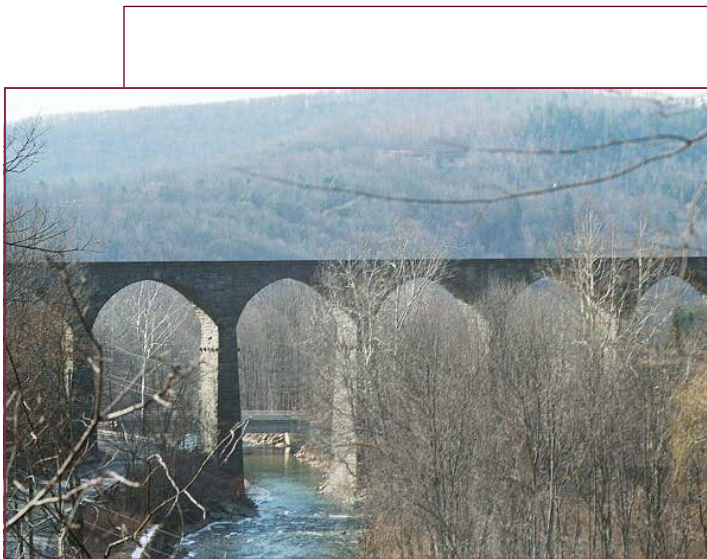


Susquehanna County Planning Commission

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

DRAFT March 2009



**[BUILDING RELATIONSHIPS.
DESIGNING SOLUTIONS.]**

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HRG Project Number: 4445.001

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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. 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 Susquehanna County.

ACT 167 PLANNING FOR SUSQUEHANNA COUNTY

Given the above history and information, the county-wide watershed planning process for Susquehanna 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 Susquehanna 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 Susquehanna 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 and institutional 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 Susquehanna 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; 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 all major watersheds within Susquehanna County during Phase I. Since the Act itself is very dependent on municipal coordination to provide for the planning and management of stormwater throughout their respective municipality, it was necessary to get "buy-in", endorsement, and involvement from each municipality early in the planning process.

In order to initiate municipal level involvement in the overall development of the plan, a Watershed Plan Advisory Committee (WPAC) was formed and consists of the Susquehanna County Planning Commission, municipalities, the County Conservation District and other interested organizations. Two meetings with the WPAC were held during Phase I to obtain their general commitment to the project and to distribute questionnaires. A third meeting, a public awareness and educational meeting, was held to disseminate and obtain information from the general public. Discussions from these meetings and an evaluation of the questionnaires, in conjunction with in-house knowledge from Susquehanna County and PADEP, determined to what level this plan should be created.

THE NEED FOR A COMPREHENSIVE APPROACH FOR STORMWATER MANAGEMENT

The goal of Susquehanna 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 forty (40) municipalities in Susquehanna County, the resulting stormwater management ordinance will address severe and ongoing stormwater related problems in critical areas throughout the County. Furthermore, cooperating member municipalities will be able to adopt stormwater management controls that will have a collectively beneficial impact on the waters of Susquehanna County and those "problem" areas that presently remain unmanaged.

The Act itself is divided into two phases of which Susquehanna 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 by Susquehanna County.
- Approval by PADEP.
- Adoption by all forty (40) municipalities.
- Municipal implementation.

PREVIOUS PLAN EFFORTS

There have been one previous Act 167 Plan effort prepared for Susquehanna County. The Choconut, Snake and Wyalusing Creek Watersheds were studied in 2002 with the completion of the following:

- Susquehanna County Planning Commission, *Act 167 Storm Water Management Plan Phase I – Scope of Study, Choconut, Snake and Wyalusing Creek Watersheds*, June 30, 2002.

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

- Susquehanna County, *Susquehanna County Comprehensive Plan Update*, 2003.
- Eastern Susquehanna County Partnership, *Multi-Municipal Comprehensive Plan*, November 2005
- Northern Tier Coalition Susquehanna County, *Multi-Municipal Comprehensive Plan*, 2005

GENERAL COUNTY DESCRIPTION

Susquehanna County is located in the Appalachian Mountains in northeast Pennsylvania, often referred to as the “Endless Mountains” region. Susquehanna County is surrounded by Lackawanna and Wyoming Counties to the south, Bradford County to the west, the New York state line to the north, and by Wayne County to the east. The County was formed on February 21, 1810 out of Luzerne County and named for the Susquehanna River.

The County is characterized by moderate to steep hills trending generally in a northeast – southwest direction, a result of the direction of glacial movement. The highest point in the county is in the southeast corner of Herrick Township where the North Knob of the Elk Hills reaches an elevation of 2,693’. Summit crests above 2000 feet are common in the eastern portion of the county while 800 to 900 feet is typical in the vicinity of the Susquehanna River near Great Bend.

POLITICAL JURISDICTIONS

Susquehanna County is classified as a sixth class county and has 40 municipalities comprised of 27 townships and 13 boroughs. Montrose Borough is the county seat, and it is a significant services center for Susquehanna County. Other core communities are Great Bend, Halstead, New Milford (Borough and Township), Forest City Borough, Susquehanna Depot Borough, Lenox Township, and Clifford Township. According to the 2000 Census, Susquehanna County had a total population of 42,238, ranking it 52nd among Pennsylvania’s 67 counties. Its land area of 833.86 square miles makes the County the 22nd largest in Pennsylvania. The County’s population density of 51.3 people per square mile places it in 56th position. By comparison, Susquehanna County’s population grew by 4.6 percent from 1990 to 2000.

The 40 municipalities in Susquehanna County are as follows:

BOROUGHS	Census	Area (miles²)	TOWNSHIPS	Census	Area (miles²)	TOWNSHIPS	Census	Area (miles²)
Great Bend	700	0.30	Great Bend	1,890	36.13	Jessup	564	21.40
Hallstead	1,216	0.40	Jackson	788	26.10	Liberty	1,266	29.70
New Milford	878	1.10	New Milford	1,859	44.49	Silver Lake	1,729	32.70
Friendsville	91	1.50	Auburn	1,816	50.60	Brooklyn	889	24.30
Little Meadows	290	2.30	Dimock	1,398	29.40	Clifford	2,381	40.20
Montrose	1,664	1.30	Middletown	340	28.69	Gibson	1,129	31.70
Hop Bottom	333	0.60	Rush	1,290	37.80	Harford	1,301	32.90
Forest City	1,855	0.90	Springville	1,555	30.40	Lathrop	835	20.60
Uniondale	368	2.50	Apolacon	507	23.10	Lenox	1,832	40.30
Lanesboro	588	2.60	Bridgewater	2,668	40.50	Herrick	599	24.70
Oakland	622	0.50	Choconut	797	20.10	Ararat	531	18.80
Susquehanna Depot	1,690	0.70	Forest Lake	1,194	29.70	Harmony	558	31.40
Thompson	299	0.40	Franklin	938	23.80	Oakland	550	16.40
						Thompson	440	21.70
						TOTAL	42,238	823.03

NATURAL CHARACTERISTICS

WATER RESOURCES

Susquehanna County lies entirely within the Susquehanna River drainage basin. All precipitation which falls in Susquehanna County is channeled by gravity into nine major drainages basins. Major watersheds include the Salt Lick, Choconut, and Snake Creeks in the northern part of the County; the Wyalusing, White, and Mehoopany Creeks in the southwest; the Tunkhannock and Martins Creeks draining most of the central and eastern portions; and the Lackawanna River draining the extreme eastern area of the County.

"Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the commonwealth shall conserve and maintain them for the benefit of all the people."
 --The Constitution of the Commonwealth of Pennsylvania, Article I, Section 27

WATERSHEDS

Act 167 has designated twenty watersheds within the County included in this study are:

Drainage Basin	Act 167 Designated Watershed	Watershed Area (square miles)	
		Total within State	Total Within County
Susquehanna River	Apalachin Creek	20.14	16.49
	Choconut Creek	30.52	30.52
	Drinker Creek	8.18	8.18
	Dubois Creek	13.13	13.13
	Lackawanna River	347.64	33.11
	Martins Creek	51.62	50.72
	Meshoppen Creek	114.00	97.59
	Mitchell/Denton Creeks	13.22	13.22
	Salt Lick Creek	39.59	39.59
	Snake Creek	78.16	78.16
	Starrucca/Cascade Creeks	75.28	42.97
	Susquehanna River	1096.61	69.50
	Tunkhannock Creek (US of Martins)	59.53	59.08
	Tunkhannock Creek (US of 9 Partners)	78.07	54.22
	Tunkhannock Creek (East Branch)	69.75	59.26
	Tunkhannock Creek	56.28	24.73
	Wappasening Creek	58.67	1.50
	Wyalusing Creek (North Branch)	46.50	36.78
	Wyalusing Creek (East Middle)	102.98	102.98
	Wyalusing Creek	70.56	3.72

WATERBODIES

There are over 100 ponds and lakes in the County, some of which are natural, others are man-made. A few of the more prominent include Wrighter Lake in Thompson Township; Romobe Lake, Fiddle Lake, and Dunn Pond in Ararat Township; Stearns Lake and Potter Lake in Gibson Township; and Lowe Lake in Herrick Township. Stillwater Lake in Union Dale Borough was created as part of an Army Corps of Engineers flood control project along the Lackawanna River.

