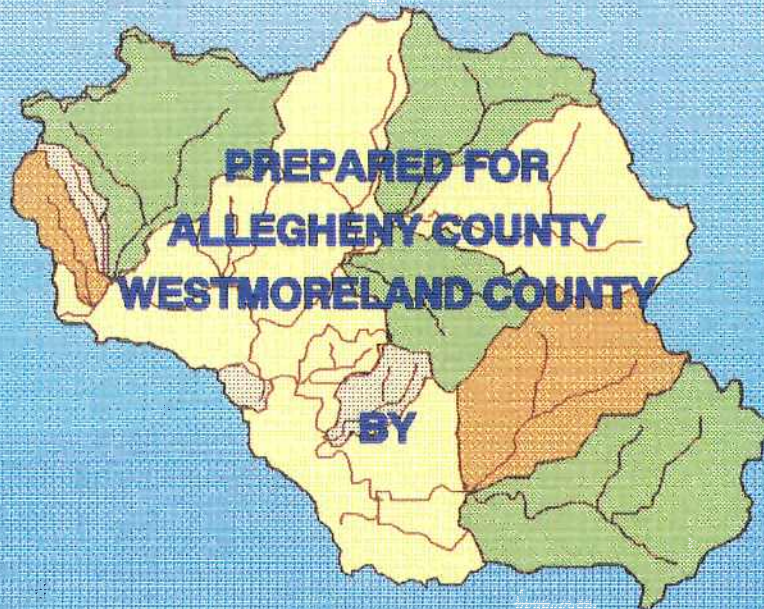


**TURTLE CREEK WATERSHED
ACT 167
STORMWATER MANAGEMENT PLAN**

Executive Summary and Appendix A



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**TURTLE CREEK WATERSHED
STORMWATER MANAGEMENT PLAN**

TABLE OF CONTENTS

	<u>PAGE NO.</u>
EXECUTIVE SUMMARY	
INTRODUCTION	1
RECOMMENDATIONS	1
Technical	1
Management	2
CONTENTS OF THE PLAN	2
EXISTING RUNOFF CHARACTERISTICS	3
General Information	3
Subbasin Physical Characteristics	5
Subbasin Hydrologic Characteristics	5
Stream Reach Hydrologic Characteristics	7
Rainfall Characteristics	8
SURVEY OF SIGNIFICANT OBSTRUCTIONS	8
ASSESSMENT OF POTENTIAL LAND DEVELOPMENT PATTERNS	9
DEVELOPMENT IN FLOOD HAZARD AREAS	9
SURVEY OF DRAINAGE PROBLEMS	10
REVIEW OF STORMWATER COLLECTION SYSTEMS	11
ASSESSMENT OF ALTERNATIVE RUNOFF CONTROL TECHNIQUES	11
IDENTIFICATION OF EXISTING AND PROPOSED FLOOD CONTROL PROJECTS ..	12
DESIGNATION OF AREAS TO BE SERVED BY STORMWATER	
COLLECTION AND CONTROL FACILITIES IN THE FUTURE	12
IDENTIFICATION OF FLOOD PLAINS WITHIN THE WATERSHED	12
CRITERIA AND STANDARDS FOR STORMWATER RUNOFF CONTROL	12
Activities Covered	13
General Performance Standards	13
Specific Technical Standards	14
PRIORITIES FOR PLAN IMPLEMENTATION	17
PROVISIONS FOR REVIEWING, REVISING AND UPDATING THE PLAN	20

**TABLE OF CONTENTS
(CONTINUED)**

PAGE NO.

APPENDIX A: MODEL ORDINANCES

SECTION 101 - GENERAL PROVISIONS	A-1
SECTION 102 - STORMWATER MANAGEMENT PERFORMANCE STANDARDS ..	A-2
SECTION 103 - DESIGN CRITERIA FOR STORMWATER MANAGEMENT CONTROLS	A-7
SECTION 104 - EROSION AND SEDIMENTATION CONTROLS	A-11
SECTION 105 - MANINTENANCE OF STORMWATER MANAGEMENT CONTROLS	A-11
SECTION 106 - STORMWATER PLAN REQUIREMENTS	A-13
SECTION 107 - PLAN REVIEW PROCEDURES	A-16
SECTION 108 - STATUS OF THE STORMWATER PLAN AFTER FINAL APPROVAL	A-18
SECTION 109 - STORMWATER PLAN MODIFICATIONS	A-19
SECTION 110 - INSPECTIONS OF STORMWATER MANAGEMENT CONTROLS	A-19
SECTION 111 - FINANCIAL GUARANTEES AND DEDICATION OF PUBLIC IMPROVEMENTS	A-20
SECTION 112 - FEE SCHEDULE	A-21
SECTION 113 - ENFORCEMENT PROCEDURES AND REMEDIES	A-21
SECTION 114 - DEFINITIONS	A-23
 SUBDIVISION/LAND DEVELOPMENT ORDINANCE - ASSIGNED RELEASE RATE PERCENTAGES	 A-27
 MODEL STORMWATER MANAGEMENT PROVISIONS FOR THE MUNICIPAL ZONING ORDINANCE	 A-28

TURTLE CREEK WATERSHED STORMWATER MANAGEMENT PLAN

EXECUTIVE SUMMARY

INTRODUCTION

The stormwater management plan for the Turtle Creek watershed has been prepared by Allegheny and Westmoreland counties in order to meet the requirements of the Pennsylvania Storm Water Management Act (Act of October 4, 1978, P.L. 864 No. 167).

This law, commonly referred to as Act 167, requires that Pennsylvania counties prepare and adopt stormwater management plans for each watershed within its boundaries. It also requires that, within six months after a watershed plan has been adopted by a county and approved by the Pennsylvania Department of Environmental Resources (DER), municipalities within the watershed must amend or enact ordinances to regulate development and other land alterations in accordance with the standards included in the adopted plan.

Each watershed plan must contain provisions to insure that development or activities in each municipality in the watershed do not adversely affect health, safety and property in other municipalities within the watershed and in basins to which the watershed is tributary.

In addition, every entity or individual who alters or develops land in a manner which affects stormwater runoff must implement stormwater control measures consistent with the adopted watershed plan.

The plan provides a foundation for future cooperative action which may lead to more effective and economical ways to manage stormwater flows.

RECOMMENDATIONS

Technical

In the absence of watershed wide planning for the regulation of stormwater flows, municipalities and developers have generally assumed that downstream harm could be avoided if stormwater runoff from a development site was not permitted to exceed the peak flows that left the area prior to development. A major finding of the engineering analyses upon which this stormwater management plan is based is that the avoidance of downstream harm cannot always be assured by simply restricting discharges from new land development to the predevelopment rates. In fact, the use of stormwater detention facilities to reduce peak discharges can actually result in increases to downstream discharges. Such facilities limit peak discharges by extending the duration of time over which the stormwater leaves the site. This attenuation of maximum discharge rates may create conditions under which peak discharges from one or more tributary areas may occur simultaneously, thereby increasing total in-stream peak discharges.

In order to avoid such situations, this plan presents a standard for the control of stormwater runoff which considers the interaction of runoff contributions from subareas or subbasins throughout the watershed and which considers the magnitude, duration and rate of stormwater flow together with the times at which peak rates of discharge arrive at various downstream locations. This standard, termed the "release rate percentage" combined with specified criteria define appropriate design storm characteristics required for computational purposes, are the primary technical plan elements which serve as the basis of this stormwater management plan and recommended municipal stormwater control ordinance and regulation provisions.

Management

The planning mandate of Act 167 can be achieved through the enactment and enforcement of municipal ordinances and regulations which incorporate the release rate percentage and associated criteria and standards presented in the plan. The implementation of the regulations will require continuing involvement by all of the municipalities in the watershed and the counties of Allegheny and Westmoreland.

The plan describes the roles of local municipalities, the counties and the Turtle Creek Watershed Association in ongoing stormwater management activities. As is required by Act 167, the municipalities are given the responsibility for adopting and enforcing relevant stormwater control requirements. The counties are delegated responsibility for updating the plan as specifically required by Act 167. It is also recommended that the counties monitor the status of enforcement of stormwater management requirements and provide review services as necessary to assist the municipalities in discharging their responsibilities. The plan recognizes the Turtle Creek Watershed Association and recommends that the Association play an informal role in stormwater management by providing a forum for information exchange, technology transfer and monitoring of stormwater management effectiveness.

CONTENTS OF THE PLAN

The Stormwater Management Plan for the Turtle Creek Watershed includes this document and a report titled Turtle Creek Watershed Act 167 Stormwater Management Plan (main plan document), including appendices and additional unpublished supporting documentation.

Section 5 of Act 167 specifies that a watershed plan shall include the thirteen elements listed below.

1. A survey of existing runoff characteristics in small as well as large storms, including the impact of soils, slopes, vegetation and existing development.
2. A survey of existing significant obstructions and their capacities.
3. An assessment of projected and alternative land development patterns in the watershed and the potential impact on runoff quantity, velocity and quality.

