												
Property Flooding			X									
Soil Erosion			X									
Sediment in Streams		X					X					X
Stream Bed/Bank Erosion			X									
Scour at Outfalls			X									
Property/Infrastructure Damage			X									
Pollution			X									
Habitat/Resource Damage			X									
Other												

Elco Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding	X						X	X				
Street Flooding		X								X		
Property Flooding	X						X	X			X	
Soil Erosion		X					X	X				
Sediment in Streams			X									
Stream Bed/Bank Erosion		X					X	X				
Scour at Outfalls			X									
Property/Infrastructure Damage		X									X	
Pollution												
Habitat/Resource Damage												
Other												

Ellsworth Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X				X						X
Street Flooding		X				X						X
Property Flooding		X				X						X
Soil Erosion		X				X						X
Sediment in Streams		X				X						X
Stream Bed/Bank Erosion		X				X						X
Scour at Outfalls		X				X						X
Property/Infrastructure Damage		X				X						X
Pollution		X				X						X
Habitat/Resource Damage		X				X						X
Other												

Fallowfield Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding	X	X		X	X					X		
Street Flooding		X			X				X			
Property Flooding		X			X							X
Soil Erosion		X			X			X				
Sediment in Streams	X	X			X			X				
Stream Bed/Bank Erosion		X			X			X				
Scour at Outfalls		X			X			X				
Property/Infrastructure Damage		X			X				X			X
Pollution		X	X		X			X				
Habitat/Resource Damage		X			X							X
Other												

Finleyville Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding												
Street Flooding												
Property Flooding												
Soil Erosion												
Sediment in Streams												
Stream Bed/Bank Erosion												
Scour at Outfalls												
Property/Infrastructure Damage												
Pollution												
Habitat/Resource Damage												
Other												

Green Hills Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding												
Street Flooding												
Property Flooding												
Soil Erosion												
Sediment in Streams												
Stream Bed/Bank Erosion												
Scour at Outfalls												
Property/Infrastructure Damage												
Pollution												
Habitat/Resource Damage												
Other												

Hanover Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X				X		X				
Street Flooding		X				X		X				
Property Flooding		X				X		X				
Soil Erosion		X				X		X				
Sediment in Streams		X				X		X				
Stream Bed/Bank Erosion		X				X		X				
Scour at Outfalls		X				X		X				
Property/Infrastructure Damage		X				X		X				
Pollution			X									
Habitat/Resource Damage			X									
Other												

Hopewell Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X					X					X
Street Flooding			X									
Property Flooding			X									
Soil Erosion			X									
Sediment in Streams		X					X					X
Stream Bed/Bank Erosion			X									
Scour at Outfalls			X									
Property/Infrastructure Damage			X									
Pollution			X									
Habitat/Resource Damage			X									
Other			X									

Houston Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding	X			X				X				
Street Flooding		X		X					X			
Property Flooding		X		X								X
Soil Erosion	X			X				X				
Sediment in Streams	X			X				X				
Stream Bed/Bank Erosion	X				X			X				
Scour at Outfalls	X					X		X				
Property/Infrastructure Damage		X				X		X				
Pollution			X				X	X				
Habitat/Resource Damage			X				X	X				
Other												

Independence Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding	X						X	X				
Street Flooding												
Property Flooding		X					X	X				
Soil Erosion												
Sediment in Streams												
Stream Bed/Bank Erosion	X						X	X				
Scour at Outfalls												
Property/Infrastructure Damage	X						X	X				
Pollution												
Habitat/Resource Damage												
Other: (Sub Surface Water)												

Jefferson Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X					X					X
Street Flooding			X				X					X
Property Flooding			X				X					X
Soil Erosion		X					X					X
Sediment in Streams		X					X					X
Stream Bed/Bank Erosion		X					X					X
Scour at Outfalls		X					X					X
Property/Infrastructure Damage		X					X					X
Pollution		X					X					X
Habitat/Resource Damage			X				X					X
Other												

Long Branch Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding												
Street Flooding												
Property Flooding												
Soil Erosion												
Sediment in Streams												
Stream Bed/Bank Erosion												
Scour at Outfalls												
Property/Infrastructure Damage												
Pollution												
Habitat/Resource Damage												
Other: (Sub Surface Water)												

McDonald Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding												
Street Flooding												
Property Flooding												
Soil Erosion												
Sediment in Streams												
Stream Bed/Bank Erosion												
Scour at Outfalls												
Property/Infrastructure Damage												
Pollution												
Habitat/Resource Damage												
Other: (Sub Surface Water)												

Marianna Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding	X			X				X				
Street Flooding		X		X					X			
Property Flooding		X		X								X
Soil Erosion	X			X				X				
Sediment in Streams	X			X				X				
Stream Bed/Bank Erosion	X				X			X				
Scour at Outfalls	X					X		X				
Property/Infrastructure Damage		X				X		X				
Pollution			X				X	X				
Habitat/Resource Damage			X				X	X				
Other: (Sub Surface Water)												

Midway Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X			X							X
Street Flooding		X			X							X
Property Flooding		X			X							
Soil Erosion			X									
Sediment in Streams	X				X							
Stream Bed/Bank Erosion		X				X						
Scour at Outfalls			X									
Property/Infrastructure Damage		X			X							
Pollution												
Habitat/Resource Damage			X									
Other												

Monongahela City

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding												
Street Flooding												
Property Flooding												
Soil Erosion												
Sediment in Streams												
Stream Bed/Bank Erosion												
Scour at Outfalls												
Property/Infrastructure Damage												
Pollution												
Habitat/Resource Damage												
Other: (Sub Surface Water)												

Morris Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X		X				X				
Street Flooding		X		X							X	
Property Flooding		X		X					X			
Soil Erosion		X		X				X				
Sediment in Streams			X	X				X				
Stream Bed/Bank Erosion		X		X				X				
Scour at Outfalls			X									
Property/Infrastructure Damage		X		X				X	X			
Pollution			X									
Habitat/Resource Damage			X									
Other												

Mount Pleasant Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X				X					X	
Street Flooding		X				X		X				
Property Flooding		X				X		X				
Soil Erosion		X				X		X				
Sediment in Streams			X				X	X				
Stream Bed/Bank Erosion		X				X		X				
Scour at Outfalls		X					X			X		
Property/Infrastructure Damage			X				X	X				
Pollution			X				X					X
Habitat/Resource Damage			X				X					X
Other												

New Eagle Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding			X									
Street Flooding		X			X			X	X	X		
Property Flooding		X			X			X	X	X		
Soil Erosion		X			X			X	X	X		
Sediment in Streams			X									
Stream Bed/Bank Erosion			X									
Scour at Outfalls			X									
Property/Infrastructure Damage		X				X		X	X	X		
Pollution			X									
Habitat/Resource Damage			X									
Other												

North Bethlehem Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X			X			X		X	X	
Street Flooding		X			X			X		X		
Property Flooding		X			X			X		X	X	
Soil Erosion		X		X				X	X			
Sediment in Streams		X		X				X	X			
Stream Bed/Bank Erosion		X		X				X				
Scour at Outfalls		X		X				X	X			
Property/Infrastructure Damage		X			X			X	X	X	X	
Pollution												
Habitat/Resource Damage												
Other												

North Charleroi Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding												
Street Flooding												
Property Flooding												
Soil Erosion												
Sediment in Streams												
Stream Bed/Bank Erosion												
Scour at Outfalls												
Property/Infrastructure Damage												
Pollution												
Habitat/Resource Damage												
Other: (Sub Surface Water)												

North Franklin Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding												
Street Flooding												
Property Flooding												
Soil Erosion												
Sediment in Streams												
Stream Bed/Bank Erosion												
Scour at Outfalls												
Property/Infrastructure Damage												
Pollution												
Habitat/Resource Damage												
Other: (Sub Surface Water)												

North Strabane Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X			X				X	X		
Street Flooding		X					X	X				
Property Flooding		X				X			X			
Soil Erosion			X									
Sediment in Streams			X									
Stream Bed/Bank Erosion			X									
Scour at Outfalls			X									
Property/Infrastructure Damage			X									
Pollution			X									
Habitat/Resource Damage			X									
Other			X									

Nottingham Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding	X			X				X				
Street Flooding		X		X					X			
Property Flooding		X		X								X
Soil Erosion	X			X				X				
Sediment in Streams	X			X				X				
Stream Bed/Bank Erosion	X				X			X				
Scour at Outfalls	X					X		X				
Property/Infrastructure Damage		X				X		X				
Pollution			X				X	X				
Habitat/Resource Damage			X				X	X				
Other												

Peters Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X				X						X
Street Flooding		X			X				X			
Property Flooding		X		X					X			
Soil Erosion		X		X								
Sediment in Streams		X			X							
Stream Bed/Bank Erosion		X			X			X				
Scour at Outfalls		X				X		X				
Property/Infrastructure Damage		X			X				X			
Pollution			X									
Habitat/Resource Damage			X									
Other												

Robinson Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X				X		X				
Street Flooding		X				X			X			
Property Flooding		X				X			X			
Soil Erosion		X			X			X				
Sediment in Streams		X			X			X				
Stream Bed/Bank Erosion		X			X			X				
Scour at Outfalls			X									
Property/Infrastructure Damage		X				X		X	X			
Pollution	X			X								
Habitat/Resource Damage		X				X						
Other												

Roscoe Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X			X					X		
Street Flooding		X			X					X		
Property Flooding			X									
Soil Erosion		X		X				X				
Sediment in Streams			X									
Stream Bed/Bank Erosion			X									
Scour at Outfalls			X									
Property/Infrastructure Damage			X									
Pollution			X									
Habitat/Resource Damage			X									
Other												

Smith Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X					X	X				X
Street Flooding		X				X		X	X			
Property Flooding		X				X		X				X
Soil Erosion		X										
Sediment in Streams	X											
Stream Bed/Bank Erosion	X											
Scour at Outfalls		X										
Property/Infrastructure Damage		X										
Pollution												X
Habitat/Resource Damage												X
Other												

Somerset Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X				X		X	X	X		
Street Flooding		X				X		X	X			
Property Flooding		X			X			X	X	X		
Soil Erosion		X			X			X				
Sediment in Streams	X					X		X				
Stream Bed/Bank Erosion		X			X			X				
Scour at Outfalls		X			X			X				
Property/Infrastructure Damage		X		X				X				
Pollution			X									
Habitat/Resource Damage			X									
Other			X									