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", which includes High Quality and Exceptional Value designations. Certain activities in those watersheds that could adversely affect surface water are more stringently regulated to prevent degradation.

The named streams within the County with protected use classification are listed below:

SPECIAL PROTECTION WATERSHEDS		
Exceptional Value Waters		
Unnamed Tributary to Starrucca Creek at RM 11.68		
High Quality Value Waters		
East Branch Lackawanna River	Bow Bridge Creek	Salt Lick Creek
Lackawanna River	Cork Hill Creek	

A complete list of all the streams within the County and their Chapter 93 classifications are listed in Appendix G.

IMPAIRED STREAMS

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 collectively form a network that drains a basin. PA DEP protects 4 stream water uses:

- aquatic life
- fish consumption
- potable water supply
- recreation

The 305(b) stream segments have been evaluated for attainment of those uses. If a stream segment is not attaining any one of its 4 uses, it is then considered non-attaining. In Susquehanna County, the non-attaining streams all were for either aquatic life or fish consumption.

The following table lists the non-attaining streams in Susquehanna County and the source-cause of the pollution:

SOURCE CAUSE	MILES	%
Source Unknown - Mercury	15.83	45%
Agriculture - Cause Unknown ; Agriculture - Nutrients ; Agriculture - Suspended Solids	5.81	16%
Natural Sources - Cause Unknown ; Natural Sources - Thermal Modifications	4.30	12%
Municipal Point Source - Suspended Solids ; Urban Runoff/Storm Sewers - Siltation ; Upstream Impoundment - Thermal Modifications ; Erosion from Derelict Land - Siltation ; Road Runoff - Siltation	4.46	13%
Source Unknown - Metals	2.47	7%
Source Unknown - Cause Unknown	2.40	7%
	35.27	

A complete list of impaired streams and their causes are included in the Appendix.

CLIMATE

Susquehanna County is situated in the Upper Susquehanna Climatic Division and the climate is classified as humid continental. In general, the winters in Susquehanna County are moderately cold and the summers are cool. The County receives about forty-two inches of rain per year, ranging from 34" to 59" per year. Twenty inches of this is lost to the atmosphere as a result of evaporation and plant transpiration. Six to nine inches constitutes runoff to surface waters. Twelve to fifteen inches percolates to ground water, between 400 and 500 gallons of water per minute per square mile. Seasonal snowfall averages about 88" per year but varies widely.

GEOLOGY

Susquehanna County's present day surface forms were created through several geologic forces acting over many thousands of years. The land emerged from a prehistoric inland sea essentially as a plain comprised of water-deposited materials. Tectonic forces then created uplift creating a mountainous region. Through the action of time and pressure, the earlier deposits of sand, clay, silt, and carboniferous (plant) materials were formed into the sandstone, shale, limestone, and coal strata which make up the bedrock stratigraphy of the area.

In more recent geologic times, several glaciers penetrated into the county. The glaciers exerted a powerful new force upon the landscape. As they advanced, they penetrated along the stream valleys, filling them with ice and shaping them into the U-shaped cross-sections associated with glacial erosion. As they retreated, they deposited enormous quantities of rock and soil transported from areas to the north. These deposits, in the form of outwash and terminal and ground moraines, changed and modified the underlying land forms. As the glaciers retreated, the removal of the great weight of ice resulted in a gradual uplifting of the entire land mass of the region. At the same time, the down-cutting, eroding forces of the surface streams acted to deepen the ravines and stream valleys. These were the forces, explained here in greatly simplified terms, which produced the form of the land as it now exists in Susquehanna County.

Susquehanna County is located within two Physiographic Provinces - the Appalachian Plateaus and the Ridge and Valley Physiographic Provinces.

Anthracite Section of the Ridge and Valley Physiographic Province – The small portion of the County lies within this Section toward the southeastern corner. The Anthracite Valley Section is a narrow to wide, canoe-shaped valley. It is enclosed by a steep-sloped mountains rim. The overall structure of the Valley is a broad, doubly plunging syncline with smaller folds. Surface elevations range from 500 to 2,368'. The rocks are composed of sandstone, siltstone, conglomerate, and anthracite coal.

Glaciated Low Plateau Section of the Appalachian Plateaus Province – This Section includes an area of diversified topography in northeastern Pennsylvania. The topography consists of rounded hills and broad to narrow valleys all of which have been modified by glacial erosion and deposition. Swamps and peat bogs are common in the eastern part of the Section. The Section reflects the interplay between bedrock of various types, mainly sandstones and siltstones, and glacial erosion and deposition. The more erosion-resistant rocks form the hills, while the less erosion-resistant rocks occur in the valleys. Glacial deposits, mainly glacial till or sand and gravel, may occur anywhere, but are found mainly in the valley bottoms and margins.

BEDROCK FORMATIONS

The majority of the bedrock formations in Susquehanna County belong to the Devonian Age with some Pennsylvanian Age. The vast majority of the County is underlain by Devonian Age bedrock. The Pennsylvanian Age formations are located in the southeast corner of the County. The bedrock formations are shown on the following table with specific details listed from the Pennsylvania Geological Survey, *Geologic Map of Pennsylvania, 4th series, 1980*.

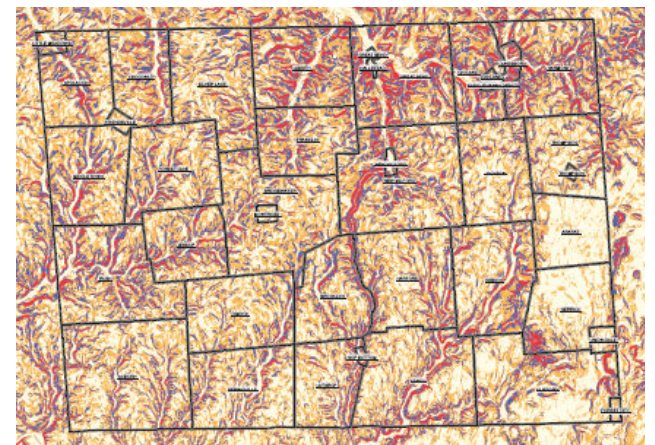
Map Symbol	Formation Name	Formation Age	Geologic Description
Dck	Catskill Formation	Devonian	Succession of grayish-red sandstone, siltstone, shale, and mudstone, generally in fining-upward cycles; some gray sandstone and conglomerate.
Dlh	Lock Haven	Devonian	Interbedded olive-gray mudstone, siltstone, sandstone, and thin conglomerate; marine fossils throughout; "Chemung" of earlier workers. Laterally equivalent to Scherr and Foreknobs Formations.
Pp	Pottsville Formation	Pennsylvanian	Gray conglomerate, fine- to coarse-grained sandstone, and siltstone and shale containing minable anthracite coals. Includes three members, in descending order: Sharp Mountain--conglomerate and conglomeratic sandstone; Schuylkill--sandstone and conglomeratic sandstone; Tumbling Run--conglomeratic sandstone and sandstone.
Pl	Llewellyn Formation	Pennsylvanian	Gray, fine- to coarse-grained sandstone, siltstone, shale, conglomerate, and numerous anthracite coals in repetitive sequences.

SLOPES

The slope of the land is an indication of the developability and use of land. Susquehanna County's land area is comprised of varying degrees of slope, ranging from nearly level plateaus to severe sloping along the rivers of the County. The general characteristics and development potentials and limitations of each category of slope are described as follows:

0-8% slope; 290 square miles; 35% of the County. Flat to moderate; capable of all normal development for residential, commercial, and industrial uses; involves minimum amount of earth moving; suited to row crop agriculture, provided that terracing, contour planting, and other conservation practices are followed.

8-16% slope; 341 square miles; 41% of the County. Rolling terrain and moderate slopes; generally suited only for residential development; site planning requires considerable skill; care is required in street layout to avoid long sustained gradients; drainage structures must be properly designed and installed to avoid erosion damage; generally suited to growing of perennial forage crops and pastures with occasional small grain plantings.



Susquehanna County Slopes

16-24% slope; 138 square miles; 16% of the County. Steep slopes; generally unsuited for most urban development; individual residences may be possible on large lot areas, uneconomical to provide improved streets and utilities; overly expensive to provide public services; foundation problems and erosion usually present; agricultural uses should be limited to pastures and tree farms.

24%->slope; 67 square miles; 8% of the County. Severe and precipitous slopes; no development of an intensive nature should be attempted; land not to be cultivated; permanent tree cover should be established & maintained; adaptable to open space uses (recreation, game farms, & watershed protection).

SOILS

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. Characteristics for the soil associations are described as follows:

Soil Associations:

Volusia-Mardin Association comprises about 20% of Susquehanna County and is primarily characteristic of rounded hilltops, sloping sides, and concave lower slopes and swales. Many natural and artificial ponds and lakes are present along with a few streams. The soil is poorly drained due to the firm fragipan in the subsoil.