4. An analysis of present development in flood hazard areas and its sensitivity to damage from future flooding or increased runoff.
5. A survey of existing drainage problems and proposed 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 particular watershed.
8. An identification of existing and proposed State, Federal and local flood control projects located in the watershed and their design capacities.
9. A designation and description of those areas to be served by stormwater collection and control facilities within a ten-year period.
10. An identification of flood plains within the watershed.
11. Criteria and standards for the control of stormwater runoff from development activities which are necessary to minimize dangers to property and life and carry out the purposes of Act 167.
12. Priorities for implementation of action within the plan.
13. Provisions for periodically reviewing, revising and updating the plan.

Each of these topics is addressed in the main plan document. Summaries of the findings and recommendations relative to these topics are provided in this Executive Summary in the order listed above.

EXISTING RUNOFF CHARACTERISTICS

General Information

The Turtle Creek Watershed is situated in Allegheny and Westmoreland counties in southwestern Pennsylvania. The watershed encompasses approximately 95,000 acres, roughly 66 percent of which lie in Westmoreland County. A general watershed map, together with a listing of affected municipalities is provided in Figure 1 of this document and Figure III-1 in the main plan document.

The basin has an approximately oval shape, the length of which is approximately 18 miles. Named tributaries to Turtle Creek are listed below:

Abers Creek	Fourth Street Run
Bull Run	Haymakers Run
Bushy Run	Humms Run
Brush Creek	Lynn Run
Chalfant Run	Lyons Run
Coal Run	Pine Hollow Run
Dirty Camp Run	Sawmill Run
Duffs Run	Thompson Run
Falls Creek	Tinkers Run

An extensive general description of the Turtle Creek Watershed is presented in Section III of the main plan document.

Existing and potential future runoff characteristics were described using the Penn State Runoff Model (PSRM). PSRM is a computer model which was developed at the Pennsylvania State University in the mid-1970's. PSRM has gained broad acceptance as a stormwater runoff modeling tool, particularly with respect to Act 167 stormwater management planning. The model generates runoff flow information for selected points within a drainage system as the sum of flows contributed from tributary subareas. This is accomplished by estimating runoff generated in each defined subarea based upon the physical characteristics of the area and defined rainfall characteristics and then routing that runoff through the drainage system in accordance with the hydraulics of the channels and conduits comprising the system. A detailed discussion of the development and use of the PSRM is provided in Section IV of the main plan document.

The general input requirements of PSRM include the following parameters:

1. watershed representation data
 - A. tributary area (subbasin) physical features
 - B. tributary area (subbasin) hydrologic features
 - C. drainage (reach) system features

2. rainfall inputs
 - A. rainfall volumes
 - B. rainfall distribution

Subbasin Physical Characteristics

The first step in developing the PSRM input database was the delineation of subbasins within the watershed. Due to the size of the watershed, it was first divided into eight subbasins which, in turn, were further divided into a total of 533 subbasins. Subbasin boundaries were defined so as to as closely as practical produce hydrologically homogeneous areas as well as to adequately model hydrologically significant features such as tributaries, major storm sewers and significant obstructions. The size of the subbasins average 178 acres. Delineated subbasins are illustrated in Plate IV-1 of the main plan document.

The boundaries of the delineated subbasins were digitized and overlaid over elevation information obtained from United States Geological Survey (U.S.G.S.) digital elevation models. These data were analyzed using ERDAS[™] and ARC/INFO[™] image analysis and geographic information system (GIS) software to determine subbasin areas, land slopes, overland flow lengths and centroids.

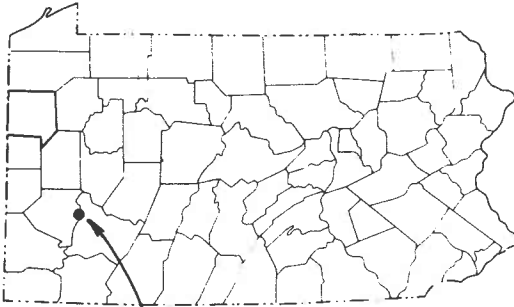
Subbasin Hydrologic Characteristics

The principal subbasin characteristics of interest included the composite Soil Conservation Service (SCS) runoff curve number and percentage of impervious area for each subbasin. Percent of impervious area is defined as the percentage of the total subbasin area covered by surfaces which are essentially impermeable to water. The runoff curve number is an indication of the amount of surface runoff which may be expected to be produced as a result of a rainfall event. This runoff potential is influenced by land cover and soil conditions. The determination of impervious percentages and curve numbers required the classification of land cover and soil types.

Land cover / land use classifications were determined throughout the Turtle Creek Watershed using remote sensing and digital image analysis techniques. The imagery used in this analysis came from three sources. Landsat Thematic Mapper (TM) and SPOT satellite digital images were used to delineate land cover classes which were then verified using National High Altitude Photography (NHAP) photographs.



The Thematic Mapper data used were collected on July 3, 1988. Bands 1, 2, 4 and 5 were used in the classification combining SPOT panchromatic and TM data. The SPOT panchromatic image was acquired using the SPOT1 (Satellite Pour l'Observation de la Terre) High Resolution Visible sensor aboard the SPOT1 satellite at 4:38 pm on August 15, 1987. The NHAP photographs used in this analysis were taken during April 1986 using color infrared film.

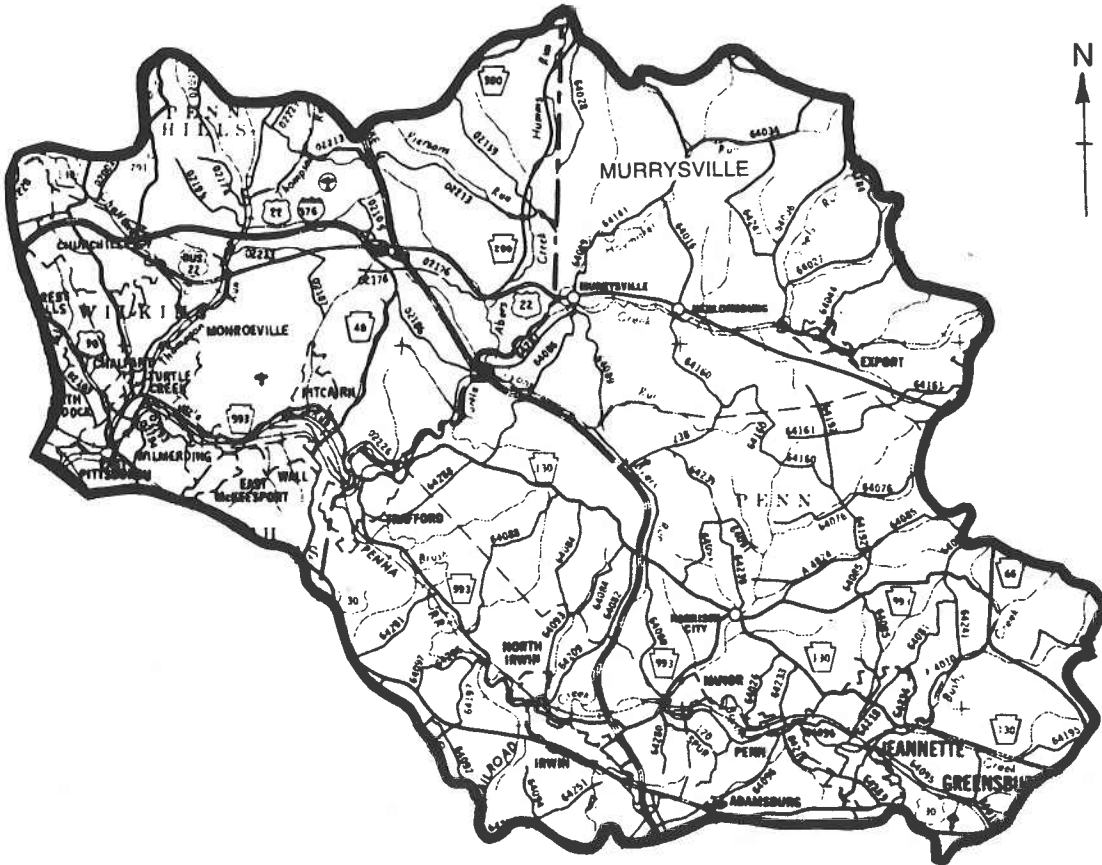
Land use information was derived from the 30 meter TM multispectral data enhanced with the 10 meter SPOT panchromatic imagery. The land cover classes were assigned based on the appearance of the land cover class in the NHAP photographs. The NHAP photographs were used in this project as "ground truth". A total of 60 land cover classes were identified during the unsupervised classification. These classes were subsequently aggregated into eight broader classes for mapping and presentation purposes.