South Franklin Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding												
Street Flooding												
Property Flooding												
Soil Erosion												
Sediment in Streams												
Stream Bed/Bank Erosion												
Scour at Outfalls												
Property/Infrastructure Damage												
Pollution												
Habitat/Resource Damage												
Other: (Sub Surface Water)												

South Strabane Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X				X		X				
Street Flooding		X				X		X				
Property Flooding		X				X		X				
Soil Erosion		X				X		X	X			
Sediment in Streams		X		X				X				
Stream Bed/Bank Erosion	X			X						X		
Scour at Outfalls			X									
Property/Infrastructure Damage		X				X		X				
Pollution			X									
Habitat/Resource Damage			X									
Other												

Speers Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X			X			X				
Street Flooding			X				X					
Property Flooding		X					X				X	
Soil Erosion			X					X				
Sediment in Streams		X				X		X				
Stream Bed/Bank Erosion			X									
Scour at Outfalls			X									
Property/Infrastructure Damage		X					X				X	
Pollution			X				X					
Habitat/Resource Damage			X				X					
Other												

Stockdale Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding												
Street Flooding												
Property Flooding												
Soil Erosion												
Sediment in Streams												
Stream Bed/Bank Erosion												
Scour at Outfalls												
Property/Infrastructure Damage												
Pollution												
Habitat/Resource Damage												
Other: (Sub Surface Water)												

Twilight Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding												
Street Flooding												
Property Flooding												
Soil Erosion												
Sediment in Streams												
Stream Bed/Bank Erosion												
Scour at Outfalls												
Property/Infrastructure Damage												
Pollution												
Habitat/Resource Damage												
Other: (Sub Surface Water)												

Union Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding												
Street Flooding												
Property Flooding												
Soil Erosion												
Sediment in Streams												
Stream Bed/Bank Erosion												
Scour at Outfalls												
Property/Infrastructure Damage												
Pollution												
Habitat/Resource Damage												
Other: (Sub Surface Water)												

Washington City

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X						X				
Street Flooding		X								X		
Property Flooding		X										
Soil Erosion		X						X				
Sediment in Streams		X						X				
Stream Bed/Bank Erosion		X										X
Scour at Outfalls												
Property/Infrastructure Damage		X								X		
Pollution		X										X
Habitat/Resource Damage		X										X
Other												

West Alexander Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding			X									
Street Flooding			X									
Property Flooding			X									
Soil Erosion			X									
Sediment in Streams			X									
Stream Bed/Bank Erosion			X									
Scour at Outfalls			X									
Property/Infrastructure Damage			X									
Pollution			X									
Habitat/Resource Damage			X									
Other												

West Bethlehem Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding												
Street Flooding												
Property Flooding												
Soil Erosion												
Sediment in Streams												
Stream Bed/Bank Erosion												
Scour at Outfalls												
Property/Infrastructure Damage												
Pollution												
Habitat/Resource Damage												
Other: (Sub Surface Water)												

West Brownsville Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding			X									
Street Flooding	X			X				X	X	X		
Property Flooding		X			X			X	X	X		
Soil Erosion			X									
Sediment in Streams			X									
Stream Bed/Bank Erosion		X						X				
Scour at Outfalls			X									
Property/Infrastructure Damage			X									
Pollution			X									
Habitat/Resource Damage			X									
Other												

West Finley Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X				X						
Street Flooding			X									
Property Flooding		X										
Soil Erosion			X									
Sediment in Streams			X									
Stream Bed/Bank Erosion		X										
Scour at Outfalls		X										
Property/Infrastructure Damage			X									
Pollution			X									
Habitat/Resource Damage		X										
Other			X									

West Middleton Borough

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding			X				X					X
Street Flooding			X				X					X
Property Flooding		X				X			X			
Soil Erosion			X				X					X
Sediment in Streams			X				X					X
Stream Bed/Bank Erosion			X				X					X
Scour at Outfalls			X				X					X
Property/Infrastructure Damage		X				X			X			
Pollution			X				X					X
Habitat/Resource Damage			X				X					X
Other			X				X					X

West Pike Run Township

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding		X				X		X				
Street Flooding			X									
Property Flooding		X					X		X			
Soil Erosion		X				X		X				
Sediment in Streams		X				X			X			
Stream Bed/Bank Erosion			X									
Scour at Outfalls		X			X			X				
Property/Infrastructure Damage		X					X		X			
Pollution		X			X				X			
Habitat/Resource Damage			X									
Other												

Washington County Conservation District

PROBLEM	SEVERITY			FREQUENCY (YEARS)				CAUSE				
	Severe	Moderate	None	<1	1-2	3-6	>6	Increased Runoff	Poor/No Drainage	Undersized Structure	Floodplain Development	Unknown
Stream Flooding	X			X				X				
Street Flooding	X			X				X				
Property Flooding	X			X				X				
Soil Erosion	X			X				X				
Sediment in Streams	X			X				X				
Stream Bed/Bank Erosion	X			X				X				
Scour at Outfalls	X			X				X				
Property/Infrastructure Damage	X			X							X	
Pollution	X			X				X				
Habitat/Resource Damage	X			X							X	
Other												

APPENDIX C.
PHASE II SCOPE OF WORK

Phase II Scope of Work

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

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

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

The selected engineering firm shall be considered as the CONSULTANT.

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

Project Administration

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

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

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

Project Billing

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

TASK A - Data Collection/Review/Analysis

SubTask A.1 - Data Collection

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

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

1. Comprehensive land use plans.

2. Existing municipal ordinances.

3. Stormwater-related problems areas and proposed conceptual solutions.

4. Existing and proposed flood control projects.

5. Existing and proposed stormwater control facilities.

6. A listing of existing and proposed stormwater collection and control facilities, including a designation of those areas to be served by stormwater collection and control facilities within a 10-year period, an estimate of the design capacity and costs of such facilities, a schedule and the proposed methods of financing the development, construction, and operation of such facilities, and an identification of the existing or proposed institutional arrangements to implement and operate the facilities, where this information is readily available.

7. Soils.

8. Geology.

9. Significant water obstructions.

10. Topographic and other readily available mapping.

11. Aerial photographs.

12. Previously completed engineering and planning studies.

13. Stream flow and rain gauge data and other water quality information.

14. FEMA FIS floodplain information.

Necessary field investigations will be accomplished to gather and/or confirm the data. This task also involves the review and preliminary analysis of the technical data that has been obtained

for consistency and usability. It also includes the review of the institutional data collected through the Phase I Information Request Form process for consistency and usability in the final PLAN.

Problem Areas and Obstructions Inspection/Summary/Proposed Solutions

A detailed investigation will be performed to evaluate any problem areas and obstructions identified during Phase I. Additional effort will be expended to review this information and possibly collect additional information for those municipalities who did not respond under Phase I. Those problem areas and obstructions recognized as "significant" would be field evaluated. Detailed modeling will be completed for the subwatershed where these "significant" problem areas or obstructions occur (SubTask B.3), then these sites shall be designated as points-of-interest, and associated design storm flows will be developed. A collection of past studies/investigations including any PennDOT hydrologic computations, if possible, will be compiled and reviewed for proposed solutions. The PLAN will summarize these problem areas and obstructions, provide proposed solutions, and will specify possible sources of funding to pursue for implementation. The PLAN will make suggestions for other programs/activities to deal with the issues raised during the planning process. The identification of the problem areas will help in assessing the stormwater management rate controls needed for the subwatersheds.

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

Review of Existing Plans/Studies/Reports/Programs

A comprehensive review of related documents and/or programs will be performed and a coordinated list of goals and objectives from each of the documents will be developed.

Anticipated Product

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

SubTask A.2 - Municipal Ordinance Reviews/Evaluations

This task will involve the detailed evaluation of the provided municipal ordinances in order to prepare a municipal ordinance comparison matrix. This matrix is intended to display (for both the actual preparation of the implementation PLAN and also for the municipal education process), the current stormwater management provisions in the various municipal ordinances for all municipalities within Washington County. The objectives and the preparation of the matrix are to easily and effectively see the

similarities and differences, as well as the consistency/inconsistency, between the various municipal ordinances in the County. The matrix will be used to develop ordinance provision recommendations for the various municipalities.

Anticipated Product

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

SubTask A.3 - Data Preparation for Technical Analysis

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

The GIS data layers will include:

- Base Mapping – Existing base map information (roads, streams, municipal boundaries, text, etc.) will be collected and the most accurate data will be utilized to develop the County's base map. All data will be projected into the coordinate system utilized by Washington County. All data from various sources will be merged into a seamless base map.

- Land Use/Land Cover Information – Current aerial (photographic and/or digital images), available GIS land use files, and zoning maps will be collected and formatted into the format required for hydrologic modeling based on NRCS (formerly SCS) land use classifications. Land development projects completed subsequent to existing data will be added as necessary.

- Future Land Use Conditions – Future projected planning information will be overlaid on the existing land use conditions mapping to determine the future land use scenario for development at a 10-year build-out condition.

- Soils Information – The County Soils Survey maps will be modified and/or prepared to illustrate NRCS hydrologic soils groups instead of individual soil types. Overlay mapping will be necessary to prepare the hydrologic soils group map necessary for modeling.

- Digital Elevation Models – Digital Elevation Models (DEMs) will be utilized and evaluated for watershed and subwatershed delineation and to assign slope category information to the subwatersheds for which detailed modeling will be completed. The DEMs will be merged to form a seamless watershed map and projected to the appropriate coordinate system.

- Digital Raster Graphics (DRGs) – Ortho digital USGS topographical maps will be compiled and utilized to evaluate NRCS land use classifications and to determine the location of significant obstructions and problem areas.

- Geology – If available, digital geologic maps that include pertinent geologic features (limestone, sandstone, etc.) will be developed for the County and be extracted and displayed as part of the PLAN.

- Obstructions – Obstructions will be located on the appropriate base map and data or attributes will be attached or linked to the locations.

- Problem Areas, Flood Control Structures, Stormwater Management Facilities – These items will be located on the appropriate base map and data or attributes will be attached or linked to the locations.

- Floodplains – Available FEMA FIS floodplain data will be transposed to the appropriate base map and displayed with the development in Washington County.

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

Delineation of Subwatersheds

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

The subwatersheds will be delineated based on the following:

1. The location of existing regionally significant stormwater management problems, as identified by the WPAC in the Information Request Form, during the field reconnaissance, or from data compiled in any previous studies or reports.

2. The location of significant regional stormwater and flood control obstructions such as highway bridges and culverts, or stormwater control facilities.