Morris-Wellsboro-Volusia Association comprises about 35% of the County and is also found in hilltops, sloping sides and lower slopes. A firm fragipan restricts water movement and penetration of roots. About half of these soils are developed in glacial till on deep and moderately deep well-drained uplands. They are generally found in the southern portion of Susquehanna County where the soil warms and dries faster in the spring.

Mardin-Volusia Oquaga Association comprises 35% of the County and is found where deep stream-cut valleys dissect the original high plateau. Long slopes, excessive relief, and rapid runoff are common. Stream water often deposits gravel fans at the base of slopes. This association includes the sloping and very stony area around Elk Mountain, where a high proportion of moderately deep soils are found over hard bedrock.

Morris-Wellsboro Association soils are found on gently sloping plateaus with broad swamps, swales, and large lakes. Streams are few and shallow, and gradients are low. This association accounts for about 7% of the county's soils.

Chenango-Barbour-Volusia Association is the least limiting soils in Susquehanna County. They are found on floodplains, fans, terraces, and low valley sides. About 3% of the county's soils are of this association. Much of this land is covered by roads and villages.

Hydric Soils; The analysis of hydric soils has recently become an important consideration when performing almost any kind of development review. These soils are important to identify and locate because they provide an approximate location where wet areas may be found. Wetland areas are lands where water resources are the primary controlling environmental factor as reflected in hydrology, vegetation, and soils. Thus, the location of hydric soils is one indication of the potential existence of a wetland area. Wetland areas are now protected by the Pennsylvania Department of Environmental Protection and should be examined before deciding on any type of development

activity. The U.S. Forest Service estimated that there were 61 wetlands over forty acres in size in Susquehanna County in 1979, some 3,800 acres. Although the total area of wetlands today, it is certainly less than in the past.

FLOODPLAIN DATA

35 of the 40 municipalities within the County participate in the National Flood Insurance Program. The following table lists the municipalities:

Boroughs	Townships	Townships	Townships
Forest City	Apolacon	Harford	Oakland
Great Bend	Auburn	Harmony	Rush
Hallstead	Bridgewater	Herrick	Silver Lake
Hop Bottom	Brooklyn	Jackson	Springville
Lanesboro	Choconut	Jessup	Thompson
Little Meadows	Clifford	Lathrop	
Montrose	Dimock	Lenox	
New Milford	Franklin	Liberty	
Susquehanna Depot	Gibson	Middletown	
Thompson	Great Bend	New Milford	

LAND USE

EXISTING PATTERNS

The way land is used effects stormwater runoff from its rate and volume to its quality. Approximately 97 percent of the County's total land is undeveloped, with about 95 percent of this land devoted to forest and agriculture uses.

I-81 is the principal growth corridor in Susquehanna County. Present development attracted by the corridor is quite moderate, although it does involve some agricultural land conversion. There is not much recent housing development activity, and housing development does not pose a threat to open space preservation. A lot of land is owned, but not currently developed, by older people expecting to build retirement homes.

The U.S. Forest Service estimated that there were sixty-one wetland sites over forty acres in size in Susquehanna County in 1979, some 3,800 acres.

FARMLANDS

Conversion of agricultural land in Susquehanna County is tracked by the county assessment office. Dairy farming, in particular, is a substantial part of the County's economy and there is a strong desire to preserve dairy farming. The County has purchased agricultural easements for 17 farms, ranking it 27th among Pennsylvania counties. The total acreage for which easements have been purchased is 4,080, the 19th largest number of acres statewide.

In an effort to identify the extent and location of important farmlands, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for the production of the Nation's food supply. "Prime farmland" is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply

of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland. This inventory was designed to assist planners and other officials in their decision making to avoid unnecessary, irrevocable conversion of good farmland to other uses. On the United States Department of Agriculture's important farmland inventory map, the farmlands are categorized into four classifications: prime farmland, unique farmland, additional farmland of statewide importance, and additional farmland of local importance. The definitions of each are explained below, with the total acreage of each category contained within the County indicated in parenthesis:

Prime Farmland (61,795 acres, 11.6%); Land best suited for producing food, feed, forage, fiber, and oilseed crops. The land could be cropland, pastureland, rangeland, or forest land but cannot be already developed or covered by a waterbody. This farmland has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops economically when treated and managed, according to modern farming methods.

Unique Farmland (0 acres); Land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables.

Additional Farmland of Statewide Importance (153,899 acres, 28.9%); Land, in addition to prime and unique farmlands, of statewide importance for the production of food, feed, fiber, forage, and oilseed crops. These lands do not qualify for prime and unique farmland, but meet certain soil characteristics standards, as determined by capability classes assigned to each soil type.

Additional Farmland of Local Importance (0 acres); Land identified by local agencies or officials as having local importance in the production of food, feed, fiber, forage, and oilseed crops, even though they were not identified as having statewide importance.

It is calculated that over 40% of Susquehanna County's land area is classified as "important farmland" and over 11% of the "important farmland" can be labeled "prime farmland". 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.

To address this problem, Susquehanna County and its municipalities has active Ag Security and Agland Preservation programs as shown below:

- Agricultural Security Areas: 28 participating municipalities, 190,879 acres (36% of the County) protected as of 2002.
- Clean & Green Program: Over 7,480 parcels participate in the program.

- Agricultural Conservation Easements: Through Susquehanna County Land Preservation Board, 21 easements have been purchased totaling 4,922 acres as of 4/2006.

FORESTS

It is estimated that about 65% of the County land identified as forest. Sixty-five percent of the forests resources are northern hardwoods.

There are over 28 square miles of State Gamelands within the County as shown below:

SGL	Town	Acres
140	FRIENDSVILLE	1,244
175	NEW MILFORD	736
236	HERRICK CENTER	2,010
35	HALLSTEAD	7,739
70	STEVENS POINT	6,363
		18,092 acres 28.27 miles ²

The 405-acre Salt Springs State Park is located seven miles north of Montrose and contains the rocky gorge cut by Fall Brook with its three waterfalls. The Friends of Salt Springs Park www.friendsofsaltspringspark.org, a volunteer support group, owns 300 acres adjacent to the park's southern border, which is also open for public access.

TRANSPORTATION

Transportation in the county has influenced the hydrology of the watersheds. Of the 1,884 miles of roadway in the County, the main transportation route is I-81 which runs for 27-miles in a north-south direction providing development opportunities at its exits. The important north-south arterial routes in the County are:

- SR0171 – connecting Forest City to Susquehanna Depot, connecting with I-81 at Great Bend,
- SR0092 – connecting Lenox to Susquehanna Depot and north into New York State
- US0011 – connecting Wyoming County and south with New York (paralleling I-81)
- SR0267 – connecting Wyoming County with Vestal, New York and NY17

The important east-west arterial routes in the County are:

- SR0706 – connecting Bradford County and US 6 with Montrose, New Milford and I-81
- SR0492 – connecting I-81 at New Milford with Jackson Township and east
- SR0106 – connecting Kingsley and US11 with Clifford, to Carbondale and US 6.

These major thoroughfares provide a critical transportation and commuting link for County residents. However, these routes create an increase of impervious surfaces throughout the watershed. These impervious surfaces create more surface runoff and are non-point source pollution during precipitation events. This increases the stress on the drainage systems in the watershed, reduces water quality, and exacerbates streambank erosion, especially at already-known problem areas.

Susquehanna County has two Class 1 railroads: Norfolk Southern's Southern Tier Main Line forms an east-west corridor running along the Susquehanna River in Great Bend, Oakland and Harmony Townships. This railroad also runs through the boroughs of Susquehanna and Lanesboro. The Canadian Pacific railroad runs north-south through the County along the Route 11 corridor.

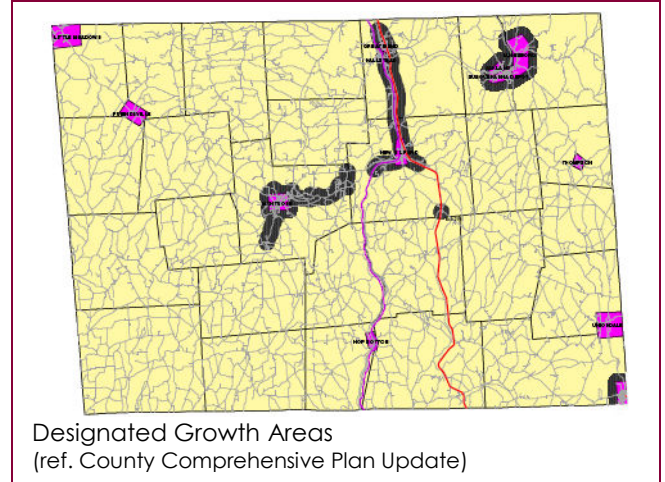
FUTURE GROWTH PATTERNS

The Susquehanna County Comprehensive Plan Update identifies five parts of the County as designated growth areas based on existing population/commercial centers, the major transportation routes, and areas served by public utilities.