LOCATION KEY MAP

Legend

-  Watershed Boundary
-  Turtle Creek and Tributaries



Turtle Creek Watershed

Drainage Area = 146 Square Miles

List of Municipalities

- | | | |
|-------------------------|---------------------------|----------------------|
| Adamsburg Borough | Irwin Borough | Penn Hills Township |
| Braddock Hills Borough | Jeannette City | Penn Township |
| Chalfant Borough | Manor Borough | Pitcairn Borough |
| Churchill Borough | Monroeville Borough | Plum Borough |
| Delmont Borough | Murrysville Borough | Trafford Borough |
| East McKeesport Borough | North-Braddock Borough | Turtle Creek Borough |
| East Pittsburgh Borough | North-Huntingdon Township | Wall Borough |
| Export Borough | North Irwin Township | Wilkins Township |
| Forest Hills Borough | North Versailles Township | Wilkesburg Borough |
| Hempfield Township | Penn Borough | Wilmerding Borough |

The percent impervious value assigned to each of the land cover classes was based upon the SCS estimates of imperviousness for similar land use types. The numbers included in the hydrologic characterization were weighted averages of the original 60 land cover classes. The weights were derived by matching percentages of impervious areas in the unsupervised classification land cover classes to those used in the SCS manual.

The spatial distribution of soils (aggregated by SCS hydrologic soil groups) was defined through the use of SCS soils maps and reports for the two counties. Soils polygons were transferred from the SCS plats to stable-base mylar, registered to the USGS base and scan digitized for inclusion in and analysis by the GIS software.

GIS processing was used to digitally combine the land use and hydrologic soil group themes to yield a set of associations between surface type and soils units. These associations were referenced to the SCS information to attach the appropriate runoff curve numbers. Further processing within the GIS calculated composite runoff curve numbers for each of the subbasins within the watershed.

All of the subbasin information necessary for PSRM modeling was represented in the GIS system as digitized themes. Once these data were resident in the GIS, the necessary analyses were performed to develop the required PSRM input data set. This data set is common to all subwatersheds and subbasins in the watershed and keyed to assigned subbasin identification numbers.

Stream Reach Hydrologic Characteristics

Important data requirements of the PSRM are estimates of times of travel in each of the modeled stream reaches and the bankfull capacity of each reach.

Travel time is calculated as the length of the reach divided by the average flow velocity. Stream reaches were defined in conjunction with the delineation of watershed subbasins as described previously. The length of each reach was determined by direct measurement from USGS topographic maps. Stream reach velocity estimates were based upon cross section information available from the 16 detailed Flood Insurance Studies (FIS) completed within the watershed. These data was used in conjunction with empirical relationships between stream cross section measurements, discharge and mean velocity to produce velocity estimates for stream reaches for which no FIS information is available. Velocities for improved (i.e. channelized) stream reaches and major storm sewers and long culverts were calculated based upon reported and/or field measured dimensional and slope information. Estimated velocities were divided by measured lengths to produce travel time estimates for each defined stream reach.

The estimation of bankfull capacities in the natural stream reaches was performed based upon field investigations and information reported in the literature.

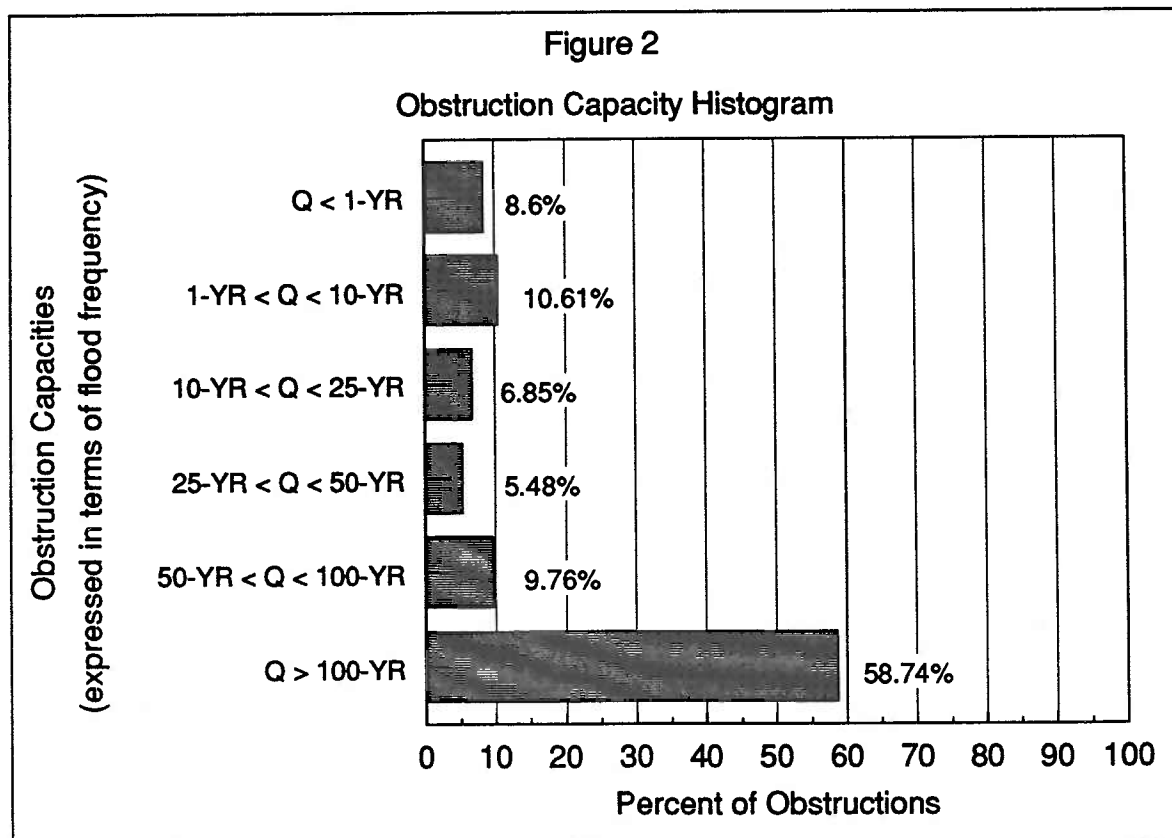
Rainfall Characteristics

Rainfall depth, duration and frequency data were calculated using the Pennsylvania Department of Transportation IDF Field Manual. The SCS Type II storm distribution was selected for use as the means for defining the distribution of rainfall intensities within specific rainfall events.

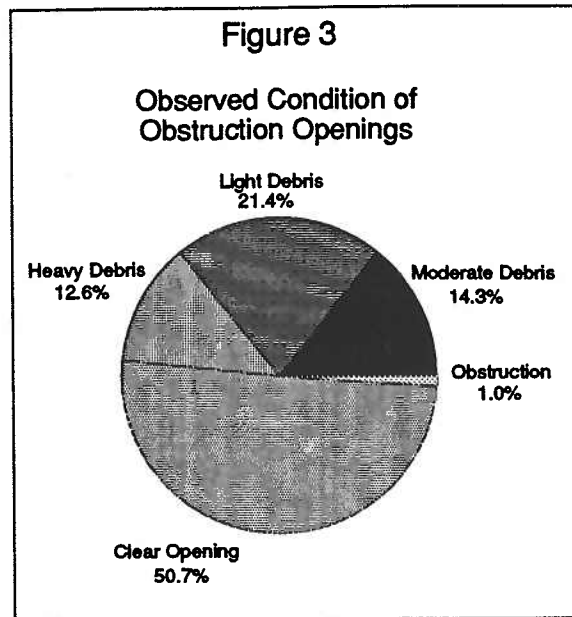
SURVEY OF SIGNIFICANT OBSTRUCTIONS

Information describing the dimensions, condition and flow capacity of 594 separate stream obstruction was developed during the preparation of this plan. The location of these obstructions are illustrated in Plate III-4 contained in the main plan document. Data for the majority of these obstructions were acquired through field visits and measurements. This information was supplemented by data extracted from previous studies.

The capacities the obstructions were calculated based upon field measurements of critical dimensions and the application of procedures outlined in the U.S. Department of Transportation's publication Hydraulic Design of Highway Culverts. Calculated obstruction capacities presented in terms of adequacy as compared to estimated flood peaks return frequencies are presented in Appendix A of the main plan document. The capacities of obstructions throughout the watershed are summarized below in Figure 2.



The survey of stream obstructions also provided information characterizing their condition. The field data acquired indicate that sedimentation and/or debris accumulations in the stream openings of the obstructions is evidenced in a significant number of locations throughout the watershed. As is indicated in Figure 3, the openings of nearly half of the obstructions surveyed contained observable amounts of sediment/debris. In roughly 25% of the cases, the degree of deposition can be classified as moderate to severe. The accumulation of debris in what should be the clear openings of culverts and bridges reduces the capacity of the structure and increases the risk of flooding. The maintenance of clear openings under stream crossings, while not strictly speaking a stormwater management function, should be given a high priority by the responsible agencies in the watershed.