3. Confluence points of tributaries, as deemed appropriate and significant relative to regional stormwater management planning based on engineering judgment and good modeling practice.

4. Other points of interest, such as stream gage or water quality monitoring stations, locations of water quality concerns, potential flood control project sites, significant outfall locations downstream of existing developments, or where significant development is anticipated and projected to occur.

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

1. Floodplain Areas - The approximate floodplain limits plotted over the watershed base map or the highlighting of those stream segments for which FEMA detailed or approximate Flood Insurance Studies are available.

2. Regionally significant stormwater obstructions and their capacities - "Significant" obstructions will be those that are identified in the Information Request Form and/or which are confirmed by the CONSULTANT as being areas where insufficient capacity exists to pass the necessary storm flows, thereby resulting in a flooding hazard to persons or property, or those obstructions that would act as regionally significant impoundments that may affect watershed modeling and the watershed stormwater response.

3. Storm Sewer Systems - Areas where significant storm sewer systems exist will be indicated generally on the final base map.

4. Existing local, state, and federal flood protection and stormwater management facilities.

5. Proposed stormwater facilities within the 10-year planning period - Where known and confirmed by the municipalities through the Information Request Form completions process.

6. Regionally Stormwater Related "Problems" - Those areas indicated in the Information Request Form and where confirmed by the CONSULTANT through technical modeling/analysis (for example, flooding points or areas of streambank erosion).

Anticipated Product

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

SubTask A.4 - Data Collection for Integrated Water Resource Plan Effort

This task will involve the necessary efforts to gather, review, and analyze the required data to complete the technical and institutional planning steps for the IWRP concerning:

- Act 220 Water Planning
- Source Water Protection Planning
- NPDES Municipal Separate Storm Sewer Systems (MS4)
- Floodway & Floodplain Management

The CONSULTANT and COUNTY will work jointly to collect data from county offices, municipalities, and municipal authorities, local, state, and federal agencies that will aid in preparation of the PLAN. All data collection activities will be accomplished by gathering available information from the identified parties.

Review of Existing Plans/Studies/Reports/Programs

A comprehensive review of related documents and/or programs will be performed and a coordinated list of goals and objectives from each of the documents will be developed.

Anticipated Product

The product will include the information listed above, gathered and organized in such a way as to be usable for coordinated water resource planning. A final data summary, possibly included as an Appendix to the Plan, will be prepared that will identify and/or catalogue the collected data.

TASK B - Technical Analysis

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

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

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

SubTask B.1 - Implement Volume Controls

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

SubTask B.2 - Implement Rate and Water Quality Controls

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

Establish water quality control guidelines per the Pennsylvania Best management Practices Manual

SubTask B.3 - Model Subwatersheds of Designated Watersheds

This task involves the hydrologic modeling, quantitative computations, and evaluations necessary to analyze runoff characteristics of the subwatersheds under existing and future conditions. It will also establish the need and extent of release rates for the subwatersheds. The Chartiers Creek watershed and approximately twenty (20) subwatersheds will be modeled to determine peak flow rates. Subwatersheds chosen will be based on existing problem areas and future development pressures based on input provided by the WPAC. Existing and future land use and land cover will be used to determine existing and future peak rates of discharge. Input data including rainfall information, drainage network layouts and capacities, travel times within subwatersheds, significant obstructions, and GIS based data will be added to develop the selected hydrologic model.

Model Calibration

The individual subwatershed models will be run to get preliminary results. The models will be calibrated to verify the results. Calibration efforts will include the adjustment of the

model parameters to accurately simulate natural runoff conditions of the subwatershed. Consideration will be given to all calibration techniques including, but not limited to: use of any available gaging information, comparison with rainfall and runoff information from similar watersheds, comparison with Flood Insurance Study information, and regression analyses. As necessary, calibration will be performed at multiple points within the subwatersheds to assure the most accurate modeling.

Design Storm Selection

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

Model Runs

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

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

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

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

Based on the results of SubTask B.3, this information will be used to develop alternative conceptual solutions for the problem areas identified in the Information Request Form and other problems areas as identified by the WPAC. Problem areas may generally consist of flooding, stream channel or bank erosion, property damage, detention basis (retrofitting), etc. The developed solutions will be conceptual in nature (i.e. no final engineering or specification will be completed). These conceptual solutions will be presented as recommendations to the municipalities. It will be up to the individual municipality's discretion whether or not to implement the conceptual solutions to the problem areas. The municipality will also be responsible to acquire funding sources to implement the final solutions.

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

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

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

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

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

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

The proposed standards and criteria need to address the following control requirements:

1. Apply to all areas covered by the PLAN.
2. Establish release rate percentages (if applicable) or other levels of control of runoff.
3. Specify design flood frequencies and computational methodologies for design of stormwater management measures.
4. Provide specifications for construction and maintenance of stormwater management systems (if applicable).
5. Provide conceptual solutions to both regional and local problems areas.
6. Summary and prioritization strategies for long-term potential solutions.
7. Identify funding sources for correction of existing problems related to infrastructure.
8. Address consistency with concurrent studies so as to avoid duplication of effort.
9. Provide a fee schedule for: submissions of permit applications, review of permit applications, construction inspections, periodic inspections, and enforcement actions and potential creation of a maintenance fund.
10. An implementation strategy, including funding, for retrofit measures, if necessary.
11. Strategies to incorporate and identify subwatersheds that may need to be modeled after completion of the Plan.

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

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

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

SubTask B.6 - Implementation of Technical Standards and Criteria

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

Anticipated Product

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

SubTask B.7 - Economic Analysis

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

Anticipated Product

The product will be the design example.

SubTask B.8 - Regulations for Activities Impacting Stormwater Runoff

This subtask will involve the research and development of standards and provisions regarding regulating activities that may impact stormwater runoff and quality. The activities will only be regulated in regards to stormwater management controls and protecting water quality requirements to ensure the protection of health, safety, and property of the people and Waters of the Commonwealth.

Anticipated Product

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

SubTask B.9 - Water Quality Impairments

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

Anticipated Product

The product will be to identify how to protect the existing uses and for waters not attainting, how to improve the water quality to the designated use.

SubTask B.10 – Integrated Water Resource Plan Analysis

This subtask involves coordinating water resource planning efforts being conducting associated with Act 220 State Water Plan, Source Water Protection, NPDES MS4 Program, and Floodplain Management. In addition, an analysis will be conducted to determine the current water management efforts (administrative, technical, etc.) including efforts taken to address financial aspects of Plan integration. The analysis will also include documentation of the existing MS4 programs efforts. Research will be conducted to further identify a potential central water management entity that would effectively and efficiently address water management for many communities, including, but not limited to, the formation of a stormwater authority.

Anticipated Product

The product will be a separate analysis for the Chartiers Watershed area located within the County for the coordination of water resources that may be included in a future feasibility study.

TASK C – Public/Municipal Participation

SubTask C.1 - WPAC/MEG/LAG/Meetings

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

In addition to the WPAC, the County will conduct focus group meetings to educate and solicit input and comment from the public, municipal governments (elected officials, engineers, and solicitors), and other interest groups such as watershed associations. These focus groups are the Municipal Engineers Group (MEG) and the Legal Advisory Group (LAG).

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

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

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

A BMP Workshop for the municipalities and municipal engineers will be developed and conducted. The presentation of the workshop shall be based on *The Pennsylvania Stormwater Best Management Practices Manual*. The workshop will contain one or more examples showing the design and construction of BMPs, including design calculations, review procedures, and approval of permit applications.

Meetings of these focus groups may be held separately or combined as the County desires.

The following table outlines the proposed WPAC, MEG, and LAG meetings and public hearing schedules including the purpose of each meeting:

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

Meeting	Purpose of Meeting	Meeting Schedule
WPAC 3	Review Phase I, discuss problem areas and obstructions from Questionnaire Form, present GIS maps and data, and review overall goals of Phase II. Discuss future meetings, makeup, combinations, schedules.	Beginning of Phase II
WPAC 4 & MEG 1	Potential separate meetings to review the project status, review technical aspects of the PLAN, including initial modeling runs, calibration efforts, and review of technical standards (Control Guidance 1 & 2). Purpose is to receive comments and direction in the development of the Model Ordinance. Meetings may be combined if so desired by the County.	Middle of Task B
WPAC 5 & MEG 2	Potential separate meetings to present final technical modeling results, present technical standards and criteria; discuss water quality issues, and preliminary ordinance provisions for the municipalities. Review final modeling runs and present draft PLAN and address previous comments. Meetings may be combined if so desired by the County.	End of Task B
WPAC 6 & LAG 1	Potential separate meetings to present final draft and review municipal implementation procedures. Educate the municipal solicitors on the ordinance adoption and implementation requirements of the PLAN. Meetings may be combined if so desired by the County.	End of Phase II
Public Hearing	Conduct the pubic hearing as required by Act 167 to present the final PLAN to the public.	End of Phase II
BMP Workshop	Educate municipalities on implementing stormwater quality through the BMP Workshop.	End of Phase II
Municipal Workshop	Municipal Implementation Workshop: Provide assistance to municipalities on implementation of the PLAN including adaptation, enactment, and implementation of the ordinances and other action items.	Within 3 months of DEP's approval of the PLAN
Public Implementation Workshop	Public Implementation Workshop: Provide introduction and overview of the PLAN to public.	Within 6 months of DEP's approval of the PLAN

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

Anticipated Product

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

TASK D - PLAN Preparation and Implementation

SubTask D.1 - Final Phase II Report Preparation

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

- A description of the hydrologic characteristics of the subwatersheds; the existing and future land uses and their impacts on stormwater runoff and stormwater collection systems; the available runoff control techniques and their efficiencies in the subwatersheds; a list of significant obstructions; and available FEMA FIS floodplain information. The available floodplain information will either be included in the PLAN or their sources will be referenced.

- Based upon the results of the subwatershed modeling, the technical evaluation resulting in the criteria and standards governing the use of stormwater management controls throughout the subwatersheds. An important aspect of the technical components of the PLAN will be the delineation of subwatersheds with specific management strategies. This determination will be accomplished based upon an evaluation of any land development activities on critical drainage points throughout Washington County. Peak discharge tables will be compiled for the critical drainage points from the hydrologic model runs involved in the modeling effort. BMP tables and data on their effectiveness and applicability will be presented or referenced.

- The tables for the rainfall depths for various frequency durations, which are computed as part of the hydrologic, modeling.