Forest City is located in southeast corner of the County near the Lackawanna Valley Industrial Highway and has active industrial development. The Susquehanna - Oakland - Lanesboro area is located in northeast section of the County with easy access to I-81. This area has direct railroad service and active industrial development. The New Milford -

Great Bend - Hallstead area is located in north-central Susquehanna County with direct access to I-81 via New Milford and Great Bend interchanges. There is also direct railroad service. Montrose - Bridgewater is located in central Susquehanna County with access to I-81 via State Route 706 and State Route 11. Gibson Interchange located about midway in the County on I-81 with direct access via an interchange and level land suitable for development available.

The Comprehensive Plan does note that *future growth areas* are designated around the *designated growth areas* and would not be developed until the designated growth areas can no longer absorb the higher density residential and larger scale commercial development. The balance of the County is designated *rural resource area* with the principal goal of protecting open land and agricultural land and preserving agriculture, forestry and quarrying as viable components of the local economy. Similar to the *growth areas*, one or more locally designated zoning districts should further define the bounds and types of uses permitted. Recognizing that farmers and other large landowners



PHASE I PLANNING PROCESS

AGREEMENT BETWEEN PADEP AND SUSQUEHANNA COUNTY

An agreement for a Phase I Watershed Stormwater Management Plan Grant for all watersheds of Susquehanna County was made between the Pennsylvania Department of Environmental Protection and Susquehanna County on **June 29th, 2007**.

The agreement was made in order for Susquehanna 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 Susquehanna 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 30th, 2009.

ENGINEERING CONSULTANT SELECTION

In order to assist in the preparation of Phase I, the Susquehanna County Commissioners selected Herbert, Rowland & Grubic Inc. to provide stormwater planning services to Susquehanna County and completed this Phase I report.

CREATION AND DISTRIBUTION OF A QUESTIONNAIRE FORM

HRG created the "Susquehanna County Phase I Act 167 Stormwater Management Plan Questionnaire Form" which was distributed by the Susquehanna County Regional Planning Commission at various times throughout the Phase I process. All municipalities and other interested citizen groups and public organizations were encouraged to complete the form. The purpose of the 7-page Questionnaire 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 Questionnaire 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 inter-municipal 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.

ORGANIZATION	WPAC MEMBER
Forest City	Barbara Mihele
Friendsville	Gary Hardy
Great Bend	Council Member
Hallstead	
Hop Bottom	
Lanesboro	Bob Mireider
Little Meadows	
Montrose	Jack Yeager
New Milford	Teri Gulick
Oakland	Thomas Kubus
Susquehanna Depot	Micheal Matis
Thompson	
Uniondale	Benjamin Ponczek
Apolacon	David McGuigan
Ararat	
Auburn	Dan Trivett
Bridgewater	Chuch Mead
Brooklyn	
Choconut	
Clifford	
Dimock	Paul Jennings
Forest Lake	Arthur Donato
Franklin	David Darrow & Harvey Rosenkrans
Gibson	Chris Burdick
Great Bend	Twp Supervisor
Harford	Terry Van Gordon & Sue Furney
Harmony	
Herrick	
Jackson	
Jessup	
Lathrop	
Lenox	
Liberty	Bill Goodrich
Middletown	Thomas Curley
New Milford	Jim Hunter
Oakland	Cy Cowperthwait
Rush	Kendall Mitchell
Silver Lake	Sandy Payne
Springville	Ed Wood
Thompson	Tom Jenkins
Conservation District	
Planning Commission	

Members - Head of
Governing Body –
Appointed WPAC
Member

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 March 31st, 2008. 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 Questionnaire Form, began the formation of the WPAC membership and concluded with a question and answer period.

WPAC Meeting #2 was held on March 25th, 2009. Prior to the meeting, a draft copy of the Phase I report was supplied to the WPAC for their review. The purpose of this meeting was to summarize the Phase I 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.

PHASE I REPORT

The Phase I Report is a scope of study to assist Susquehanna 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 was submitted to the Pennsylvania Department of Environmental Protection for their review and approval in March 2009. Finalization of the Phase I Report will lead to an additional contract between Susquehanna County and PADEP for the completion of a Phase II Report.

EXISTING WATERSHED PLAN DISCUSSION

There are no Act 167 Plans completed for the designated watersheds within the County. A Phase I Scope of Study was completed for the Choconut, Snake and Wyalusing Creek Watersheds in 2002.

QUESTIONNAIRE DISCUSSION

QUESTIONNAIRE RESULTS

The Questionnaire was designed to solicit input from each municipality and other interested organizations, relative to specific problem areas throughout Susquehanna County, as well as the needs they may see for stormwater management in their particular municipality. The Questionnaire was distributed, along with an educational handout during the WPAC#1 meeting in Phase I. The Questionnaire included a map of the individual municipalities and was used to identify locations of problem areas, significant obstructions, and existing or proposed stormwater management facilities. (A copy of the Questionnaire is included as Appendix A of this document.) In addition, the information contained within the Questionnaires 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 Questionnaire 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 Susquehanna County.

Questionnaires were received from 26 out of the 40 municipalities in Susquehanna County. In addition, Questionnaires were received from the Susquehanna County Planning. Through analysis of the results of the Questionnaires it was determined that the two principal stormwater problems are peak flows and stream bank erosion. New land developments and commercial lots are most numerous in Great Bend and New Milford Township, both containing I-81 interchanges, and Bridgewater Township, which is experiencing the growth around the Borough of Montrose.

A summary of the results of the Questionnaires 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

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

Task C – Public/Municipal Participation

Task D – Plan Preparation and Implementation

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

One of the most critical issues during Phase I was the determination of which and how many of the 21 PADEP designated watersheds would be studied in detail during Phase II. As shown on the following table, three watersheds contain the majority of concerns: the Meshoppen Creek, Snake Creek, and Susquehanna River watersheds. It is proposed that both the Meshoppen Creek and Snake Creek watersheds be modeled. Due to the overall size of the Susquehanna River watershed, it was determined not to be feasible to model only small portions of these

watersheds contained within Susquehanna County. But, sub-watersheds up-stream of identified problem areas of the River will be modeled.

Act 167 Designated Watershed	Problem areas	Obstructions	Concerns (P+O)	% Concerns
Apalachin Creek	1	1	2	2.1%
Choconut Creek	0	0	0	0.0%
Drinker Creek	3	0	3	3.1%
Dubois Creek	0	0	0	0.0%
Lackawanna River	2	4	6	6.3%
Martins Creek	0	0	0	0.0%
Meshoppen Creek	5	9	14	14.6%
Mitchell/Denton Creeks	0	0	0	0.0%
Salt Lick Creek	6	4	10	10.4%
Snake Creek	12	0	12	12.5%
Starrucca/Cascade Creeks	3	3	6	6.3%
Susquehanna River	12	1	13	13.5%
Tunkhannock Creek (US of Martins)	6	2	8	8.3%
Tunkhannock Creek (US of 9 Partners)	3	1	4	4.2%
Tunkhannock Creek (East Branch)	0	0	0	0.0%
Tunkhannock Creek	0	0	0	0.0%
Wappasening Creek	1	0	1	1.0%
Wyalusing Creek (North Branch)	7	0	7	7.3%
Wyalusing Creek (East Middle)	10	0	10	10.4%
Wyalusing Creek	0	0	0	0.0%
	71	25	96	100.0%

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.

GENERAL WORK PLAN

PHASE II AGREEMENT

Upon completion and submission of the Phase I report to PADEP, Susquehanna 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 Susquehanna County and PADEP during the Phase II project.

CONSULTANT SELECTION

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

QUESTIONNAIRE

A Questionnaire Form was distributed during and subsequent to the first WPAC meeting during Phase I. The Questionnaire (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 Questionnaire 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 Questionnaires 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 Questionnaire 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 PADEP'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 Questionnaire Form, the WPAC identified the following organizations as possible WPAC participants:

- The Pennsylvania Department of Transportation

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

MUNICIPAL ENGINEERS PARTICIPATION

Two of the WPAC meetings will focus on the more technical aspects of the Plan. These elements include modeling, technical analysis, and development of management criteria. This meeting will be encouraged to be attended by 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.

LEGAL ADVISORY PARTICIPATION

Another WPAC meeting will have a purpose to incorporate information between municipal solicitors into the Plan. This committee will focus on implementation of the Model Ordinance from a legal and regulatory framework standpoint.

STANDARDS

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

Peak Rate Control Management – Implementation of Release Rates for various subwatersheds will be developed based on collected data, modeling, engineering judgment, and committee input. It is noted that Provisional No Detention areas cited in the existing Tuna Creek Plan will not be allowed in this Plan.

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

ROLES OF COUNTY AND CONSULTANT

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

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

WORK SCHEDULE

A work schedule should be developed early in the Phase II process in conjunction with Susquehanna County and the Consultant. The work schedule will be formulated to set target dates for various tasks with the intention of completing the project for PADEP review within the Phase II contract period.