ASSESSMENT OF POTENTIAL LAND DEVELOPMENT PATTERNS

Potential future land development patterns were defined based upon development patterns projected in the Southwestern Pennsylvania Comprehensive Water Quality Management Plan. This plan delineated year 2000 development envelopes throughout the study area, which included the Turtle Creek Watershed. Anticipated near term (5 to 10 year) development areas within this envelope were identified through a GIS analysis which identified "prime" development areas defined based upon slope considerations and proximity to existing road networks.

The possible impact of future land development without effective stormwater management controls was assessed using the Penn State Runoff Model. Runoff and streamflows in the watershed were modeled under the potential future land use pattern conditions for the 100 year storm event. This analysis indicated potential future development could increase peak discharges by approximately six percent at the mouth of Turtle Creek and by as much 60% or more in the upper reaches of tributaries situated in high potential development areas. The result of this analysis is evidence of the importance of instituting proper stormwater management controls within the watershed.

DEVELOPMENT IN FLOOD HAZARD AREAS

The State Water Plan has identified six damage centers and two damage reaches in the Turtle Creek Watershed. The State Water Plan defines damage centers as communities where damages for one flood totalled \$25,000 or more at a 1969 price level. East Pittsburgh and Wilmerding, Turtle Creek, Manor, Penn Hills, Monroeville and Wilkins Township have been identified as damage centers.

Damage reaches are defined wherever the average annual flood damages per mile of stream length totalled \$500 or more at a 1969 price level. Turtle Creek from Murrysville to Trafford and Bushy Run from Claridge to its confluence with Brush Creek have been identified as damage reaches.

Municipal questionnaires assembled during this planning effort and prior reports indicate that between 220 and 575 properties in 14 municipalities are affected by flood related problems at various frequencies. The types of development affected include residential, commercial, industrial and agricultural uses as well as undeveloped properties.

No major new development is currently projected to occur in the identified high flood hazard areas. However, scattered land development in the flood plain can be expected to occur during the future unless adequately controlled. This points to the importance of enforcing flood plain management throughout the watershed. All of the municipalities in the watershed required under the Flood Plain Management Act to adopt flood plain management ordinances have done so. The adoption and enforcement of effective flood plain management ordinances is an important adjunct to stormwater management and should be afforded a high priority for implementation.

SURVEY OF DRAINAGE PROBLEMS

Each of the municipalities in the watershed was contacted to solicit information relative to stormwater conditions which are perceived locally to be problems. In many cases, these problems are somewhat localized and related to drainage limitations apart from stream flooding and occur at a high frequency. Also, information relative to stormwater problems in addition to flooding (i.e., accelerated erosion, sedimentation and water pollution) was requested. Data obtained through this effort was supplemented by a review of recent stormwater investigations conducted in the watershed to produce a listing of identified stormwater drainage problems (Table III-5 in the main plan document).

A total of 101 problem areas were identified in 21 municipalities. The distribution of identified problem types and suggested solutions is presented in Figure 4. As one would expect, flooding was the predominant problem type reported. The identified flooding problems are in most cases stream flooding generally caused by stormwater runoff rates exceeding the channel and/or obstruction capacities. Erosion and sedimentation were frequently reported as accompanying the flooding conditions. One instance of water pollution tied to mine acid drainage was reported.

A number of types of suggested solutions to recognized problems were offered. The suggested solutions include structural approaches such as channel improvements, the replacement of undersized culverts, stream bank stabilization and the construction of stormwater detention or ponding areas. Also included are such remedial actions as stream dredging for the removal of accumulated silt, the clearing of debris from culvert and bridge openings and the removal of obstructions from the stream bed. All of the suggested solutions offered restore or increase hydraulic capacities. It is important to note that the ultimate success of any of these efforts will require that the incremental increases in hydraulic capacity are not offset by future increases in stormwater runoff. The nature of the problems currently encountered and the types of solutions available point to the importance of effective stormwater management in the watershed.

REVIEW OF STORMWATER COLLECTION SYSTEMS

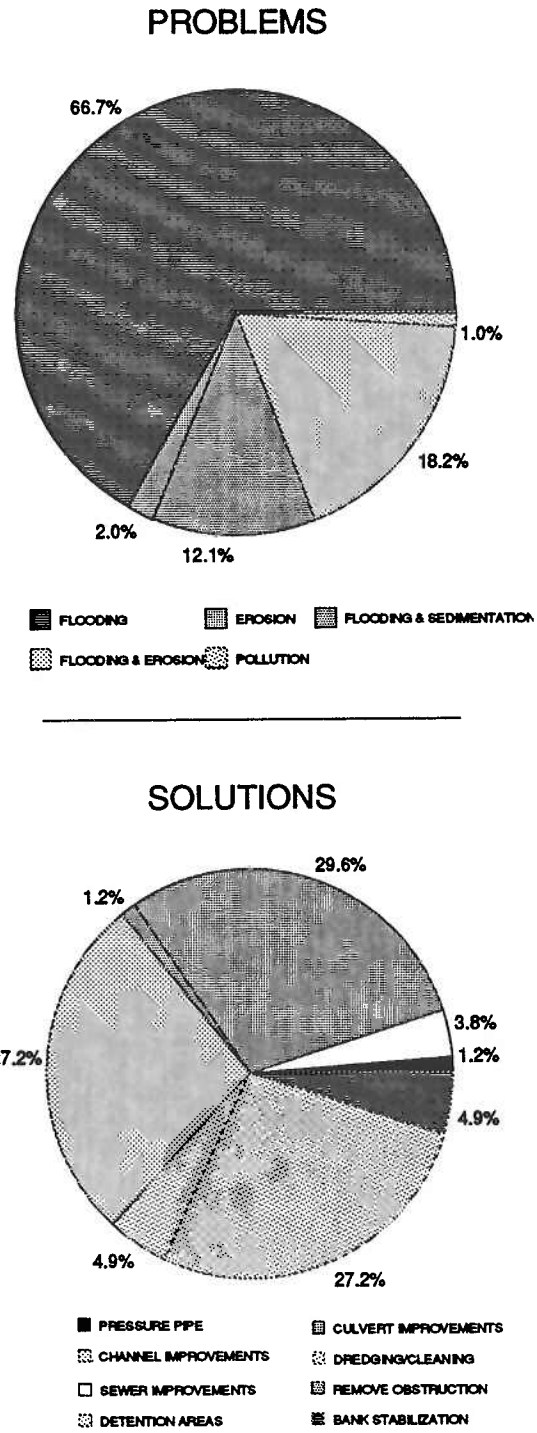
Most of the developed areas of the watershed are served by storm sewer systems of either the combined or separate type. The locations of these facilities generally coincide with existing land development. Instances where major, long storm sewers significantly affect hydrology and drainage reach hydraulics were identified. The relevant characteristics of these facilities (capacity and velocity) were considered in the model. Future storm sewer system construction will occur as residential and commercial development progresses. The locations of future storm sewer systems will approximate the locations of future development and the timing of such construction will parallel that of new development in general.

ASSESSMENT OF ALTERNATIVE RUN-OFF CONTROL TECHNIQUES

The Turtle Creek Stormwater Management Plan presents performance based standards for the management of runoff within the watershed. Within the context of the quantitative performance standards this plan does not specify the use of particular runoff control techniques. Each developer is given relatively wide latitude within which to select one or a combination of several specific techniques through which to comply with the control standards.

Section VI of the main plan document contains descriptions of a variety of runoff reduction and control measures. These descriptions identify relative advantages and disadvantages of each of the control techniques as well as special considerations related to associated operation and maintenance requirements and potential water quality and public health considerations where appropriate.

Figure 4
LOCALLY IDENTIFIED
PROBLEMS AND SOLUTIONS



IDENTIFICATION OF EXISTING AND PROPOSED FLOOD CONTROL PROJECTS

Section III of the main plan document contains descriptions of the following nine existing and four proposed flood control projects:

- Turtle Creek Flood Control Project (existing)
- Westinghouse Flood Gates (existing)
- Bull Run Dam (existing)
- Jeannette Channel Rectification Project (existing)
- Saw Mill Run Channel Improvement Project (existing)
- Four Smaller Miscellaneous Projects (existing)
- Repair and Restoration of the Turtle Creek Local Flood Protection Project Rehabilitation (proposed)
- Dirty Camp Run in Pitcairn (proposed)
- Brush Creek and Fourteenth Street Run in Jeannette (proposed)
- Export Flood Protection Feasibility Study

DESIGNATION OF AREAS TO BE SERVED BY STORMWATER COLLECTION AND CONTROL FACILITIES IN THE FUTURE

As the Turtle Creek Stormwater Management Plan is enforced, all significant development areas can be expected to be supplied with stormwater collection and control facilities as necessary to comply with established runoff control standards. The location and exact nature of the facilities will depend upon the specific locations where development occurs. Under current practice and conditions, most if not all new storm sewer and runoff control facilities construction is financed by the land developer. The provisions of the recommended stormwater management ordinances will permit this practice to continue. Consequently, it can be expected that funding for the construction of required facilities will continue to be provided by land developers as development progresses.