- Approximate floodplain limits for areas where detailed FIS studies are available. Where detailed flood control engineering plans for proposed remedial measures are available from municipality, county, or private agencies, a summary analysis and evaluation of those plans will be included in the PLAN. Where detailed plans are not available, preliminary recommendations relating to such measures will be provided.

- Recommendations for solutions to the existing drainage problems will only be conceptual in nature indicating the type of approach needed and inter-municipal cooperation issues. Identification of sites for potential restoration and/or protection projects that would qualify for Pennsylvania's "Growing Greener" Funds will be identified.

- Recommendations for new drainage facilities to prevent future problems due to new land development and a discussion regarding inter-municipal arrangements for funding the projects will also be discussed.

- Priorities for Implementation. The conclusions and recommendations of the goals and objectives of the PLAN will be summarized. Recommended actions will be

listed according to agency, municipality, or individual responsible for each action. Priority of recommended actions will be based on chronological order, importance, hydrologic significance, or other factors as may be appropriate. This will include type and location of potential watershed projects that could be considered under Pennsylvania's "Growing Greener" grant program.

- PLAN Update. As a part of the implementation strategy for the PLAN, specific steps and/or procedures will be established for pursuing and completing the PLAN as required by Act 167. Specific circumstances will be identified and described in the PLAN document that will "trigger" a decision to update. For example, land development circumstances (such as major changes in the type and/or amount of proposed land development, and in excess of that which was assumed for the preparation of the original PLAN) will be identified as reasons for pursuing an update of the PLAN prior to the required 5-year time frame identified in Act 167.

The preliminary outline for the PLAN is as follows:

Part I

Section I	-	Introduction
Section II	-	Washington County Description
Section III	-	Significant Problem Areas and Obstructions
Section IV	-	Watershed Level Stormwater Management Planning
Section V	-	Technical Analysis
Section VI	-	Existing Municipal Regulations
Section VII	-	Economic Impact of Stormwater Management Standards
Section VII	-	Goals, Objectives, and Additional Recommendations
Section IX	-	PLAN Implementation and Update Procedures
Section X	-	References

Part II (or Appendix as appropriate)

Integrated Water Resources Plan Information

Part III (or Appendix as appropriate)

Model Ordinance

Plates:

- Existing Land Use Base map.
- Future (10-year) Land Use Base map.
- Subwatersheds used for hydrologic analysis including information on applicable release rate management strategies.
- Hydrologic soil groups and development and floodplains.
- Stream obstructions, flooding, and problem areas.
- Areas where storm sewer networks exist (if available) and projected future storm sewer networks.

Anticipated Product

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

SubTask D.2 - Model Ordinance Preparation

A Model Ordinance, which includes the provisions and standards developed during Phase II, will be created consistent with the Department of Environmental Protection Pennsylvania Model Stormwater Management Ordinance. The WPAC will review and discuss drainage and construction standards and decide to what extent they will be included in the Ordinance.

Anticipated Product

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

SubTask D.3 – Integrated Water Resource Planning

Integrated Water Resource information will be created documenting the coordination of the various water resource planning activities. It will also include an analysis documenting existing stormwater management and MS4 efforts as well as recommendations for a central entity to implement stormwater management efforts including an MS4 program for interested municipalities.

Anticipated Product

The product will be the Integrated Water Resource Planning Information. This information will be prepared in both digital and paper formats.

SubTask D.4 - Plan Adoption

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

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

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

The Washington County Commissioners will vote by resolution on the adoption of the PLAN. The resolution will have to be carried by an affirmative vote of at least a majority of the Commissioners, and should refer expressly to the maps, charts, textual matter, and other materials intended to comprise the PLAN. Upon positive resolution, this action will then be recorded on the adopted PLAN.

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

As desired by the County, the adopted PLAN could be posted on the COUNTY's and/or CONSULTANT's websites.

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

Anticipated Product

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

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

1. A survey of existing runoff characteristics in minor as well as large storms, including the impact of soils, slopes, vegetation, and existing development.

2. A survey of existing significant obstructions, their capacities, and associated storm return periods.

3. An assessment of projected and alternative land development patterns in Washington County, and the potential impact of runoff quantity, velocity, and quality.

4. An analysis of existing and future development in flood hazard areas, and its sensitivity to damages from future flooding or increased runoff.

5. A survey of existing drainage problems and proposed conceptual solutions.

6. A review of existing and proposed stormwater collection systems and their impacts including short and long term maintenance of existing and future systems.

7. An assessment of alternative runoff control techniques and their efficiency in the individual subwatershed.

8. An identification of existing and proposed local, State, and Federal flood control projects located in Washington County and their design capacities.

9. A designation of those areas to be served by stormwater collection and control facilities within a ten (10) year period, an estimate of the design capacity and costs of such facilities, a schedule and proposed methods of financing the development, construction and operation of such facilities, and an identification of the existing or proposed institutional arrangements to implement and operate the facilities.

10. An identification of FIS delineated floodplains throughout Washington County.

11. Criteria and standards for the control of stormwater runoff from existing and future development, which are necessary to minimize dangers to property and life and carry out the purposes of Act 167.

12. A BMP Workshop to inform engineers and local officials about enhanced water quality and groundwater recharge stormwater management techniques (information on BMPs is also to be included or referenced in the PLAN).

13. Short and long term priorities for implementation of conceptual solutions.

14. Provisions for periodically reviewing, revising, and updating the PLAN.

15. Provisions as are reasonably necessary to manage stormwater such that land development or activities in each municipality do not adversely affect health, safety, and property in other municipalities of Washington County and in drainage basins to which the watershed is tributary.

16. Consideration of consistency with other existing municipal, county, regional, and State environmental and land use plans.

APPENDIX D.
PHASE II COST PROPOSAL

Phase II Cost Proposal

The estimated cost associated with completing the Phase II work is Four Hundred One Thousand Dollars ($401,000 .00) as per the following breakdown:

Task - Description	TIME	EXPENSES	TOTAL
Task A – Data Collection/Review/Analysis	$95,150.00	$8,000.00	**$103,150.00**
Task B – Technical Analysis	$130,850.00	$10,000.00	**$140,850.00**
Task C – Public/Municipal Participation	$44,038.00	$7,275.00	**$51,313.00**
Task D – PLAN Preparation and Implementation	$65,246.00	$5,000.00	**$70,246.00**
Task E – Project Management & Administration	$33,441.00	$2,000.00	**$35,441.00**
PHASE II PROJECT TOTALS	**$368,725.00**	**$32,275.00**	**$401,000.00**

Budget Appropriations for the associated Fiscal Year Periods are estimated to be as follows:

Fiscal Year	Proposed Act 167 Phase 2 Budget Appropriation
2009 (July 1, 2008 –June 30, 2009)	**$139,835**
2010 (July 1, 2009 – June 30, 2010)	**$128,983**
2011 (July 1, 2010 – June 30, 2011)	**$132,182**
TOTAL	**$401,000**

APPENDIX E.
PHASE II PROPOSED SCHEDULE

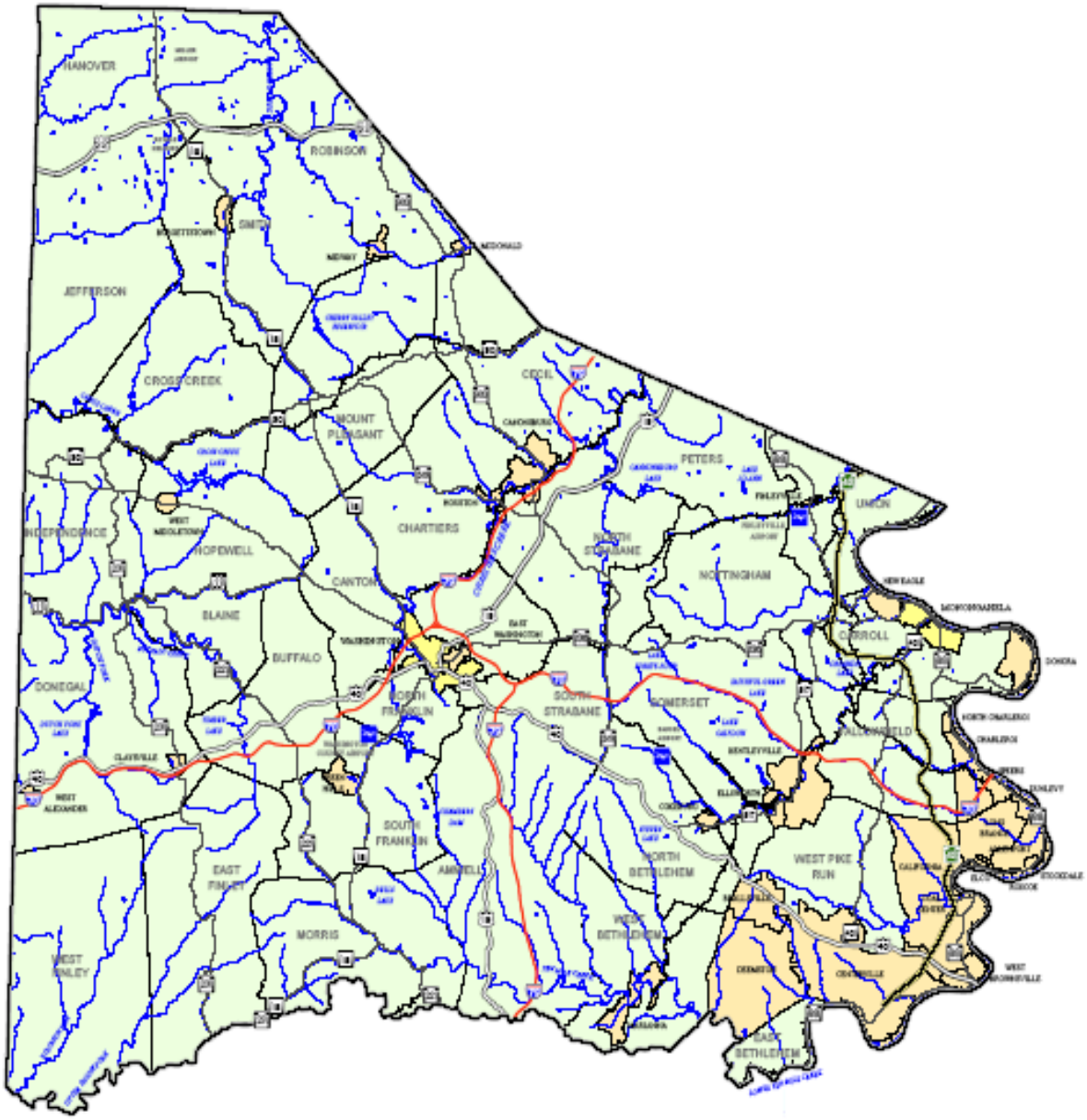
Phase II Proposed Schedule

The proposed Phase II Schedule is as follows:

ANTICIPATED DATE	MILESTONE	FY
2008		
August	PADEP and Washington County Phase II Contract Executed	
September	WPAC Meeting #3	
October – December	Field View of Problem Areas/Modeling	**2009**
2009		
February	Conceptual Solutions to Problem Areas	
June	WPAC Meeting #4 and MEG Meeting #1	
September	Draft Phase II Report	
December	Draft Model Ordinance	**2010**
2010		
March	WPAC Meeting #5 and MEG Meeting #2	
July	Finalize Phase II Report, Model Ordinance, and Plates	
August	WPAC Meeting #6, LAG Meeting #1, and BMP Workshop	
November	Public Hearing	**2011**
2011		
March	Commissioners Approval of Phase II Plan	
May	Phase II Report Submission to PADEP	
June	PADEP and Washington County Phase II Contract Expiries	

APPENDIX F.
WASHINGTON COUNTY MAP

General County Map



Legend

- Interstate
- Toll Road
- US Route
- State Route
- Railroad
- Waterways
- City
- Borough
- Township
- County

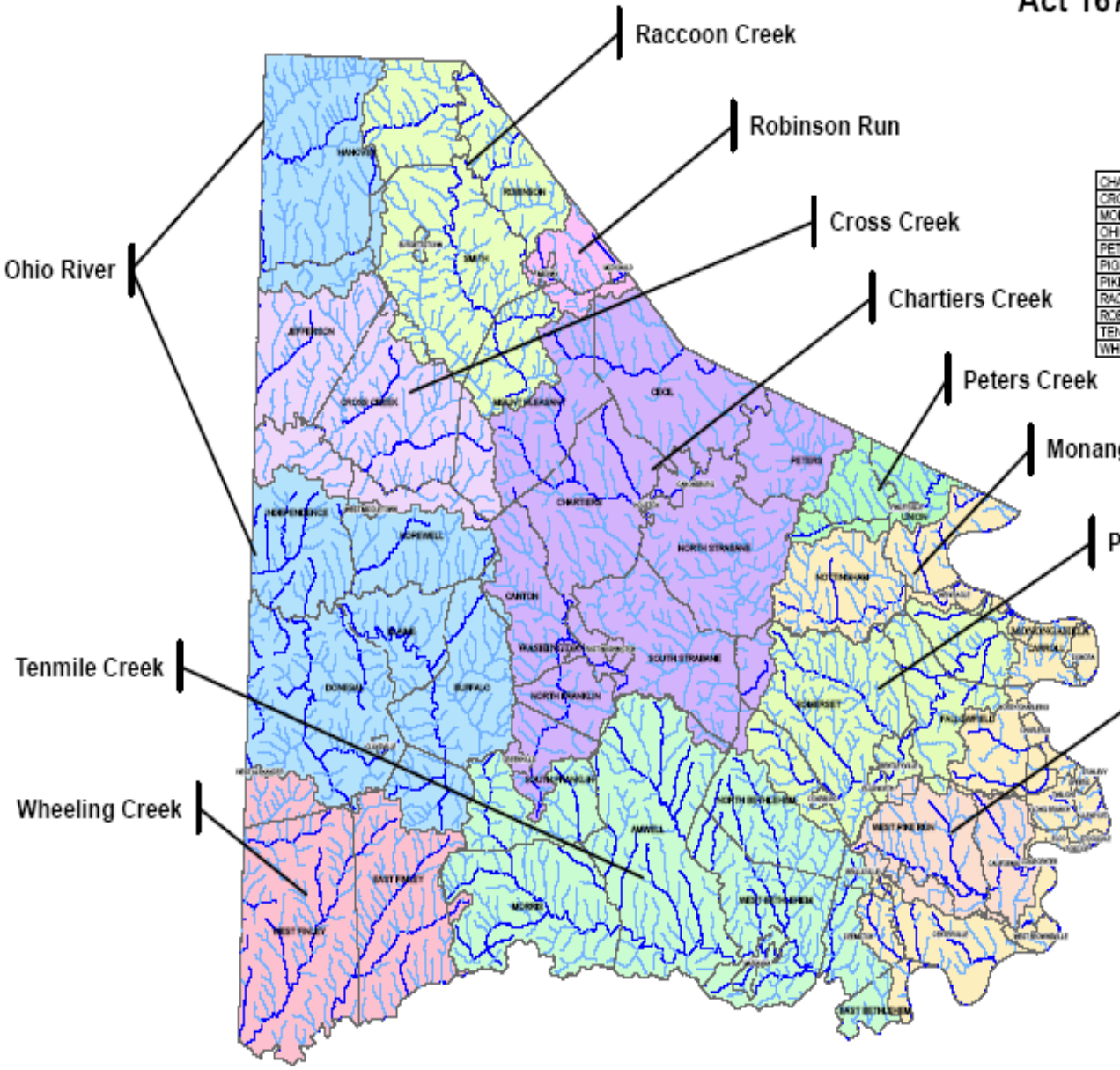
N
W E
S

Scale in Miles

HRG
Herbert, Rowland & Grubic, Inc.
Engineering & Related Services

APPENDIX G.
WASHINGTON COUNTY
ACT 167 DESIGNATED WATERSHEDS

Act 167 Designated Watersheds



Area by Watershed (in Square Miles)

Watershed Name	Total Area of Watershed	Portion Within Washington County
CHARTIERS CREEK	236.12	171.128
CROSS CREEK	62.96	62.9775
MONONGAHELA RIVER	313.86	77.1856
OHIO RIVER	341.8	152.8299
PETERS CREEK	51.42	15.9078
PIGEON CREEK	61.52	61.5406
PIKE RUN	28.55	28.5575
RACCOON CREEK	145.85	74.1429
ROBINSON RUN	39.89	10.2218
TEN MILE CREEK	139.3	135.5646
WHEELING CREEK	159.37	71.3085

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Cranberry Township, PA 16066
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hrg@hrg-inc.com
www.hrg-inc.com

APPENDIX H.
STREAM QUALITY DATA

Washington County Impaired Streams Map

STREAM NAME	SOURCE CAUSE	MILES
Barneys Run	Grazing Related Agric - Siltation; Grazing Related Agric - Organic Enrichment/Low D.O.; Road Runoff - Siltation; Other - Flow Alterations	0.78
Beckets Run	Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Metals	0.03
Catfish Creek	Abandoned Mine Drainage - Suspended Solids; Combined Sewer Overflow - Organic Enrichment/Low D.O.; Urban Runoff/Storm Sewers - Nutrients; Urban Runoff/Storm Sewers - Siltation; Abandoned Mine Drainage - Metals; Habitat Modification - Siltation; Agr	0.51
	Habitat Modification - Siltation; Urban Runoff/Storm Sewers - Nutrients	0.70
Chartiers Creek	Source Unknown - PCB; Source Unknown - Chlordane	3.39
	Combined Sewer Overflow - Organic Enrichment/Low D.O.; Agriculture - Nutrients; Urban Runoff/Storm Sewers - Nutrients; Urban Runoff/Storm Sewers - Siltation; Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Suspended Solids; Habitat Modi	3.13
	Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Organic Enrichment/Low D.O.; Abandoned Mine Drainage - Salinity/TDS/Chlorides; Abandoned Mine Drainage - Turbidity	2.12
	Grazing Related Agric - Nutrients; Land Development - Nutrients; Small Residential Runoff - Siltation	0.43
	Agriculture - Nutrients; Agriculture - Siltation; Urban Runoff/Storm Sewers - Nutrients; Urban Runoff/Storm Sewers - Siltation	1.50
	Habitat Modification - Nutrients; Habitat Modification - Siltation; Habitat Modification - Turbidity	1.32
	Abandoned Mine Drainage - Metals; Source Unknown - Pesticides	0.51
Chartiers Run	Combined Sewer Overflow - Organic Enrichment/Low D.O.; Agriculture - Nutrients; Urban Runoff/Storm Sewers - Nutrients; Urban Runoff/Storm Sewers - Siltation; Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Suspended Solids; Habitat Modi	0.39
	Construction - Siltation; Construction - Turbidity; Habitat Modification - Nutrients; Habitat Modification - Siltation; Habitat Modification - Turbidity	0.07
	Construction - Siltation; Construction - Other Habitat Alterations; Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Salinity/TDS/Chlorides; Habitat Modification - Siltation; Habitat Modification - Other Habitat Alterations	0.72
	Agriculture - Nutrients; Agriculture - Siltation; Agriculture - Turbidity; Habitat Modification - Siltation; Habitat Modification - Other Habitat Alterations	1.37
Coal Run	Agriculture - Nutrients; Agriculture - Siltation	0.38
Downers Run	Agriculture - Organic Enrichment/Low D.O.; Small Residential Runoff - Organic Enrichment/Low D.O.; Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - pH	0.03
Dutch Fork	Source Unknown - Cause Unknown	0.57
Enlow Fork	Subsurface Mining - Siltation; Subsurface Mining - Other Habitat Alterations	3.42
Georges Run	Urban Runoff/Storm Sewers - Siltation; Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Suspended Solids	0.56
Harmon Creek	Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Suspended Solids	1.76
Huston Run	Abandoned Mine Drainage - Metals	0.38
Kelley Run	Abandoned Mine Drainage - Metals	0.03
Lamb Lick Run	Abandoned Mine Drainage - Metals	0.03
Lilly Run	Road Runoff - Siltation; Natural Sources - Water/Flow Variability	0.44
Little Redstone Creek	Small Residential Runoff - Organic Enrichment/Low D.O.; Abandoned Mine Drainage - Metals ; Natural Sources - Siltation; Natural Sources - Siltation	0.03
Little Tenmile Creek	Grazing Related Agric - Siltation; Grazing Related Agric - Other Habitat Alterations; Removal of Vegetation - Siltation; Removal of Vegetation - Other Habitat Alterations	0.61
Maple Creek	Small Residential Runoff - Organic Enrichment/Low D.O.; Abandoned Mine Drainage - Metals; Road Runoff - Siltation; Natural Sources - Water/Flow Variability	1.19
Meadow Run	Abandoned Mine Drainage - Metals	0.03
Millers Run	Agriculture - Nutrients; Agriculture - Siltation	0.71
	Agriculture - Nutrients; Agriculture - Siltation; Urban Runoff/Storm Sewers - Nutrients; Urban Runoff/Storm Sewers - Siltation	0.33
	Habitat Modification - Siltation; Habitat Modification - Turbidity	0.15
	Construction - Siltation; Construction - Turbidity; Habitat Modification - Siltation; Habitat Modification - Turbidity	0.18
	Agriculture - Nutrients; Agriculture - Siltation; Agriculture - Turbidity; Urban Runoff/Storm Sewers - Siltation	1.12
	Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Suspended Solids; On site Wastewater - Nutrients; Abandoned Mine Drainage - Salinity/TDS/Chlorides; Source Unknown - Cause Unknown	0.32
	Agriculture - Nutrients; Agriculture - Siltation; Urban Runoff/Storm Sewers - Nutrients; Abandoned Mine Drainage - Salinity/TDS/Chlorides	0.15