REFERENCES

1. Susquehanna County Planning Commission, *Susquehanna County Comprehensive Plan Update*, 2007.
2. United States Department of Agriculture Soil Conservation Service, Soil Survey of Susquehanna County, Pennsylvania, August 1977.
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.



**APPENDIX A.
QUESTIONNAIRE FORM**

Susquehanna COUNTY WATERSHEDS

Act 167 Stormwater Management Plan

QUESTIONNAIRE

PLEASE COMPLETE THE FOLLOWING AND RETURN THE QUESTIONNAIRE AND MARKED UP MAP TO:

DOUGLAS E. WEIKEL, PE

Herbert, Rowland & Grubic, Inc.

474 Windmere Drive

State College PA 16801

(An addressed envelope with postage is provided for your convenience.)

PERSON COMPLETING QUESTIONNAIRE

Municipality	
Name	
Phone	
e-mail	

1. DOES YOUR MUNICIPALITY HAVE?

	Yes	No	Location/Date
Comprehensive Plan	<input type="checkbox"/>	<input type="checkbox"/>	
Zoning Ordinance	<input type="checkbox"/>	<input type="checkbox"/>	
Subdivision/Land Development Ordinance	<input type="checkbox"/>	<input type="checkbox"/>	
Floodplain Regulations *	<input type="checkbox"/>	<input type="checkbox"/>	
Stormwater Management Regulations *	<input type="checkbox"/>	<input type="checkbox"/>	
Erosion Control Regulations *	<input type="checkbox"/>	<input type="checkbox"/>	
Drainage Regulations *	<input type="checkbox"/>	<input type="checkbox"/>	

*For the above regulations, please list where the regulation is found in the "Location" column.

Use the following abbreviations:

CP = comprehensive plan

ZO = zoning ordinance

BC = building code

SO = separate ordinance

SL = subdivision/land development ordinance

2. IS YOUR MUNICIPALITY CONSIDERED AN MS4 MUNICIPALITY UNDER THE CURRENT NPDES PHASE II STORMWATER REGULATIONS? (PLEASE CIRCLE ONE)

Yes	No
IF YES, IS YOUR 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.).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Water Quality	Dissolved and un-dissolved pollutants washed off the land surface – negative impacts to recreation, aesthetics and in-stream habitat.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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 baseflow in dry periods.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Stream Erosion	Eroding banks and beds may undercut roads and utilities, damages in-stream habitat, clog culverts and bridges.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Flooding	Larger scale overbank flows such as the 100-year flood associated with extreme storm events	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Model/Implemented Ordinances	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information on Act 167 reimbursements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other topics you would like to have considered: _____			

5. WHAT IS THE MOST IMPORTANT STORMWATER RELATED ISSUE TO YOUR MUNICIPALITY?

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	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Street Flooding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Property Flooding	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soil Erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sediment in Streams	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stream Bed/Bank Erosion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Scour at Outfalls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Property/Infrastructure Damage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pollution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Habitat/Resource Damage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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. 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
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. WILL YOUR MUNICIPALITY/AGENCY ATTEND WATERSHED PLAN ADVISORY COMMITTEE MEETINGS? MEETINGS ARE EXPECTED TO BE HELD APPROXIMATELY 4 TIMES PER YEAR FOR APPROXIMATELY 2 YEARS. (PLEASE CIRCLE ONE)

Yes		No	
If yes, 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
1	<input type="checkbox"/>	<input type="checkbox"/>		
2	<input type="checkbox"/>	<input type="checkbox"/>		
3	<input type="checkbox"/>	<input type="checkbox"/>		
4	<input type="checkbox"/>	<input type="checkbox"/>		
5	<input type="checkbox"/>	<input type="checkbox"/>		
6	<input type="checkbox"/>	<input type="checkbox"/>		
7	<input type="checkbox"/>	<input type="checkbox"/>		
8	<input type="checkbox"/>	<input type="checkbox"/>		
9	<input type="checkbox"/>	<input type="checkbox"/>		
10	<input type="checkbox"/>	<input type="checkbox"/>		
11	<input type="checkbox"/>	<input type="checkbox"/>		
12	<input type="checkbox"/>	<input type="checkbox"/>		

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.

PLEASE NOTE THAT THE INTENT OF QUESTIONS 15-17 IS INTENDED TO ASSESS THE EFFECTIVENESS OF THE EXISTING TUNA CREEK PLAN OF 1992. THEREFORE, THERE MAY BE SOME SIMILARITIES TO QUESTIONS ASKED ABOVE.

15. ARE ANY OF THE PROBLEMS LISTED BELOW OCCURRING IN YOUR MUNICIPALITY?		
ISSUE/CONCERN	Yes	No
A. Increased channel erosion/scour at outfalls of stormwater management facilities or storm sewer systems?	<input type="checkbox"/>	<input type="checkbox"/>
B. Increased general channel erosion not associated with outfalls?	<input type="checkbox"/>	<input type="checkbox"/>
C. Increased nuisance flooding?	<input type="checkbox"/>	<input type="checkbox"/>
D. Increased stream flooding?	<input type="checkbox"/>	<input type="checkbox"/>
E. Increased incidence of undersized bridges or culverts?	<input type="checkbox"/>	<input type="checkbox"/>
F. Noticeable increase in sediment deposits in streams?	<input type="checkbox"/>	<input type="checkbox"/>
G. Increase in sediment related problems (sediment deposits, gravel bars, clogged pipes/culverts)?	<input type="checkbox"/>	<input type="checkbox"/>
H. Has there been significant development within your municipality since the existing plan was completed?	<input type="checkbox"/>	<input type="checkbox"/>
I. Are existing stormwater management facilities being maintained (i.e. removal of debris from outlet structures, adequate control of vegetation, capacity maintenance)?	<input type="checkbox"/>	<input type="checkbox"/>

16. THE EXISTING EXISTING ALLEGHENY RIVER PLAN OF 1992 CONTAINS CRITERIA FOR PEAK FLOW MANAGEMENT ONLY. HOW WOULD YOU ASSESS THE EFFECTIVENESS OF THE EXISTING PLAN FOR THE WATERSHEDS IN YOUR MUNICIPALITY?		
Effective	Not Effective	Unknown
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

17. PLEASE PROVIDE ANY INPUT YOU FEEL IS RELEVANT REGARDING THE EFFECTIVENESS OF THE EXISTING PLAN FOR TUNA CREEK PLAN.	
A.	
B.	
C.	



**APPENDIX B.
QUESTIONNAIRE SUMMARY**

Summary Table of information provided by the WPAC through the Questionnaire Form:

MUNICIPALITY/AGENCY	Q1							Q2		Q4					Q6	Q8	Q10	Q11
	Comp Plan	Zoning Ord	SALDO	Floodplain Regs	SWM Regs	E&S Regs	Drainage Regs	MS4	In compliance	Peak Flow Rates	Water Quality	Groundwater Rech.	Stream Bank Prof.	Flooding	Support Project	WPAC	Flood Control Projects	Maintained SW Facilities
Forest City	N	Y	Y	Y	Y	Y		Y	Y	5	4	4	5	4	5	Y	Y	Y
Friendsville			N	N	N	N	N	Y		1	1	1	1	1		N	N	N
Great Bend	N	N	Y	Y	N	N	N	Y	Y	5	3	3	2	3	4	Y	N	Y
Lanesboro	N	Y	Y	Y	N	N	N	N		5	3	2	5	5	5	Y	N	Y
Montrose	Y	Y	Y	?	N	N	N	Y	?	5	4	3	4	4	4	Y	N	Y
New Milford	Y	Y	N	Y	N	Y	N	Y	Y	5	4	4	5	5	5	Y	N	N
Oakland	N	N	N	Y	N	N	N	N		5	2	2	5	4	5	Y	N	Y
Susquehanna Depot	Y	Y	N	Y	N	N	N	N		5	3	2	5	4	5	Y	N	N
Uniondale	Y	N	N	Y	N	N	N	N		4	5	4	5	3	4	Y	N	N
Apolacon	N	Y	Y	N	N	N	N	N		5	5	4	5	4	4	Y	N	
Auburn	N	N	N	Y	N	N	N	N		5	5	5	5	5	3	Y	N	N
Bridgewater	Y			Y	N	N	N	N		5	4	3	4	5	5	Y	Y	Y
Dimock	N	N	N		N	N	N	N		5	3	3	4	2	4	Y	N	Y
Forest Lake	Y			Y	N	N	N	N		5	2	3	5	3	3	Y	N	Y
Franklin	Y							N	N	5	4	5	5	5	4	Y	N	Y
Gibson	Y	N	N	N	N	N	N	N		4	4	4	4	4	3	Y	N	N
Great Bend	N	N	N	Y	N	N	N	Y	Y	5	3	3	5	5	4	Y	N	Y
Harford	N	N	N	Y	N	N	N	N		5	3	3	5	5	5	Y	Y	N
Liberty	Y	N	Y	N	N	N	N	Y		5	3	4	5	5	4	Y	N	N
Middletown	Y	N	Y	Y	N	Y	N	N		3	1	2	4	5	4	Y	N	N
New Milford		N	N	N	N	N	N	N							4	Y		
Oakland	N	N	N	Y	N	N	N	?	N	5	3	3	5	5	2	Y	N	Y
Rush	Y	N	N	Y	N	N	N	N		5	3	2	5	5	3	Y	N	N
Silver Lake	Y	N	Y	Y	N	N	N	N		5	4	5	5	5	5	Y	N	Y
Springville	N	N	Y	Y	N	Y	Y	Y		5	4	3	5	5	3	Y	Y	N
Thompson	Y		Y	Y	Y	N	Y	N		2	2	2	3	2	3	Y	N	Y
County Planning	Y	N	Y	N	Y	Y	Y	N		5	5	5	5	5	5	Y	N	N
Total Response %	64%									4.6	3.3	3.2	4.5	4.2	4.0			

Question 1. Does your Municipality have the following regulations?