IDENTIFICATION OF FLOOD PLAINS WITHIN THE WATERSHED

Delineated flood prone areas are identified on Plate III-3 of the main plan document.

CRITERIA AND STANDARDS FOR STORMWATER RUNOFF CONTROL

This section includes a description of the specific criteria and standards recommended for the control of stormwater runoff in the Turtle Creek Watershed. These standards are based upon the analysis of runoff conditions in the watershed and are designed to carry out the purpose of Act 167. The standards and criteria developed for the Turtle Creek Watershed area detailed in the *Model Stormwater Management Provisions for Municipal Subdivision/Land Development Ordinance* and *Model Stormwater Management Provisions for Municipal Zoning Ordinance* contained in Appendix B of the main plan document and Appendix A of this Executive Summary.

Activities Covered

All land development activities are covered by the stormwater management criteria and standards. Land development is defined as any of the following activities:

1. the improvement of one lot or two or more contiguous lots, tracts or parcels of land for any purpose involving:
 - a. a group of two or more residential or non-residential buildings, whether proposed initially or cumulatively, or a single not-residential building on a lot or lots regardless of the number of occupants or tenure; or
 - b. the division or allocation of land or space, whether initially or cumulatively, between or among two or more existing or prospective occupants by means of, or for the purpose of streets, common areas, leaseholds, condominiums, building groups or other features;
2. a subdivision of land.

Agricultural activities, nurseries and forestry management operations are required to comply with the established standards and criteria, except that the submission and approval of a stormwater management plan may be waived when:

1. agricultural activities are operated in accordance with a conservation plan or erosion and sedimentation control plan approved by the Conservation District;
2. forestry management operations are following Pennsylvania DER management practices contained in its *Soil Erosion and Sedimentation Control Guidelines for Forestry* publication and are operating under an approved erosion and sedimentation control plan.

Simplified stormwater management plans (which nevertheless comply with established performance standards) may be submitted by subdivision or land development activities which will result in the creation of 5,000 or less square feet of impervious area and 1 acre or less of any land cover change.

General Performance Standards

The following provision is considered the overriding performance standards are to be evaluated: Any landowner and any person engaged in the alteration or development of land which may affect stormwater runoff characteristics must implement such measures as are reasonably necessary to prevent injury to health, safety or other property.

Specific Technical Standards

Release Rate Percentage: The release rate percentage is the primary performance standard for the control of stormwater in the Turtle Creek Watershed. Section V of the main plan document contains a discussion of the release rate percentage concept. Specific release rate percentages were assigned to each of 133 release rate areas comprising the watershed. These areas are delineated in Plate V-1 contained in the main plan document and appended hereto. Assigned release rate percentages for each area are illustrated on Plate V-1 and tabulated in Table 1.

The release rate percentage applies uniformly to all land development or alterations within an area which will result in an increase in post-development volumes and rates of runoff from a site. It is a tool for watershed level stormwater management developed to ensure that the application of runoff control plans for individual sites consider downstream runoff implications. To utilize the release rate percentage for a particular site in one of the release rate percentage areas, a developer should follow the general sequence of events listed below.

1. Compute the pre-development and post-development runoff for the specific site using an approved method for the designated control storms using no stormwater management techniques. If the post-development peak rate is less than or equal to the pre-development rate, the requirements of Act 167 and this plan have been met. If the post-development runoff rate exceeds the pre-development rate, proceed to Step 2.
2. Apply on-site stormwater management techniques to increase infiltration and reduce impervious surfaces. Recompute the post-development runoff rate for the control storms; and if the resulting post-development rate is less than or equal to the pre-development rate, the requirements of this plan have been met. Otherwise, stormwater flow attenuation techniques, including detention, retention will be required and the developer must proceed to Step 3.
3. Multiply the assigned release rate percentage for the subbasin times the pre-development peak runoff rate to determine the allowable peak runoff rate from the development. Design the necessary detention/retention facilities or other flow attenuation features to meet the allowable runoff rate standard.

Table 1
Assigned Release Rate Percentages

RELEASE RATE AREAS	ASSIGNED RELEASE RATE PERCENTAGE	RELEASE RATE AREAS	ASSIGNED RELEASE RATE PERCENTAGE	RELEASE RATE AREAS	ASSIGNED RELEASE RATE PERCENTAGE
1	50%	51	70%	101	50%
2	60%	52	80%	102	60%
3	80%	53	90%	103	70%
4	70%	54	80%	104	80%
5	60%	55	50%	105	50%
6	50%	56	90%	106	100%
7	50%	57	70%	107	70%
8	60%	58	100%	108	50%
9	50%	59	50%	109	70%
10	70%	60	60%	110	90%
11	70%	61	50%	111	80%
12	50%	62	60%	112	90%
13	80%	63	50%	113	90%
14	100%	64	60%	114	100%
15	50%	65	70%	115	60%
16	80%	66	90%	116	70%
17	60%	67	60%	117	90%
18	90%	68	90%	118	70%
19	70%	69	70%	119	100%
20	60%	70	80%	120	90%
21	70%	71	70%	121	80%
22	80%	72	80%	122	60%
23	50%	73	60%	123	70%
24	90%	74	60%	124	70%
25	100%	75	50%	125	90%
26	90%	76	50%	126	80%
27	60%	77	70%	127	60%
28	50%	78	50%	128	50%
29	80%	79	50%	129	100%
30	70%	80	70%	130	80%
31	50%	81	80%	131	50%
32	80%	82	70%	132	70%
33	60%	83	60%	133	90%
34	60%	84	70%		
35	90%	85	60%		
36	70%	86	50%		
37	50%	87	50%		
38	60%	88	50%		
39	60%	89	50%		
40	80%	90	80%		
41	50%	91	100%		
42	90%	92	90%		
43	80%	93	80%		
44	70%	94	60%		
45	60%	95	80%		
46	60%	96	80%		
47	70%	97	60%		
48	100%	98	80%		
49	90%	99	50%		
50	90%	100	70%		

Note: Release Rate Percentage Areas refer to those delineated on Plate V-1

Control Storms: Certain control storms must be used to analyze stormwater runoff under pre- and post-development conditions and for the design of stormwater control facilities. The rationale for selecting the 24 hour 2-, 10, 25 and 100 year frequency storms is discussed in Section V of the main plan document. These control storms and associated rainfall depths are presented in Table 2 below.

<u>Control Storm Return Period</u>	<u>24-Hour Precipitation Depth in Inches</u>
2-year	2.50
10-year	3.61
25-year	4.31
100-year	5.71

The Turtle Creek Watershed Stormwater Management Plan specifies that the indicated rainfall volumes must be distributed over a 24 hour period according to the U.S. Soil Conservation Service Type II Rainfall Distribution Pattern.

Permissible Runoff Computation Techniques: A number of techniques and methods have been used to estimate rates and volumes of runoff from land. The Turtle Creek Watershed Stormwater Management Plan identifies the following permissible techniques to be used in plan implementation.

- Soil Conservation Service Urban Hydrology Method (TR-55)
- Soil Conservation Service Model (TR-20)
- U.S. Army Corps of Engineers Flood Hydrograph (HEC-1)
- Penn State Runoff Model (PSRM)

The Rational Method may be employed under specific limited circumstances if authorized by the municipal engineer responsible for control plan review.

This list of permissible techniques includes a cross section of the most commonly used computation methods entailing a range of approaches, levels of effort and required access to computer facilities. The list affords developers the opportunity to select from a suite of techniques. At the same time, the number of techniques with which the local reviewing engineer must be familiar is kept to a manageable number and the use of inapplicable, unproven or inaccurate techniques is prohibited.

Stormwater Detention Facilities: If stormwater detention facilities are used, they must be designed such that the post-development peak runoff rates do not exceed the applicable subbasin release rate percentage for the 2-, 10-, 25- and 100-year control storms. All basins must be equipped with outlet structures which will control discharges to the specified rates and must include provisions to safely pass the peak flows associated with the 100-year storm without impairing the functioning of the facility. In addition, all runoff must be conveyed from its point of origin to the storage facility, whether located on the same property or elsewhere, in a manner which avoids adverse impacts such as flooding, erosion and scouring of land and drainage channels located between the point of origin and the detention facility

PRIORITIES FOR PLAN IMPLEMENTATION

Implementation of the Turtle Creek Stormwater Management Plan will require that a number of actions be taken by the municipalities, county agencies, the Turtle Creek Watershed Association and land developers. The recommended distribution of responsibilities is summarized in Figure 5.