STREAM NAME	SOURCE CAUSE	MILES
Monongahela River	Source Unknown - PCB; Source Unknown - Chlordane; Source Unknown - Chlordane	6.58
	Source Unknown - PCB	4.62
Peters Creek	Abandoned Mine Drainage - Metals	1.17
Pigeon Creek	Small Residential Runoff - Organic Enrichment/Low D.O.; Road Runoff - Siltation	0.47
Plum Run	On site Wastewater - Nutrients; On site Wastewater - Organic Enrichment/Low D.O.; Habitat Modification - Siltation; Habitat Modification - Other Habitat Alterations	1.30
	Agriculture - Siltation; On site Wastewater - Organic Enrichment/Low D.O.	0.91
Raccoon Creek	Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Suspended Solids	1.77
	Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - pH	4.31
	Grazing Related Agric - Siltation; Removal of Vegetation - Siltation	0.19
Redstone Creek	Abandoned Mine Drainage - Metals	0.20
Robb Run	Abandoned Mine Drainage - Metals	0.61
Robinson Fork	Subsurface Mining - Siltation; Subsurface Mining - Other Habitat Alterations; Source Unknown - Organic Enrichment/Low D.O.	2.21
Robinson Fork	Grazing Related Agric - Organic Enrichment/Low D.O.; Grazing Related Agric - Other Habitat Alterations	1.28
Robinson Run	Abandoned Mine Drainage - Metals	1.25
	Abandoned Mine Drainage - Metals; On site Wastewater - Nutrients	0.25
	On site Wastewater - Nutrients; Natural Sources - Siltation	0.07
	Abandoned Mine Drainage - Metals	0.58
Rocky Run	Subsurface Mining - Siltation; Subsurface Mining - Other Habitat Alterations	0.44
South Branch Maple Creek	Small Residential Runoff - Organic Enrichment/Low D.O.; Abandoned Mine Drainage - Metals ; Road Runoff - Siltation; Natural Sources - Water/Flow Variability	0.27
Speers Run	Small Residential Runoff - Siltation; Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - pH; Road Runoff - Siltation	0.08
Sunfish Run	Abandoned Mine Drainage - Metals	0.06
Templeton Fork	Subsurface Mining - Siltation; Subsurface Mining - Other Habitat Alterations	0.67
Twomile Run	Road Runoff - Siltation; Natural Sources - Water/Flow Variability	0.40
Westland Run	Construction - Siltation; Construction - Other Habitat Alterations; Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Salinity/TDS/Chlorides; Habitat Modification - Siltation; Habitat Modification - Other Habitat Alterations	0.51
	Agriculture - Nutrients; Agriculture - Siltation; Agriculture - Turbidity; Habitat Modification - pH; Habitat Modification - Turbidity	0.18
	Abandoned Mine Drainage - Salinity/TDS/Chlorides; Habitat Modification - Siltation; Habitat Modification - Turbidity	0.56
Unnamed	Abandoned Mine Drainage - Metals	16.43
Unnamed	Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Organic Enrichment/Low D.O.; Abandoned Mine Drainage - Salinity/TDS/Chlorides; Abandoned Mine Drainage - Turbidity	0.08
Unnamed	Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - pH	2.42
Unnamed	Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Siltation	2.37
Unnamed	Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Suspended Solids	2.62
Unnamed	Abandoned Mine Drainage - Metals; On site Wastewater - Nutrients	0.81
Unnamed	Abandoned Mine Drainage - Metals; On site Wastewater - Nutrients; Abandoned Mine Drainage - Suspended Solids; Abandoned Mine Drainage - Salinity/TDS/Chlorides; Source Unknown - Cause Unknown	0.19
Unnamed	Abandoned Mine Drainage - Metals; Road Runoff - Siltation	0.54
Unnamed	Abandoned Mine Drainage - Salinity/TDS/Chlorides; Habitat Modification - Siltation; Habitat Modification - Turbidity	0.63
Unnamed	Abandoned Mine Drainage - Siltation	0.87
Unnamed	Abandoned Mine Drainage - Siltation; Abandoned Mine Drainage - Metals	0.73
Unnamed	Agriculture - Nutrients; Agriculture - Siltation	2.56
Unnamed	Agriculture - Nutrients; Agriculture - Siltation; Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Suspended Solids	1.65
Unnamed	Agriculture - Nutrients; Agriculture - Siltation; Agriculture - Organic Enrichment/Low D.O.	1.02
Unnamed	Agriculture - Nutrients; Agriculture - Siltation; Agriculture - Turbidity; Habitat Modification - pH; Habitat Modification - Turbidity	0.67
Unnamed	Agriculture - Nutrients; Agriculture - Siltation; Agriculture - Turbidity; Habitat Modification - Siltation; Habitat Modification - Other Habitat Alterations	4.05
Unnamed	Agriculture - Nutrients; Agriculture - Siltation; Agriculture - Turbidity; Habitat Modification - Siltation; Habitat Modification - Turbidity	0.21
Unnamed	Agriculture - Nutrients; Agriculture - Siltation; Agriculture - Turbidity; Urban Runoff/Storm Sewers - Siltation	1.18
Unnamed	Agriculture - Nutrients; Agriculture - Siltation; Urban Runoff/Storm Sewers - Nutrients; Abandoned Mine Drainage - Salinity/TDS/Chlorides	0.78
Unnamed	Agriculture - Nutrients; Agriculture - Siltation; Urban Runoff/Storm Sewers - Nutrients; Urban Runoff/Storm Sewers - Siltation	4.36

STREAM NAME	SOURCE CAUSE	MILES
Unnamed	Agriculture - Nutrients; Agriculture - Siltation; Urban Runoff/Storm Sewers - Nutrients; Urban Runoff/Storm Sewers - Siltation; Abandoned Mine Drainage - Salinity/TDS/Chlorides; On site Wastewater - Nutrients	0.35
Unnamed	Agriculture - Nutrients; Construction - Siltation	0.80
Unnamed	Agriculture - Nutrients; Small Residential Runoff - Nutrients; On site Wastewater - Organic Enrichment/Low D.O.; Removal of Vegetation - Siltation	1.64
Unnamed	Agriculture - Nutrients; Urban Runoff/Storm Sewers - Nutrients	0.97
Unnamed	Agriculture - Siltation; Agriculture - Turbidity; Agriculture - Nutrients	1.12
Unnamed	Agriculture - Siltation; Crop Related Agric - Nutrients; Grazing Related Agric - Nutrients; On site Wastewater - Organic Enrichment/Low D.O.	0.65
Unnamed	Agriculture - Siltation; On site Wastewater - Organic Enrichment/Low D.O.	1.10
Unnamed	Agriculture - Siltation; Silvaculture - Siltation; Small Residential Runoff - Organic Enrichment/Low D.O.; Road Runoff - Siltation	0.91
Unnamed	Attaining - Siltation; Abandoned Mine Drainage - Metals	1.75
Unnamed	Combined Sewer Overflow - Organic Enrichment/Low D.O.; Agriculture - Nutrients; Urban Runoff/Storm Sewers - Nutrients; Urban Runoff/Storm Sewers - Siltation; Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Suspended Solids; Habitat Modi	3.60
Unnamed	Combined Sewer Overflow - Organic Enrichment/Low D.O.; Habitat Modification - Siltation	0.62
Unnamed	Combined Sewer Overflow - Organic Enrichment/Low D.O.; Urban Runoff/Storm Sewers - Organic Enrichment/Low D.O.; Abandoned Mine Drainage - Metals; Road Runoff - Siltation	0.20
Unnamed	Construction - Siltation	0.52
Unnamed	Construction - Siltation; Construction - Flow Alterations; Construction - Other Habitat Alterations; Construction - Suspended Solids; Construction - Turbidity	0.82
Unnamed	Construction - Siltation; Construction - Other Habitat Alterations; Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Salinity/TDS/Chlorides; Habitat Modification - Siltation; Habitat Modification - Other Habitat Alterations	0.57
Unnamed	Construction - Siltation; Construction - Turbidity; Habitat Modification - Nutrients; Habitat Modification - Siltation	1.16
Unnamed	Construction - Siltation; Construction - Turbidity; Habitat Modification - Siltation; Habitat Modification - Turbidity	0.74
Unnamed	Construction - Siltation; Urban Runoff/Storm Sewers - Nutrients	1.16
Unnamed	Construction - Siltation; Urban Runoff/Storm Sewers - Organic Enrichment/Low D.O. ; Abandoned Mine Drainage - Metals ; Road Runoff - Siltation	0.45
Unnamed	Construction - Siltation; Urban Runoff/Storm Sewers - Siltation	0.97
Unnamed	Crop Related Agric - Nutrients; Grazing Related Agric - Nutrients; Land Development - Siltation	0.41
Unnamed	Crop Related Agric - Nutrients; Grazing Related Agric - Siltation	0.49
Unnamed	Crop Related Agric - Siltation; Crop Related Agric - Organic Enrichment/Low D.O.; Urban Runoff/Storm Sewers - Organic Enrichment/Low D.O. ; Abandoned Mine Drainage - Metals	1.56
Unnamed	Erosion from Derelict Land - Siltation	0.64
Unnamed	Grazing Related Agric - Nutrients; Land Development - Nutrients; Small Residential Runoff - Siltation	0.74
Unnamed	Grazing Related Agric - Organic Enrichment/Low D.O.; Grazing Related Agric - Other Habitat Alterations	0.57
Unnamed	Grazing Related Agric - Siltation; Grazing Related Agric - Organic Enrichment/Low D.O.; Road Runoff - Siltation; Other - Flow Alterations	0.42
Unnamed	Grazing Related Agric - Siltation; Grazing Related Agric - Other Habitat Alterations; Removal of Vegetation - Siltation; Removal of Vegetation - Other Habitat Alterations	0.45
Unnamed	Grazing Related Agric - Siltation; Removal of Vegetation - Siltation	8.34
Unnamed	Habitat Modification - Nutrients; Habitat Modification - Other Habitat Alterations	3.02
Unnamed	Habitat Modification - Nutrients; Habitat Modification - Other Habitat Alterations; Construction - Siltation; Construction - Turbidity	0.43
Unnamed	Habitat Modification - Nutrients; Habitat Modification - Other Habitat Alterations; Habitat Modification - Turbidity	0.82
Unnamed	Habitat Modification - Nutrients; Habitat Modification - Siltation	0.84
Unnamed	Habitat Modification - Nutrients; Habitat Modification - Siltation; Habitat Modification - Other Habitat Alterations; Habitat Modification - Turbidity	0.36
Unnamed	Habitat Modification - Nutrients; Habitat Modification - Siltation; Habitat Modification - Turbidity	1.00
Unnamed	Habitat Modification - Nutrients; Habitat Modification - Turbidity	0.36
Unnamed	Habitat Modification - Organic Enrichment/Low D.O.; Habitat Modification - Other Habitat Alterations	0.54