Question 2. Is your Municipality considered an MS4? In compliance? Interested in intermunicipal cooperation?

Question 4. How important (5 - Very Important) to (1- Not Important) are the following issues?

Question 6. How much support will your Municipality provide (5- Strongly Support) to (1- Strongly Oppose)?

Question 8. Will your Municipality participate in the WPAC (Yes or No)?

Question 10. Are there existing or proposed flood control projects in your Municipality (Yes or No)?

Question 11. Are existing stormwater management facilities being maintained (Yes or No)?

The following municipalities did not respond: Hallstead, Hop Bottom, Little Meadows, and Thompson Boroughs, Ararat, Brooklyn, Choconut, Clifford, Harmony, Herrick, Jackson, Jessup, Lathrop, and Lenox Townships.

MUNICIPALITY/AGENCY	Question 3. What is the most important stormwater issue?
Forest City	
Friendsville	None
Great Bend	Water that comes under I-81 to the river
Lanesboro	Debris/Gravel bars; adequate drainage; ponding on roads
Montrose	Galvanized pipe failures
New Milford	Lack of drainage
Oakland	Drainage off mountain, drainage size expanded
Susquehanna Depot	Creek erosion, flooded sewer plant
Uniondale	Still water drain & north road flooding
Apolacon	Undersized culverts; surface flow
Auburn	Washing out roads
Bridgewater	Safety of citizens; property damage; flooding of roads
Dimock	Flooding, streambank & ditch erosion
Forest Lake	Ditch erosion
Franklin	Runoff, trees block streams, gravel bars, stream alignment
Gibson	Water quality
Great Bend	Creek runoff overflowing
Harford	Flooding
Liberty	Snake Creek flooding; feeder streams
Middletown	Stream crossing floods; erosion
New Milford	
Oakland	100 yr floodplain, ordinance enforcement
Rush	Flooding of streams, cemetery will wash away
Silver Lake	Road flooding
Springville	Floods
Thompson	Beaver dams
County Planning	Peak flows/flooding

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

ID	MUNICIPALITY	LOCATION	DESCRIPTION	PROPOSED SOLUTION
P1	New Milford Twp	Rt 11 - Salt Lick Creek	bank erosion, trees & debris in creek	
P2	New Milford Twp	Highland Rd - Smith Creek	beaver ponds overflow in heavy rains	
P3	New Milford Twp	Foot Rd	beaver ponds overflow in heavy rains	
P4	New Milford Twp	Trib of Bulter Creek	man-made pond overflows dam & road	
P5	Forest City	Main St Rt 171	water eroding state road	need pipe
P6	Springville Twp	Whites Creek	debris in creek	cleanout
P7	Springville Twp	Rt 393	privately owned pipe not big enough	bigger pipe
P8	Springville Twp	Rt 29	undersized culvert	bigger culvert
P9	Springville Twp	T356 - Meshoppen Creek	runover bank by bridge	raise bank
P10	Lanesboro	S Main St	ponding of water on roadway	improve drainage system; cofferdam for high flows
P11	Lanesboro	S Main St	ponding of water behind houses	improve drainage system; possible wetland
P12	Lanesboro	Mountain Rd	poor drainage causing road rutting/overtopping	improve drainage - already underway
P13	Lanesboro	Viaduct St	excessive gravel bars in stream - road flooding	remove gravel bars, armor streambanks
P14	Lanesboro	N Main St	ponding of water on roadway	raise/re-grade road
P15	Lanesboro	Viaduct St	gravel bars cause flooding	remove gravel bars, armor streambanks
P16	Lanesboro	Belmont St	gravel bars cause flooding	NRCS mitigated portion, 600' needed
P17	Lanesboro	S Main St	seasonal stream eroding road	new box culvert
P18	Lanesboro	Viaduct St	ditch full of silt & debris	clean ditch; possible wetland
P19	Middletown Twp	Corby Rd	washed out bridge	replace bridge
P20	Middletown Twp	Guiton & Conboy Rd	culvert too small	bigger culvert
P21	Middletown Twp	Jones Rd	road flooding (in floodplain)	build up roadway, add culverts/bridges
P22	Middletown Twp		gravel bar at curve before bridge	removal of debris
P23	Middletown Twp	SR 858	road flooding (in wetlands)	new bridge built; roadway needs raised
P24	Middletown Twp	Foran Rd	road crosses wetland & floods	roadway ditches & raise road (being done)
P25	Middletown Twp	SR 4015	beaver dams on stream	remove dams
P26	Middletown Twp	Corby Rd	confluence of 2 streams - debris	remove debris annually
P27	Silver Lake Twp	Russel Rd	flooding of stream crossing	install large culvert
P28	Silver Lake Twp	Snowhollow Rd	flooding of stream crossing	install large culvert
P29	Silver Lake Twp	Silver Creek Rd	ponds from MX track	eliminate them
P30	Montrose	Prospect to Chenango St	pipe failures across private property	replace pipe and headwall
P31	Montrose	Lake Ave to Grow Ave e of High St	runoff to Pettis Creek Trib.	upgrade size of pipe and surface grading
P32	Bridgewater Twp	Intersection of SR29 & SR3029	undersized pipes/culverts - flooding	PADOT to divert runoff west of SR29
P33	Bridgewater Twp	Sprout Rd	clearcut runoff overburdens 84" culvert	
P34	Bridgewater Twp	Ritz Tex Rd	2-42" RCP clog w/debris	replace w/larger pipes for 100yr storm
P35	Bridgewater Twp	Rafferty Rd	104"x76" CMP to small	hydrologic study for 100yr storm
P36	Bridgewater Twp	Cantone Rd	runoff from devel. causes road erosion	re-assess detention pond
ID	MUNICIPALITY	LOCATION	DESCRIPTION	PROPOSED SOLUTION

P37	Bridgewater Twp	Dark Hollow Rd	48" CMP undersized	replace w/larger pipes for 100yr storm
P38	Bridgewater Twp	Lewis Rd	change in driveway diverting more runoff into ditches	work with prop. owner to reduce flow
P39	Bridgewater Twp	Lewis Rd	runoff from hill erodes stream bank & road	
P40	Susquehanna Boro	Sewer Plant	flood waters	control flooding
P41	Susquehanna Boro	Exchange St	flood waters close road	close underpass - find another access
P42	Susquehanna Boro	various locations	inadequate drainage pipes	bigger pipes
P43	Uniondale Boro	Mountain Rd	bridge flooding	raise county bridge & road
P44	Oakland Boro	High St	mountain runoff, poor drainage	in planning stages
P45	Oakland Boro	Franklin St		
P46	Oakland Boro	Boyden St		
P47	Oakland Boro	Upper State		
P48	Oakland Boro	Westfall Ave	poor drainage job by state	
P49	Oakland Boro	3rd Ave		
P50	Apolacon Twp	Lake of Meadows - T775	flooding during high storms	d/s dam insufficient overflow cap.
P51	Apolacon Twp	SR 858	culverts undersized, low lying areas	
P52	Gibson Twp	SR 2034 at Tunkhannock Creek	beavers in swamp	
P53	Gibson Twp	Tunkhannock Creek	bank erosion in several areas	
P54	Gibson Twp	Bell Creek	bank erosion	
P55	Harford Twp	Lower Podunk Rd	portion floods from creek overflowing	dredge creek
P56	Harford Twp	Stearns Rd at swamp	beaver problems	
P57	Harford Twp	Bartholomew Rd	beaver dams on pipe	
P58	Harford Twp	Oliver Rd	beaver dams on pipe	
P59	Harford Twp	Penney Hill Rd	bridge washed out	replacement designed; DEP permitting
P60	Franklin Twp	Franklin Forks Village - Silver Creek	stream obstructions, gravel bars	clean & remove stabilize banks
P61	Franklin Twp	Hawk & Bolles Intersection	undersized culvert	increase size, box culvert
P62	Franklin Twp	Silver Creek	stream channel changed, gravel bar	realign stream, remove gravel bar, stab. Bank
P63	Franklin Twp	Snake Creek above Bailey Rd	realign stream, stabilize banks	put channel back
P64	Franklin Twp	Olszewski Rd	undersized pipes, property owner	clean obstructions & channel
P65	Franklin Twp	Conroy Rd	obstructions	increase pipe sizes
P66	Franklin Twp	Valley View Rd	bank erosion	stabilize
P67	Franklin Twp	Buckley Rd	bank erosion	stabilize
P68	Oakland Twp	Rt 92 North	sections in floodplain, 4' deep	
P69	Rush Twp	SR 706 @ cemetary	channel alignment encroaching on cemetary	re-align stream to original location
P70	Rush Twp	SR 267	building flooding	rip rap channel
P71	New Milford Boro	Johnston St underpass	floods from Smith Creek; street erosion property damage	
P72	New Milford Boro	Meylert Creek	flooding, erosion stream bank erosion	
P73	Great Bend Twp	Salt Lick Creek	shallow creek bed with excess debris	cleanout & deepen creek
P74	Great Bend Boro	outlet from I-81 (brick pond)	excess water from I-81 causes damage	clean water flow area
P75	Auburn Twp	Hinkley Rd	erosion	more pipes
P76	Liberty Twp	Snake Creek behind John	creed bed level w/land	