The immediate and high priority items which must be completed to begin implementation of the plan include the following:

- **Adoption or amendment of local ordinances:** Each of the municipalities are required to adopt the stormwater management provisions contained in the *Model Stormwater Management Provisions for Municipal Subdivision/Land Development Ordinance* and *Model Stormwater Management Provisions for Municipal Zoning Ordinance* presented in Appendix B of the main plan document and Appendix A of this Executive Summary within six months of the states approval of the adopted plan.
- **Establishment of review and enforcement procedures:** The model ordinances call for the review of stormwater management plans prepared by individual developers and the enforcement of ordinance requirements. The Plan assigns the basic responsibility for plan review and enforcement to the municipalities. However, it is recommended that the counties be involved in reviewing the developers' plans to, at minimum, monitor general compliance with and consistent enforcement of plan requirements. Early efforts should be made to develop procedures for coordinating such review activities.

The Turtle Creek Stormwater Management Plan preparation process is complete with the Allegheny County and Westmoreland County adoption of the draft Plan and submission of the final Plan to DER for approval. Procedures for the review and adoption of the plan were summarized in Figure IX-1. Subsequent activities to carry out the provisions of the Plan are considered by DER to be part of the implementation of the Plan. The initial step of Plan implementation is DER approval. Plan approval sets in motion the mandatory schedule of adoption of municipal ordinance provisions to implement the stormwater management criteria. Turtle Creek watershed municipalities will have six months from the date of DER approval within which to adopt the necessary ordinance provisions. Failure to do so could result in the withholding of all state funds to the municipality(ies) per Act 167.

Additional implementation activities are the development of a local program to coordinate Chapter 105 and 106 permit application reviews and the development of a systematic approach for correction of existing storm drainage problem areas.

DER Approval of the Plan

Upon adoption of the watershed plan by the counties, the Plan is submitted to DER for approval. The DER review process involves determination that all of the activities specified in the approved Scope of Work have been satisfactorily completed in the Plan. Further, the Department will only approve the Plan if it determines the following:

1. That the Plan is consistent with municipal floodplain management plans, State programs which regulate dams, encroachments and other water obstructions, and State and Federal flood control programs; and
2. That the Plan is compatible with other watershed stormwater plans for the basin in which the watershed is located and is consistent with the policies and purposes of Act 167.

DER action to either approve or disapprove the Plan must take place within ninety (90) days of receipt of the Plan by the Department. Otherwise, the Plan would be approved by default.

Municipal Adoption of Ordinance Provisions to Implement the Plan

The key ingredient for implementation of the Plan is the adoption of the necessary ordinance provisions by the Turtle Creek municipalities. Provided as part of this Plan are model subdivision/land development and zoning ordinance provisions to be used by the municipalities to modify their ordinances.

Development of a Local Program to Coordinate With DER Regarding Chapter 105 and 106 Permit Application Reviews

Stream encroachments, stream enclosures, waterway diversions and other activities regulated by Chapter 105 and Chapter 106 of DER's Rules and Regulations may have a bearing on the effectiveness of the runoff control strategy developed for the Turtle Creek watershed. Activities of this type may modify the conveyance characteristics of the watershed and, thereby, impact the relative timing of watershed peaks flows and/or the ability of the conveyance facilities to safely transport peak flows. Therefore, to ensure that the DER permitting process is consistent with the adopted and approved watershed plan, a local review of Chapter 105 and Chapter 106 applications should be coordinated with the DER review process.

The local review would be performed by Allegheny and Westmoreland counties and would be accomplished by monitoring the applications as published in the Pennsylvania Bulletin. The counties would be responsible for providing comments consistent with the adopted Act 167 plan within the stated DER review period. Further, the counties would keep records of applications reviewed and the DER actions.

Development of a Systematic Approach for Correction of Existing Storm Drainage Problems

Correction of the existing storm drainage problem areas in the watershed is not specifically part of the Act 167 planning process. However, the development of the watershed plan has provided a framework for their correction for the following reasons: (1) existing storm drainage problems have been identified; (2) implementation of the runoff control criteria specified in the Plan will prevent the existing drainage problems from becoming worse (and prevent the creation of new drainage problem areas); and (3) the hydrologic model developed to formulate the runoff control criteria could be used as an analytical tool for identifying engineering solutions to existing drainage problems.

With the above in mind, municipalities within the Turtle Creek watershed should include the following steps in their efforts to implement solutions to existing storm drainage problem areas:

1. Prioritize storm drainage problems within the municipality based up frequency of occurrence, potential for injury to persons or property, damage history, public perception of the problems and other appropriate criteria.
2. For the top priority drainage problems in the municipality, conduct detailed engineering evaluations to determine the exact nature of the problems, determine alternative solutions, provide cost estimates for the alternative solutions, and recommend a course of municipal action. The number of drainage problems to be evaluated by a municipality as a first cut from the priority list should be based on a schedule commensurate with completing engineering studies on all problem areas. The Turtle Creek hydrologic model will be available through the counties to provide input to the engineering studies. The engineering studies should include consideration of the downstream effects of eliminating specific drainage problems so as to avoid transfer of problems progressively downstream.
3. On the priority and cost basis, incorporate implementation of recommended solutions to the drainage problems in the annual municipal capital or maintenance budgets as funds are available.

The above stated procedure for dealing with existing storm drainage problems is not a mandatory action placed on municipalities with the adoption of the watershed plan. Rather, it represents a systematic method to approach the problems uniformly throughout the watershed and attempt to improve the current runoff situation in the basin. The key elements involved in the success of the remedial strategy will be the dedication of the municipalities to construct the corrective measures and the consistent and proper application of the runoff control criteria specified in the Plan. The latter element is essential to ensure that remedial measures do not become obsolete (under-designed) by increases in peak flows with development.

PROVISIONS FOR REVIEWING, REVISING AND UPDATING THE PLAN

The counties of Allegheny and Westmoreland have each been provided with data describing the physical system of the Turtle Creek watershed which affect hydrology and hydraulics. Principal types of data and information provided include: Penn State Runoff Models for the watershed and input data for the runoff models which reflect existing hydrologic and hydraulic conditions. These materials served as the basis for the development of the standards and criteria presented in the Plan. Major changes to the hydrologic and hydraulic conditions in the watershed as reflected in the PSRM input data files may warrant changes in the resulting standards and criteria.

These data files can be updated to reflect: 1) changes in land use / land cover which may affect runoff conditions; 2) changes to streams, major culverts and other flow conduits which may materially affect watershed hydraulics, and 3) the construction of regional detention facilities which may significantly affect watershed peak discharge times and associated release rate percentages. Once the input data files have been updated, the PSRM can be run under the new conditions to identify needed changes (if any) to the standards and criteria presented in this Plan.

Under the requirements of Act 167 the Plan is to be updated at intervals not exceeding five years. More frequent updating of the Plan may be warranted if significant changes in the watershed occur sooner. Factors which would warrant an update prior to the statutory data may include the following:

- Changes to major stream segments or primary stormwater conveyance elements which serve to affect watershed hydraulics such that the potential for damage is materially changed or peak discharge timings are significantly changed.
- Regional detention facilities are constructed such that changes to the release rate percentages assigned to tributary subbasins are warranted.
- Extensive changes to land use occur to the extent that significant changes to subbasin times of concentration and runoff result.
- Peculiarities in the application of specific standards and criteria are experienced which interfere with the effective and equitable administration of the Plan requirements.

All of the involved agencies (counties, municipalities, DER and the Turtle Creek Watershed Association) should monitor conditions in the watershed. In the event that any of the above listed conditions (or others) arise, the counties should proceed with updating the Plan as warranted.

APPENDIX A
MODEL ORDINANCES

**MODEL STORMWATER MANAGEMENT PROVISIONS FOR
MUNICIPAL SUBDIVISION/LAND DEVELOPMENT ORDINANCE**

Article ____, Stormwater Management

Section 101 - General Provisions

A. Purpose

These regulations are adopted and implemented to achieve the following general purposes and objectives:

1. To manage and control stormwater runoff resulting from land alteration and disturbance activities in accordance with the watershed stormwater management plans adopted pursuant to the Pennsylvania Storm Water Management Act (Act 167 of 1978, as amended).
2. To utilize and preserve the desirable existing natural drainage systems and to preserve the flood-carrying capacity of streams.
3. To encourage natural infiltration of rainfall to preserve groundwater supplies and stream flows.
4. To provide for adequate maintenance of all permanent stormwater management structures in the municipality.

B. Applicability

The provisions of this article shall apply to all subdivisions and land development activity within the municipality of _____.

C. Repealer

This ordinance shall repeal all other ordinances, or parts thereof, which are contrary to or conflict with the provisions of this ordinance to the extent necessary to give this ordinance full force and effect.

D. Severability

Should any section or provision of this ordinance be declared invalid by a court of competent jurisdiction, such decision shall not affect the validity of this ordinance as a whole or any other part hereof; the parts or sections remaining shall remain in effect as if the part of the section declared unconstitutional had never been a part of this ordinance.

E. Liability Disclaimer

1. Neither the granting of any approval under the stormwater management provisions of this ordinance, nor the compliance with the provisions of this ordinance, or with any condition imposed by a municipal official hereunder, shall relieve any person from any responsibility for damage to persons or property resulting therefrom, or as otherwise imposed by law, nor impose any liability upon the municipality for damages to persons or property.