STREAM NAME	**SOURCE CAUSE**	**MILES**
Unnamed	Habitat Modification - Other Habitat Alterations; On site Wastewater - Organic Enrichment/Low D.O.	0.34
Unnamed	Habitat Modification - Siltation	1.57
Unnamed	Habitat Modification - Siltation; Habitat Modification - Other Habitat Alterations; On site Wastewater - Nutrients; On site Wastewater - Organic Enrichment/Low D.O.	1.59
Unnamed	Habitat Modification - Siltation; Habitat Modification - Turbidity	3.47
Unnamed	Habitat Modification - Siltation; Habitat Modification - Turbidity; Habitat Modification - Nutrients	0.49
Unnamed	Habitat Modification - Siltation; Urban Runoff/Storm Sewers - Nutrients	0.82
Unnamed	Habitat Modification - Turbidity; Habitat Modification - Siltation; Agriculture - Nutrients; Abandoned Mine Drainage - Salinity/TDS/Chlorides	0.54
Unnamed	Land Development - Siltation; Small Residential Runoff - Nutrients; Golf Courses – Siltation	0.69
Unnamed	Land Development - Siltation; Small Residential Runoff - Nutrients; Small Residential Runoff - Siltation; Removal of Vegetation - Nutrients; Removal of Vegetation - Siltation	1.33
Unnamed	Municipal Point Source - Organic Enrichment/Low D.O.	0.26
Unnamed	On site Wastewater - Nutrients; Natural Sources - Siltation	0.28
Unnamed	On site Wastewater - Organic Enrichment/Low D.O.	0.89
Unnamed	On site Wastewater - Organic Enrichment/Low D.O.; Habitat Modification - Siltation; Habitat Modification - Turbidity	0.84
Unnamed	Other - Siltation	0.99
Unnamed	Road Runoff - Siltation	0.49
Unnamed	Road Runoff - Siltation; Abandoned Mine Drainage - Metals; Small Residential Runoff - Organic Enrichment/Low D.O.	0.62
Unnamed	Road Runoff - Siltation; Natural Sources - Water/Flow Variability	0.43
Unnamed	Small Residential Runoff - Organic Enrichment/Low D.O.; Abandoned Mine Drainage - Metals; Road Runoff - Siltation	0.19
Unnamed	Small Residential Runoff - Organic Enrichment/Low D.O.; Abandoned Mine Drainage - Metals; Road Runoff - Siltation; Natural Sources - Water/Flow Variability	1.33
Unnamed	Small Residential Runoff - Organic Enrichment/Low D.O.; Road Runoff - Siltation	0.00
Unnamed	Small Residential Runoff - Siltation; Small Residential Runoff - Organic Enrichment/Low D.O.; Abandoned Mine Drainage - Metals	0.63
Unnamed	Small Residential Runoff - Siltation; Small Residential Runoff - Organic Enrichment/Low D.O.; Golf Courses - Organic Enrichment/Low D.O.	0.62
Unnamed	Small Residential Runoff - Siltation; Small Residential Runoff - Organic Enrichment/Low D.O.; Road Runoff - Siltation	0.04
Unnamed	Source Unknown - Nutrients	2.91
Unnamed	Urban Runoff/Storm Sewers - Nutrients; Habitat Modification - Nutrients; Habitat Modification - Siltation	2.50
Unnamed	Urban Runoff/Storm Sewers - Nutrients; Habitat Modification - Siltation	0.35
Unnamed	Urban Runoff/Storm Sewers - Nutrients; Habitat Modification - Unknown Toxicity; Habitat Modification - Nutrients	4.33
Unnamed	Urban Runoff/Storm Sewers - Nutrients; Other - Nutrients	0.61
Unnamed	Urban Runoff/Storm Sewers - Nutrients; Urban Runoff/Storm Sewers - Suspended Solids	0.25
Unnamed	Urban Runoff/Storm Sewers - Siltation; Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Siltation	0.95
Unnamed	Urban Runoff/Storm Sewers - Siltation; Abandoned Mine Drainage - Metals; Abandoned Mine Drainage - Suspended Solids	2.46
Unnamed	Urban Runoff/Storm Sewers - Siltation; Urban Runoff/Storm Sewers - Organic Enrichment/Low D.O.; Road Runoff - Siltation	0.61
	TOTAL	**179.02**

FEMA FLOOD INSURANCE STUDIES		
Waterbody	**Municipality**	**Watershed**
Monongahela River	Allenport Boro	Monongahela River
Redd Run	Amwell Twp	Tenmile Creek
Tenmile Creek	Amwell Twp	Tenmile Creek
Brush Run	Amwell Twp	Tenmile Creek
Shipe Run	Amwell Twp	Tenmile Creek
Potato Run	Amwell Twp	Tenmile Creek
Little Tenmile Creek	Amwell Twp	Tenmile Creek
Bane Creek	Amwell Twp	Tenmile Creek
Horne Run	Amwell Twp	Tenmile Creek
Smith Run	Amwell Twp	Tenmile Creek
Plum Run	Beallsville Boro	Tenmile Creek
Pike Run	Beallsville Boro	Pike Run
Pigeon Creek	Bentleyville Boro	Pigeon Creek
Buffalo Creek	Blaine Twp	Ohio River
Brush Run	Blaine Twp	Ohio River
Buffalo Creek	Buffalo Twp	Ohio River
Raccoon Creek	Burgettstown Boro	Raccoon Creek
Oregon Hollow	California Boro	Pike Run
Lily Run	California Boro	Pike Run
Pike Run	California Boro	Pike Run
Monongahela River	California Boro	Monongahela River
Brush Run	Canonsburg Boro	Chartiers Creek
Chartiers Creek	Canonsburg Boro	Chartiers Creek
Georges Run	Canton Twp	Chartiers Creek
Chartiers Creek	Canton Twp	Chartiers Creek
Catfish Creek	Canton Twp	Chartiers Creek
Log Pile Run	Canton Twp	Chartiers Creek
Wolfdale Run	Canton Twp	Chartiers Creek
Mingo Creek	Carroll Twp	Pigeon Creek
Pigeon Creek	Carroll Twp	Pigeon Creek
Taylors Run	Carroll Twp	Pigeon Creek
Monongahela River	Carroll Twp	Pigeon Creek
Robinson Run	Cecil Twp	Chartiers Creek
Millers Run	Cecil Twp	Chartiers Creek
Brush Run	Cecil Twp	Chartiers Creek
McPherson Creek	Cecil Twp	Chartiers Creek
Two Mile Run	Centerville Boro	Monongahela River
Monongahela River	Centerville Boro	Monongahela River
Monongahela River	Charleroi Boro	Monongahela River
Maple Creek	Charleroi Boro	Monongahela River
Georges Run	Chartiers Twp	Chartiers Creek
Chartiers Creek	Chartiers Twp	Chartiers Creek
Chartiers Run	Chartiers Twp	Chartiers Creek
Plum Run	Chartiers Twp	Chartiers Creek
Brush Run	Chartiers Twp	Chartiers Creek
Monongahela River	Coal Center Boro	Monongahela River
North Fork Cross Creek	Cross Creek Twp	Cross Creek
South Fork Cross Creek	Cross Creek Twp	Cross Creek
Cross Creek	Cross Creek Twp	Cross Creek
Plum Run	Deemston Boro	Tenmile Creek
Tenmile Creek	Deemston Boro	Tenmile Creek
Buffalo Creek	Donegal Twp	Ohio River