		Lawson		
P77	Liberty Twp	Snake Creek @ Shadow Brook Dr	clean & put back to original channel	
P78	Liberty Twp	Misc. feeder streams		

Summary Table of Obstructions provided by the WPAC through the Questionnaire Form:

ID	MUNICIPALITY	LOCATION	DESCRIPTION
O1	Forest City	Upper N. Main St	grate blocks with debris, street floods
O2	Forest City	Main St Rt 171	water eroding state road
O3	Forest City	Hudson & Grand Ave	water ponds
O4	Forest City	Dundoff St Rt 247	pipes are blocked or broken
O5	Springville Twp	Whites Creek	pipe not big enough
O6	Springville Twp	t367 branch off Stevens Creek	pipe plugged
O7	Thomson Twp	Churchill Rd	beaver dam
O8	Thomson Twp	Stack Rd	beaver dam
O9	Thomson Twp	Nichols Rd	beaver dam
O10	Thomson Twp	Lamp Rd	beaver dam
O11	Apolacon Twp	Lynch Rd	48" culvert (2006 washout)
O12	Gibson Twp	SR 848 1/2 mile w/Gibson	small bridge, low laying land
O13	Gibson Twp	SR 2036 end of Plonski Rd	culvert plugs w/debris
O14	Harford Twp	Stearns Rd at Tingley Lake	pipe collapsed on Lake outlet
O15	New Milford Boro	bridge on Main St over Smith Creek	debris builds up under the bridge
O16	New Milford Boro	Johnston St	Canadian Pacific RR crosses Smith Creek
O17	New Milford Boro	Meylert Creek	debris restricts channel flow
O18	Great Bend Twp	Suchnick property, RT 11	collapsed earth under RR clogged drainage
O19	Auburn Twp	Farley Rd	pipe isn't big enough
O20	Auburn Twp	Riley Rd	pipe isn't big enough
O21	Auburn Twp	Bunnel Bridge	restrict channel flows
O22	Auburn Twp	Knights Hill Bridge	restrict channel flows
O23	Auburn Twp	Singer Bridge	restrict channel flows
O24	Auburn Twp	Lower Meshoppen Creek Rd	restrict channel flows
O25	Auburn Twp	Pointek Rd	restrict channel flows



**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 Susquehanna County Regional 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 Susquehanna 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 Susquehanna County. All data collection activities will be accomplished by gathering available information from the WPAC or from the Questionnaire 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 questionnaire 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 Questionnaire 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. 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 Susquehanna 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 Susquehanna 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 Susquehanna 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 than 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 Questionnaire 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 Questionnaire 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 Questionnaire Form completions process.
6. Regionally Stormwater Related "Problems" - Those areas indicated in the Questionnaire Form and where confirmed by the CONSULTANT through technical modeling/analysis (for example, flooding points or areas of streambank erosion).

Anticipated Product

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

TASK B - Technical Analysis

The technical analysis will describe the analytical processes involved with developing a strategy to regulate existing and new land development and activities that may affect stormwater

runoff. Since stormwater runoff has a direct impact on flooding, water quality, and groundwater recharge, this analysis will consider the following objectives:

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

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

SubTask B.1 - Implement Volume Controls

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

SubTask B.2 - Implement Rate Controls

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

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. Both the Meshoppen & Snake Creek Watersheds and the selected subwatersheds of the Susquehanna River will be modeled to determine peak flow rates. Subwatersheds chosen will be based on existing problem areas or 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 Questionnaire Form and other problem areas as identified by the WPAC. Problem areas may generally consist of flooding, stream channel or bank erosion, property damage, detention basin (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. Maintain consistency with concurrent studies including a summary of what tasks will be completed 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.
10. An implementation strategy, including funding, for retrofit measures, if necessary.

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

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

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

SubTask B.6 - Implementation of Technical Standards and Criteria

This subtask will involve the identification of the necessary ordinance provisions for each municipality. Included will be the modification of the Model Ordinance and/or recommendations for updating existing municipal ordinances, including but not limited to, subdivision and land development, zoning, erosion and sediment control, and building code ordinances to effectively implement the technical standards and criteria for stormwater management throughout Susquehanna 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. These activities may include, but are not limited to: timber harvesting, oil & gas mining, and agriculture. The activities will only be regulated in regards to stormwater management controls and protecting water quality requirements to ensure the protection of health, safety, and property of the people and Waters of the Commonwealth.

Anticipated Product

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

SubTask B.9 - Water Quality Impairments

This subtask involves the research and identification of water quality impairments throughout Susquehanna 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 attaining, how to improve the water quality to the designated use.

TASK C – Public/Municipal Participation

SubTask C.1 - 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, several meetings will focus on technical and legal issues. These meetings are 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.

As previously indicated, the WPAC consists of representatives from each municipality in the County, as well as the 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.

Two meetings of the WPAC will focus on the technical issues focusing on the municipal engineers from each municipality and any invited engineering, technical, or scientific individuals. The meetings 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.

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

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

The following describes proposed WPAC meetings and public hearing schedules including the purpose of each meeting:

Please note that 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.	Beginning of Phase II
WPAC 4 & WPAC-E	Review the project status, review technical aspects of the PLAN, including initial modeling runs, calibration efforts, and review of technical standards (Control Guidance 1 & 2). Purpose is to receive comments and direction in the development of the Model Ordinance.	Middle of Task B
WPAC 5 & WPAC-E	Present final technical modeling results, present technical standards and criteria; discuss water quality issues, and preliminary ordinance provisions for the municipalities. Review final modeling runs and present draft PLAN and address previous comments.	End of Task B
WPAC 7 & WPAC-L & Public Hearing & BMP Workshop	Present final draft and review municipal implementation procedures. Educate the municipal solicitors on the ordinance adoption and implementation requirements of the PLAN. Conduct the public hearing as required by Act 167 to present the final PLAN to the public. 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 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 members, municipal officials, interest groups and the public on the program, status, and issues of the PLAN. The agenda and minutes will be created for each meeting during Phase II.

Anticipated Product

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

TASK D - PLAN Preparation and Implementation

SubTask D.1 - Final Phase II Report Preparation

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

- A description of the hydrologic characteristics of the subwatersheds; the existing and future land uses and their impacts on stormwater runoff and stormwater collection systems; the available runoff control techniques and their efficiencies in the subwatersheds; a list of significant obstructions; and available FEMA FIS floodplain information. 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 Susquehanna 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 - McKeanCounty Description
- Section III - Significant Problem Areas and Obstructions
- Section IV - Watershed Level Stormwater Management Planning
- Section V - Technical Analysis
- Section VI - Existing Municipal Regulations
- Section VII - Economic Impact of Stormwater Management Standards
- Section VII - Goals, Objectives, and Additional Recommendations
- Section IX - PLAN Implementation and Update Procedures
- Section X - References

Part II

Model Ordinance

Plates:

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

Anticipated Product

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

SubTask D.2 - Model Ordinance Preparation

A Model Ordinance 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 make a determination on whether drainage and construction standards will be included.

Anticipated Product

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

SubTask D.3 - PLAN Adoption

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

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

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

The Susquehanna 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, Susquehanna 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 Susquehanna County. Subsequent to the DEPARTMENT's approval of PLAN, fifty (50) copies of PLAN will be printed and distributed.

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

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

Anticipated Product

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

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

1. A survey of existing runoff characteristics in minor as well as large storms, including the impact of soils, slopes, vegetation, and existing development.
2. A survey of existing significant obstructions, their capacities, and associated storm return periods.
3. An assessment of projected and alternative land development patterns in Susquehanna County, and the potential impact of runoff quantity, velocity, and quality.
4. An analysis of existing and future development in flood hazard areas, and its sensitivity to damages from future flooding or increased runoff.
5. A survey of existing drainage problems and proposed conceptual solutions.
6. A review of existing and proposed stormwater collection systems and their impacts.
7. An assessment of alternative runoff control techniques and their efficiency in the individual subwatershed.
8. An identification of existing and proposed local, State, and Federal flood control projects located in Susquehanna 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 Susquehanna 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. 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 Susquehanna County and in drainage basins to which the watershed is tributary.
16. Consideration for consistency with other existing municipal, county, regional, and State environmental and land use plans.