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

Section 102 - Stormwater Management Performance Standards

A. Stormwater Management Performance Districts

1. For purposes of stormwater management, the municipality of _____ is divided into the following stormwater management districts:

(Note: List each DER-designated watershed in the municipality.)

One or more of these districts may be further subdivided into subareas which have similar hydrological characteristics and drain to a common point.

2. The location and boundaries of the watershed(s) and subareas are shown on the "Municipal Stormwater Management District Map" which is hereby adopted as a part of this section.

(Note: Map can be included as an appendix to the ordinance or copies made available in the municipal offices.)

B. General Standards

1. The following provisions shall be considered the overriding performance standards against which all proposed stormwater control measures shall be evaluated and shall apply throughout the municipality of _____:

a. Any landowner and any person engaged in the alteration or development of land which may affect stormwater runoff characteristics shall implement such measures as are reasonably necessary to prevent injury to health, safety or other property. Such measures shall include such actions as are required:

(1) To assure that the maximum rate of stormwater runoff is no greater after development than prior to development activities; or

(2) To manage the quantity, velocity and direction of resulting stormwater runoff in a manner which otherwise adequately protects health and property from possible injury.

2. The stormwater management plan for the development site must consider all the stormwater runoff flowing over the site.

3. No discharge of toxic materials shall be permitted into any stormwater management system.

C. Watershed Standards: Turtle Creek Stormwater \ Management District

1. The stormwater performance standards contained in this section are intended to implement the standards and criteria contained in the Turtle Creek Stormwater Management Plan, adopted and approved in accordance with the Pennsylvania Storm Water Management Act. If there is any discrepancy between the provisions of this section and the standards and criteria of the plan, or if the watershed plan is subsequently amended, then the standards/criteria of the current watershed plan shall govern.

2. Storm Frequencies. Stormwater management facilities on all development sites shall control the peak stormwater discharge for the 2-, 10-, 25- and 100-year storm frequencies. The SCS 24-hour, Type II Rainfall Distribution shall be used for analyzing stormwater runoff for both pre- and post-development conditions. The 24-hour total rainfall for these storm frequencies in the watershed are:

<u>Storm Frequency</u>	<u>Rainfall Depth (inches)</u>
2-year	2.50
10-year	3.61
25-year	4.31
100-year	5.71

(For additional information or data on other storm return periods, consult the "Rainfall Duration Frequency Tables for Pennsylvania," produced by PennDER, Office of Resource Management, Bureau of Dams and Waterways Management, Division of Stormwater Management, Harrisburg, February 1983.)

3. Calculation Methods

a. **Development Sites:** For the purpose of computing peak flow rates and runoff hydrographs from development sites, calculations shall be performed using one of the following: SCS publications, Technical Release (TR) 55 or 20, HEC I, or Penn State Runoff Model.

b. **Stormwater Collection/Conveyance Facilities:** For the purposes of designing storm sewers, open swales and other stormwater runoff collection and conveyance facilities, any of the above listed calculation methods or the Rational Method may be used. Rainfall intensities for design should be obtained from the Pennsylvania Department of Transportation rainfall charts.

c. **Predevelopment Conditions:** Predevelopment conditions shall be assumed to be those which exist on any site at the time of adoption of the Turtle Creek Stormwater Management Plan. Hydrologic conditions for all areas with pervious cover (i.e., fields, woods, lawn areas, pastures, cropland, etc.) shall be assumed to be in "good" condition, and the lowest recommended SCS runoff curve number (CN) shall be applied for all pervious land uses within the respective range for each land use and hydrologic soil group.

d. **Routing of hydrographs through detention/retention facilities for the purpose of design** those facilities shall be accomplished using the Modified-Puls Method or recognized reservoir routing method subject to the approval of the municipality and county.

4. Release Rate Percentage

a. **Definition.** The release rate percentage defines the percentage of the pre-development peak rate of runoff that can be discharged from an outfall on the site after development. It applies uniformly to all land development or alterations within a subarea. A listing of the release rate percentage by subarea appears in Appendix A of this ordinance; the subareas are delineated on the municipal stormwater management district map.

b. Procedure for Use

(1) Identify the specific subarea in which the development site is located from the watershed map and obtain the subarea release rate percentage from Appendix A.

(2) Compute the pre- and post-development runoff hydrographs for each stormwater outfall on the development site using an acceptable calculation method for the 2-, 10-, 25- and 100-year storms. Apply no on-site detention for stormwater management but include any techniques to minimize impervious surfaces and/or

increase the time of concentration for stormwater runoff flowing from the development site. If the post-development peak runoff rate and the runoff volume are less than or equal to the predevelopment peak runoff rate and volume, then additional stormwater control shall not be required at that outfall. If the post-development peak runoff rate and volume are greater than the predevelopment peak runoff rate and volume, then stormwater detention will be required and the capacity of the detention facility must be calculated in the manner prescribed below.

(3) Multiply the subarea release rate percentage by the predevelopment rate of runoff from the development site to determine the maximum allowable release rate from any detention facility for the four prescribed storm events.

(4) Design the outlet control facilities and size the volume of the detention facility using the calculated post development hydrograph and accepted hydrograph routing procedures in consideration of the maximum allowable release rate.

5. No Harm Evaluation

a. An applicant may seek to exceed the otherwise applicable subarea release rate percentage by performing the "No Harm Evaluation". This evaluation requires an independent engineering analysis to demonstrate that other reasonable options exist to prevent the occurrence of increased stormwater runoff discharge rates and/or velocities or that measures can be provided to prevent increased stormwater discharge rates and/or velocities from increasing flood elevations and accelerating erosion at all downstream points in the watershed.

b. A "No Harm Evaluation" will be considered only in instances where the discharge to a stream channel from the development occurs directly to the Monongahela River, channelized portion of Turtle Creek, or through a properly sized and designed regional stormwater detention facility.

c. The analysis for the no-harm evaluation shall be submitted to the municipal engineer and Allegheny Planning Department (Westmoreland Conservation District) for review and approval.

d. The "No Harm Evaluation" shall be prepared by a registered engineer who is experienced in hydrology and hydraulics. The "No Harm Evaluation" shall be completed using the following procedure:

The Penn State Runoff Model (PSRM) is the hydrologic model required in this procedure. Use of this model would produce results from a "No Harm Evaluation" analysis that could be compared to the results of the watershed study.

1. Develop the runoff hydrograph(s) for the design storms of the site and areas tributary to it using the PSRM and the Turtle Creek Watershed Stormwater Management Plan land use of the development for both pre-development and post-development conditions.
2. Develop the runoff hydrograph(s) for the proposed site using the PSRM. If no management or controls are proposed, this would be equivalent to the runoff hydrograph under post-development conditions. If some management or controls are proposed, then the runoff hydrograph under post-development conditions would be modified to reflect their effect on the rate, volume and timing of discharges.
3. Subtract the runoff hydrograph ordinates under pre-development conditions (Step1) from the discharge hydrograph ordinates (Step2), maintaining the time scales of both hydrographs for one-to-one correspondence.
4. Obtain the PSRM for existing conditions for the Turtle Creek Watershed from the County.
5. Locate the subbasin(s) in which the proposed development is located and into which the discharge hydrograph enters. If more than one subbasin receives this incremental flow, divide the flow accordingly.
6. Add the incremental increase computed in Step 3 to the runoff hydrograph for the subbasin(s) identified in Step 5.
7. Route the adjusted runoff hydrograph through the Turtle Creek watershed PSRM and note any increase in peak flows which would occur in downstream subbasins. If no increase is noted, then the "No-Harm" has been demonstrated. If no increase is observed in peak flows, the increased potential for erosion and/or sedimentation in downstream channels resulting from any change in the flood hydrograph predicted by the model shall be evaluated. If no increased potential can be demonstrated by appropriate technical means, then the "No-Harm" exemption may be requested.
8. If an increase in peak flow is observed in any of the downstream subbasins or increased potential for erosion and/or sedimentation is indicated, the "No Harm" exemption shall not be granted.

Section 103 - Design criteria for stormwater management controls

A. General criteria

1. Applicants may select runoff control techniques, or a combination of techniques, which are most suitable to control stormwater runoff from the development site. All controls must be subject to approval of the municipal engineer. The municipal engineer may request specific information on design and/or operating features of the proposed stormwater controls in order to determine their suitability and adequacy in terms of the standards of this ordinance.
2. The applicant should consider the effect of the proposed stormwater management techniques on any special soil conditions or geological hazards which may exist on the development site. In the event such conditions are identified on the site, the municipal engineer may require in-depth studies by a competent geotechnical engineer. Not all stormwater control methods may be advisable or allowable at a particular development site.
3. The stormwater management practices to be used in developing a stormwater management plan for a particular site shall be selected according to the following order of preference:
 - a. infiltration of runoff on-site
 - b. flow attenuation by use of open vegetated swales and natural depressions
 - c. stormwater detention/retention structures
4. Infiltration practices shall be used to the extent practicable to reduce volume increases and promote groundwater recharge. A combination of successive practices may be used to achieve the applicable minimum control requirements. Justification shall be provided by the applicant for rejecting each of the preferred practices based on actual site conditions.