FEMA FLOOD INSURANCE STUDIES		
Waterbody	**Municipality**	**Watershed**
Monongahela River	Donora Boro	Monongahela River
Monongahela River	Dunlevy Boro	Monongahela River
Tenmile Creek	East Bethlehem Twp	Tenmile Creek
Black Dog Run	East Bethlehem Twp	Tenmile Creek
Monongahela River	East Bethlehem Twp	Monongahela River
Barneys Run	East Bethlehem Twp	Monongahela River
Fishpot Creek	East Bethlehem Twp	Monongahela River
Buffalo Creek	East Finley Twp	Ohio River
Rocky Run	East Finley Twp	Wheeling Creek
Enlow Fork	East Finley Twp	Wheeling Creek
Templeton Fork	East Finley Twp	Wheeling Creek
Monongahela River	Elco Boro	Monongahela River
Woods Run Hollow	Elco Boro	Monongahela River
South Branch Pigeon Creek	Ellsworth Boro	Pigeon Creek
Sawmill Creek	Fallowfield Twp	Pigeon Creek
Pigeon Creek	Fallowfield Twp	Pigeon Creek
Monongahela River	Fallowfield Twp	Monongahela River
Maple Creek	Fallowfield Twp	Monongahela River
Peters Creek	Finleyville Boro	Peters Creek
Harmon Creek	Hanover Twp	Ohio River
Kings Creek	Hanover Twp	Raccoon Creek
Aunt Clara Fork/Kings Creek	Hanover Twp	Raccoon Creek
Ward Run	Hanover Twp	Ohio River
Raccoon Creek	Hanover Twp	Raccoon Creek
Brush Run	Hanover Twp	Raccoon Creek
Dilloe Run	Hanover Twp	Raccoon Creek
Haynan Creek	Hopewell Twp	Ohio River
Brush Run	Hopewell Twp	Ohio River
Cross Creek	Hopewell Twp	Cross Creek
Dunkle Run	Hopewell Twp	Ohio River
Plum Run	Houston Boro	Chartiers Creek
Chartiers Run	Houston Boro	Chartiers Creek
Chartiers Creek	Houston Boro	Chartiers Creek
Cross Creek	Independence Twp	Cross Creek
Buffalo Creek	Independence Twp	Ohio River
Nariean Run	Independence Twp	Ohio River
Haynon Run	Independence Twp	Ohio River
Scott Run	Jefferson Twp	Cross Creek
Honor Hooders Run	Long Branch Boro	Monongahela River
Horn Run	Marianna Boro	Tenmile Creek
Tenmile Creek	Marianna Boro	Tenmile Creek
Patterson Run	Marianna Boro	Tenmile Creek
North Branch Robinson Run	McDonald Boro	Robinson Run
Robinson Run	McDonald Boro	Robinson Run
Robinson Run	Midway Boro	Robinson Run
Pigeon Creek	City of Monongahela	Monongahela River
Monongahela River	City of Monongahela	Monongahela River
Crafts Creek	Morris Twp	Tenmile Creek
Tenmile Creek	Morris Twp	Tenmile Creek
Bane Creek	Morris Twp	Tenmile Creek
Pleasant Valley Run	Morris Twp	Tenmile Creek
Bells Lakes	Morris Twp	Tenmile Creek

FEMA FLOOD INSURANCE STUDIES		
Waterbody	**Municipality**	**Watershed**
Short Creek	Morris Twp	Tenmile Creek
Hamestring Run	Morris Twp	Tenmile Creek
Robinson Run	Mt. Pleasant Twp	Robinson Run
Raccoon Creek	Mt. Pleasant Twp	Raccoon Creek
Chartiers Run	Mt. Pleasant Twp	Chartiers Creek
Cross Creek	Mt. Pleasant Twp	Cross Creek
Little Chartiers Creek	North Bethlehem Twp	Tenmile Creek
Daniels Run	North Bethlehem Twp	Tenmile Creek
South Branch Pigeon Creek	North Bethlehem Twp	Pigeon Creek
Little Daniels Run	North Bethlehem Twp	Tenmile Creek
Pine Run	North Bethlehem Twp	Tenmile Creek
Brush Run	North Bethlehem Twp	Tenmile Creek
Monongahela River	North Charleroi Boro	Monongahela River
Chartiers Creek	North Franklin Twp	Chartiers Creek
Chartiers Creek	North Strabane Twp	Chartiers Creek
Canonsburg Lake	North Strabane Twp	Chartiers Creek
Little Chartiers Creek	North Strabane Twp	Chartiers Creek
Boone Reservoir	North Strabane Twp	Chartiers Creek
Lehner Lake	North Strabane Twp	Chartiers Creek
Mingo Creek	New Eagle Boro	Monongahela River
Monongahela River	New Eagle Boro	Monongahela River
Peters Creek	Nottingham Twp	Peters Creek
Mingo Creek	Nottingham Twp	Monongahela River
Chartiers Creek	Peters Twp	Chartiers Creek
Boone Reservoir	Peters Twp	Chartiers Creek
Brush Run	Peters Twp	Chartiers Creek
Peters Creek	Peters Twp	Peters Creek
Raccoon Creek	Robinson Twp	Raccoon Creek
Bigger Run	Robinson Twp	Raccoon Creek
Chamberlain Run	Robinson Twp	Raccoon Creek
Patrick Run	Robinson Twp	Raccoon Creek
Robinson Run	Robinson Twp	Robinson Run
Monongahela River	Roscoe Boro	Monongahela River
Tenmile Creek	South Franklin Twp	Tenmile Creek
Chartiers Creek	South Franklin Twp	Chartiers Creek
Bane Creek	South Franklin Twp	Tenmile Creek
Fork of Bane Creek	South Franklin Twp	Tenmile Creek
Chartiers Creek	South Strabane Twp	Chartiers Creek
Little Chartiers Creek	South Strabane Twp	Chartiers Creek
Raccoon Creek	Smith Twp	Raccoon Creek
Burgetts Fork	Smith Twp	Raccoon Creek
Robinson Run	Smith Twp	Robinson Run
Chartiers Creek	Somerset Twp	Chartiers Creek
Opossum Run	Somerset Twp	Chartiers Creek
Center Branch/Pigeon Creek	Somerset Twp	Pigeon Creek
North Branch Pigeon Creek	Somerset Twp	Pigeon Creek
Bentleyville Reservoir	Somerset Twp	Pigeon Creek
South Branch Pigeon Creek	Somerset Twp	Pigeon Creek
Mine No 60 Reservoir	Somerset Twp	Pigeon Creek
Maple Creek	Speers Boro	Monongahela River
Monongahela River	Speers Boro	Monongahela River
Monongahela River	Stockdale Boro	Monongahela River
Maple Creek	Twilight Boro	Monongahela River

FEMA FLOOD INSURANCE STUDIES		
Waterbody	**Municipality**	**Watershed**
Peters Creek	Union Twp	Peters Creek
Monongahela River	Union Twp	Monongahela River
Little Tenmile Creek	West Bethlehem Twp	Tenmile Creek
Brush Run	West Bethlehem Twp	Tenmile Creek
Pine Run	West Bethlehem Twp	Tenmile Creek
Patterson Run	West Bethlehem Twp	Tenmile Creek
Hufford Run	West Bethlehem Twp	Tenmile Creek
Little Daniels Run	West Bethlehem Twp	Tenmile Creek
Barrs Run	West Bethlehem Twp	Tenmile Creek
Monongahela River	West Brownsville Boro	Monongahela River
Middle Wheeling Creek	West Finley Twp	Wheeling Creek
Robinson Fork	West Finley Twp	Wheeling Creek
Laidley Run	West Finley Twp	Wheeling Creek
Black House Run	West Finley Twp	Wheeling Creek
Rocky Run	West Finley Twp	Wheeling Creek
Templeton Run	West Finley Twp	Wheeling Creek
Beham Run	West Finley Twp	Wheeling Creek
Turkey Run	West Finley Twp	Wheeling Creek
Enlow Fork	West Finley Twp	Wheeling Creek
Pike Run	West Pike Run Twp	Pike Run
Little Pike Run	West Pike Run Twp	Pike Run
Chartiers Creek	City of Washington	Chartiers Creek
Catfish Creek	City of Washington	Chartiers Creek

CHAPTER 93 WATER QUALITY STANDARDS – DESIGNATED WATER USES					
Stream		Zone	County	Water Use	Exceptions
3	Unnamed Tributaries to Chartiers Creek	Basins	Washington/ Allegheny	WWF	None
3	Reservoir No. 4	Basin	Washington	HQ-WWF	None
3	Reservoir No. 3	Basin	Washington	HQ-WWF	None
3	Reservoir No. 2	Basin	Washington	HQ-WWF	None
3	Catfish Creek	Basin	Washington	WWF	None
3	Georges Run	Basin	Washington	WWF	None
3	Chartiers Run	Basin	Washington	WWF	None
3	Brush Run	Basin	Washington	WWF	None
3	Little Chartiers Creek	Basin, Source to Alcoa Dam	Washington	HQ-WWF	None
3	Little Chartiers Creek	Basin, Alcoa Dam to Mouth	Washington	WWF	None
3	McPherson Creek	Basin	Washington	WWF	None
3	Brush Run	Basin	Washington	WWF	None
3	Fishpot Run	Basin	Washington	WWF	None
3	Barneys Run	Basin	Washington	WWF	None
3	Twomile Run	Basin	Washington	WWF	None
3	Lilly Run	Basin	Washington	WWF	None
3	Pike Run	Basin	Washington	TSF	None
3	Hooders Run	Basin	Washington	WWF	None
3	Maple Creek	Basin	Washington	WWF	None
3	Pigeon Creek	Basin	Washington	WWF	None
3	Dry Run	Basin	Washington	WWF	None
3	Mingo Creek	Basin, Source to Froman Run	Washington	HQ-TSF	None
4	Froman Run	Basin	Washington	TSF	None
3	Mingo Creek	Basin, Froman Run to Mouth	Washington	TSF	None
3	Unnamed Tributaries to Monongahela River	Basins, Mingo Creek to Youghiogheny River	Allegheny/ Washington	WWF	None
3	Huston Run	Basin	Washington	WWF	None
2	Unnamed Tributaries to Enlow Fork	Basins (All Sections in PA), PA-WV State Border to Confluence with Dunkard Fork	Washington/ Greene	WWF	None
2	Kings Creek	Basin (All Sections in PA)	Washington	CWF	None
2	Harmon Creek	Basin (All Sections in PA)	Washington	WWF	None
2	Cross Creek	Basin, Source to Avella Water Intake	Washington	HQ-WWF	None
2	Cross Creek	Basin (All Sections in PA), Avella Water Intake to PA-WV State Border	Washington	WWF	None
2	Buffalo Creek	Basin (All Sections in PA)	Washington	HQ-WWF	None
2	Wheeling Creek				
3	Enlow Fork	Main Stem, Source to PA-WV State Border	Washington/ Greene	TSF	None
4	Unnamed Tributaries to Enlow Fork	Basins, Source to PA-WV State Border	Washington/ Greene	WWF	None
4	Long Run	Basin	Washington	WWF	None
4	Templeton Fork	Basin	Washington	TSF	None
4	Robinson Fork	Basin	Washington	WWF	None
4	Spottedtail Run	Basin (All Sections in PA)	Washington	WWF	None
3	Enlow Fork (WV)				
4	Unnamed Tributaries to Enlow Fork	Basins (All Sections in PA), PA-WV Border to Confluence with Dunkard Fork	Washington/ Greene	WWF	None
3	Unnamed Tributaries to Wheeling Creek	Basins (All Sections in PA), PA-Confluence of Enlow and Dunkard Forks to Mouth	Washington/ Greene	WWF	None
3	Turkey Run	Basin (All Sections in PA)	Washington	WWF	None
3	Middle Wheeling Creek	Basin (All Sections in PA)	Washington	WWF	None