**APPENDIX D.
PHASE II COST PROPOSAL**

Phase II Cost Proposal

The estimated cost associated with completing the Phase II work is Two Hundred Sixty Thousand Eight Hundred Eighty Four Dollars (\$268,000.00) as per the following breakdown:

COST ESTIMATE BY TASK			
	TIME	EXPENSES	TOTAL
<i>Task A – Data Collection/Review/Analysis</i>			
<i>Task B – Technical Analysis</i>			
<i>Task C – Public/Municipal Participation</i>			
<i>Task D – PLAN Preparation and Implementation</i>			
<i>Task E – Project Management & Administration</i>			
PHASE II PROJECT TOTALS			
COST ESTIMATE BY FISCAL YEAR			
<i>Fiscal Year</i>			
<i>2009-2010</i>			
<i>2010-2011</i>			
<i>2011-2012</i>			
PHASE II PROJECT TOTALS			



**APPENDIX E.
PHASE II PROPOSED SCHEDULE**

Phase II Proposed Schedule

The proposed Phase II Schedule is as follows:

ANTICIPATED DATE	MILESTONE
August 2009	PADEP and County Phase II Contract Executed
September 2009	WPAC Meeting #3
September 2009	Field View of Problem Areas/Modeling
February 2010	Conceptual Solutions to Problem Areas
April 2010	WPAC Meeting #4 and WPAC-E
October 2010	Draft Phase II Report
January 2011	Draft Model Ordinance
February 2011	WPAC Meeting #5 and WPAC-E
May 2011	Finalize Phase II Report, Model Ordinance, and Plates
June - July 2011	WPAC Meeting #6, WPAC-L, and BMP Workshop
September 2011	Public Hearing
October 2011	Commissioners Approval of Phase II Plan
October 2011	Phase II Report Submission to PADEP
December 2011 – June 2012	Implementation Workshops
June 2012	PADEP and County Phase II Contract Expires

This schedule will be re-evaluated at the beginning of Phase II and adjusted as needed.



**APPENDIX F.
SUSQUEHANNA COUNTY MAP**



**APPENDIX G.
SUSQUEHANNA COUNTY
DESIGNATED WATERSHEDS**

CHAPTER 93 DESIGNATIONS

§ 93.9i. Drainage List I.	Susquehanna River Basin in Pennsylvania - Susquehanna River	Water Uses Protected
Stream	Zone	
1—Susquehanna River	(NY)	
2—Unnamed Tributaries to Susquehanna River	Basins (all sections in PA), Source to PA-NY State Border near Lanesboro	CWF
1—Susquehanna River	Main Stem, PA-NY State Border near Lanesboro to PA-NY State Border near Great Bend	WWF
2—Unnamed Tributaries to Susquehanna River	Basins, (all sections in PA) PA-NY State Border near Lanesboro to PA-NY State Border near Great Bend	CWF
2—Cascade Creek	Basin (all sections in PA)	CWF
2—Hilborn Creek	Basin	CWF
2—Starrucca Creek	Basin, Source to Unnamed Tributary at RM 11.68 (Thompson Wetlands Area)	CWF
3—Unnamed Tributary to Starrucca Creek at RM 11.68	Basin	EV
2—Starrucca Creek	Basin, (all sections in PA) Unnamed Tributary at RM 11.68 to Mouth	CWF
2—Canawacta Creek	Basin	CWF
2—Drinker Creek	Basin	CWF
2—Lewis Creek	Basin	CWF
2—Bedbug Brook	Basin	CWF
2—Denton Creek	Basin (all sections in PA)	CWF
2—Mitchell Creek	Basin	CWF
2—Little Egypt Creek	Basin	CWF
2—Salt Lick Creek	Basin	HQ-CWF
2—DuBois Creek	Basin	CWF
2—Trowbridge Creek	Basin (all sections in PA)	CWF
1—Susquehanna River (NY)		
2—Unnamed Tributaries to Susquehanna River	Basins (all sections in PA), PA-NY State Border near Great Bend to PA-NY State Border near Milltown	CWF
2—Snake Creek	Basin (all sections in PA)	CWF
2—Little Snake Creek	Basin (all sections in PA)	CWF
2—Choconut Creek	Basin (all sections in PA)	WWF
2—Apalachin Creek	Basin, Source to Bow Bridge Creek	CWF
3—Bow Bridge Creek	Basin	HQ-CWF
2—Apalachin Creek	Basin, Bow Bridge Creek to Cork Hill Creek	CWF
3—Cork Hill Creek	Basin (all sections in PA)	HQ-CWF
2—Apalachin Creek	Basin (all sections in PA), Cork Hill Creek to PA-NY State Border	CWF
2—Apalachin Creek (NY)		
3—Unnamed Tributaries to Apalachin Creek	Basins (all sections in PA), PA-NY State Border to Mouth	CWF
2—Wyalusing Creek		
3—East Branch Wyalusing Creek	Main Stem, Source to Confluence with Middle Branch	CWF
4—Unnamed Tributaries to East Branch Wyalusing Creek	Basins	CWF
4—Beebe Creek	Basin	CWF
4—Pettis Creek	Basin	WWF
4—Forest Lake Creek	Basin	CWF
4—South Branch	Basin	WWF
4—Roe Creek	Basin	CWF
4—Snell Creek	Basin	CWF
4—Devel Creek	Basin	CWF
4—Elk Lake Stream	Basin	CWF
4—Deer Lick Creek	Basin	CWF

3—Middle Branch Wyalusing Creek	Basin, Source to Confluence with East Branch	CWF
2—Wyalusing Creek	Basin, Confluence of East and Middle Branches to North Branch	WWF
3—North Branch Wyalusing Creek	Basin	CWF
2—Wyalusing Creek	Basin, North Branch to Mouth	WWF
2—Tunkhannock Creek	Main Stem, Source to Susquehanna- Wyoming County Border	CWF
3—Unnamed Tributaries to Tunkhannock Creek	Basins, Source to Susquehanna- Wyoming County Border	CWF
3—Bear Swamp Creek	Basin	CWF
3—Bell Creek	Basin	CWF
3—Leslie Creek	Basin	CWF
3—Partners Creek	Basin	CWF
3—Tower Branch	Basin	CWF
3—Millard Creek	Basin	CWF
3—East Branch Tunkhannock Creek	Basin, Source to Dundaff Creek	CWF
4—Dundaff Creek	Basin, Source to Unnamed Tributary at RM 4.39 (Newton Lake Outlet)	CWF
5—Unnamed Tributaries to Dundaff Creek at RM 4.39	Basin	WWF
4—Dundaff Creek	Basin, Unnamed Tributary at RM 4.39 to Mouth	CWF
3—East Branch Tunkhannock Creek	Basin, Dundaff Creek to Mouth	CWF

§ 93.9j. Drainage List J.		Susquehanna River Basin in Pennsylvania - Lackawanna River	
Stream	Zone		Water Uses Protected
1—Susquehanna River			
2—Lackawanna River			
3—West Branch Lackawanna River	Basin, Source to Confluence with East Branch		CWF
3—East Branch Lackawanna River	Basin, Source to Confluence with West Branch		HQ-CWF
2—Lackawanna River	Main Stem, Confluence East and West Branches to SR 0347 Bridge at Dickson City		HQ-CWF
3—Unnamed Tributaries to Lackawanna River	Basins, Confluence of East and West Branches to SR 0347 Bridge at Dickson City		CWF
3—Brace Brook	Basin		CWF

STREAM INTEGRATED LIST SECTION 303(D) LISTING

NAME	SOURCE CAUSE	Total (miles)
Cascade Creek	Source Unknown - Cause Unknown	1.628284
Fiddle Lake Creek	Natural Sources - Cause Unknown & Thermal Modifications	4.298073
Pettis Creek	Municipal Point Source - Suspended Solids ; Urban Runoff/Storm Sewers - Siltation ; Upstream Impoundment - Thermal Modifications ; Erosion from Derelict Land - Siltation ; Road Runoff - Siltation	1.230435
South Branch Wyalusing Creek	Agriculture - Cause Unknown ; Agriculture - Nutrients ; Agriculture - Suspended Solids	5.805188
Susquehanna River	Source Unknown - Mercury	15.83207
Susquehanna River	Source Unknown - Metals	2.47288
UNT	Municipal Point Source - Suspended Solids ; Urban Runoff/Storm Sewers - Siltation ; Upstream Impoundment - Thermal Modifications ; Erosion from Derelict Land - Siltation ; Road Runoff - Siltation	3.226887
UNT	Source Unknown - Cause Unknown	0.769461
	TOTAL	35.26328