B. Criteria for infiltration systems

1. Infiltration systems shall be sized and designed based upon local soil and ground water conditions.
2. Infiltration systems shall be greater than three (3) feet deep and shall be located at least ten (10) feet from basement walls.
3. Infiltration systems shall not be used to handle runoff from commercial or industrial working or parking areas. This prohibition does not extend to roof areas which are demonstrated to be suitably protected from the effects of the commercial/industrial activities.

4. Infiltration systems may not receive runoff until the entire drainage area to the system has received final stabilization.

5. The stormwater infiltration facility design shall provide an overflow system with measures to provide a non-erosive velocity of flow along its length and at the outfall.

C. Criteria for stormwater detention facilities

1. If detention facilities are utilized for the development site, the facility(ies) shall be designed such that post-development peak runoff rates from the developed site are controlled to those rates defined by the subarea release rate percentage for the 2-, 10-, 25, and 100-year storm frequencies.

2. All detention facilities shall be equipped with outlet structures to provide discharge control for the four (4) designated storm frequencies. Provisions shall also be made to safely pass, at minimum, the post-development 100 year storm runoff without breaching or otherwise damaging (i.e., impairing the continued function of) the facilities.

3. Shared-storage facilities, which provide detention of runoff for more than one development site within a single subarea may be considered and are encouraged. Such facilities shall meet the criteria contained in this section. In addition, runoff from the development sites involved shall be conveyed to the facility in a manner that avoids adverse impacts (such as flooding or erosion) to channels and properties located between the development site and the shared-storage facilities.

4. Where detention facilities will be utilized, multiple use facilities, such as wetlands, lakes, ballfields or similar recreational/open space uses are encouraged wherever feasible, subject to the approval of the municipality and Pennsylvania Department of Environmental Resources' Chapter 105 regulations.

5. Other considerations which should be incorporated into the design of the detention facilities include:

a. Inflow and outflow structures shall be designed and installed to prevent erosion and bottoms of impoundment type structures should be protected from soil erosion.

b. Control and removal of debris both in the storage structure and in all inlet or outlet devices shall be a design consideration.

c. Inflow and outflow structures, pumping stations, and other structures shall be designed and protected to minimize safety hazards.

d. The water depth at the perimeter of a storage pond should be limited to that which is safe for children. This is especially necessary if bank slopes are steep or if ponds are full and recirculating in dry periods. Restriction of access (fence, walls, etc.) may be necessary depending on the location of the facility.

e. Side slope of storage ponds shall not exceed a ratio of two-and-one-half to one (2.5:1) horizontal to vertical dimension.

f. Landscaping shall be provided for the facility which harmonizes with the surrounding area.

g. Facility shall be located to facilitate maintenance, considering the frequency and type of equipment that will be required.

D. Criteria for collection/conveyance facilities

(Note: The municipality should review the specific requirements of this section to ascertain conformance with existing requirements and local preferences. Specific design and construction details suggested herein may be modified in consultation with the municipal engineer as necessary to reflect the municipality's current standard practices, local conditions and preferences.)

1. All stormwater runoff collection or conveyance facilities, whether storm sewers or other open or closed channels, shall be designed in accordance with the following basic standards:

a. All sites shall be graded to provide drainage away from and around the structure in order to prevent any potential flooding damage.

b. Lots located on the high side of streets shall extend roof and french drains to the curb line storm sewer (if applicable). Low side lots shall extend roof and french drains to a stormwater collection/conveyance/control system or natural watercourse in accordance with the approved stormwater management plan for the development site.

c. Collection/conveyance facilities should not be installed parallel and close to the top or bottom of a major embankment to avoid the possibility of failing or causing the embankment to fail.

d. All collection/conveyance facilities shall be designed to convey the 25-year storm peak flow rate from the contributing drainage area and to carry it to the nearest suitable outlet such as a stormwater control facility, curbed street, storm sewer or natural watercourse.

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

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

- a. Where practical, designed to traverse under seeded and planted areas. If constructed within ten (10) feet of road paving, walks or other surfaced areas, drains shall have a narrow trench and maximum compaction of backfill to prevent settlement of the superimposed surface or development.
- b. Preferably installed after excavating and filling in the area to be traversed is completed, unless the drain is installed in the original ground with a minimum of three (3) feet cover and/or adequate protection during the fill construction.
- c. Designed: (1) with cradle when traversing fill areas of indeterminate stability, (2) with anchors when gradient exceeds twenty (20) percent, and (3) with encasement or special backfill requirements when traversing under a paved area.
- d. Designed to adequately handle the anticipated stormwater flow and be economical to construct and maintain. The minimum pipe size shall be fifteen (15) inches in diameter.
- e. Drain pipe, trenching, bedding and backfilling requirements shall conform to the requirements of the municipality and/or applicable PENNDOT Specifications, Form 408.
- f. All corrugated metal pipe shall be polymer coated, and with asbestos bonding and paved inverts where prone to erode. Pipe within a municipal right-of-way shall be reinforced concrete pipe with a minimum diameter of 15 inches.
- g. Storm inlets and structures shall be designed to be adequate, safe, self-cleaning and unobtrusive and consistent with municipal standards.
- h. Appropriate grates shall be designed for all catch basins, stormwater inlets and other entrance appurtenances.
- i. Manholes shall be designed so that the top shall be at finished grade and sloped to conform to the slope of the finished grade. Top castings of structures located in roads or parking areas shall be machined or installed to preclude "rattling."
- j. Where proposed sewer connects with an existing storm sewer system, the applicant shall demonstrate that sufficient capacity exists in the downstream system to handle the additional flow.
- k. Storm sewer outfalls shall be equipped with energy dissipation devices to prevent erosion and conform with applicable requirements of the Pennsylvania DER for stream encroachments (Chapter 105 of Pennsylvania DER Rules and Regulations).

Section 104 - Erosion and sedimentation controls

A. Erosion/sedimentation plan shall be provided in accordance with the Pennsylvania Erosion/Sedimentation Regulations (25 PA Code, Chapter 102) and the standards and guidelines of the County Conservation District.

(Note: If the municipality has a grading or other ordinance which contains its erosion/sedimentation provisions, then it should be referenced here.)

B. Proposed erosion/sedimentation measures shall be submitted with the stormwater management plan as part of the preliminary and final applications.

Section 105 - Maintenance of stormwater management controls

A. Maintenance responsibilities

1. The stormwater management plan for the development site shall contain an operation and maintenance plan prepared by the developer and approved by the municipal engineer. The operation and maintenance plan shall outline required routine maintenance actions and schedules necessary to insure proper operation of the facility(ies).

2. The stormwater management plan for the development site shall establish responsibilities for the continuing operation and maintenance of all proposed stormwater control facilities, consistent with the following principals:

a. If a development consists of structures or lots which are to be separately owned and in which streets, sewers and other public improvements are to be dedicated to the municipality, stormwater control facilities should also be dedicated to and maintained by the municipality.

b. If a development site is to be maintained in single ownership or if sewers and other public improvements are to be privately owned and maintained, then the ownership and maintenance of stormwater control facilities should be the responsibility of the owner or private management entity.

3. The governing body, upon recommendation of the municipal engineer, shall make the final determination on the continuing maintenance responsibilities prior to final approval of the stormwater management plan. The governing body reserves the right to accept the ownership and operating responsibility for any or all of the stormwater management controls.

B. Maintenance agreement for privately owned stormwater facilities

1. Prior to final approval of the site's stormwater management plan the property owner shall sign and record a maintenance agreement covering all stormwater control facilities which are to be privately owned. The agreement shall stipulate that:

a. The owner shall maintain all facilities in accordance with the approved maintenance schedule and shall keep all facilities in a safe and attractive manner.

b. The owner shall convey to the municipality easements and or rights-of-way to assure access for periodic inspections by the municipality and maintenance if required.

c. The owner shall keep on file with the municipality the name, address and telephone number of the person or company responsible for maintenance activities; in the event of a change, new information will be submitted to the municipality within ten (10) days of the change.

d. If the owner fails to maintain the stormwater control facilities following due notice by the municipality to correct the problem(s), the municipality may perform the necessary maintenance work or corrective work and the owner shall reimburse the municipality for all costs.

2. Other items may be included in the agreement where determined necessary to guarantee the satisfactory maintenance of all facilities. The maintenance agreement shall be subject to the review and approval of the municipal solicitor and governing body.

C. Municipal stormwater maintenance fund

(Note: This provision is an example of one way that a municipality could establish a special fund to finance its maintenance and inspection activities for stormwater retention/detention facilities. It is an optional provision of the ordinance. If a municipality is interested in establishing such a fund, it is recommended that it consult with its solicitor for legal requirements and procedures.)

1. Persons installing stormwater storage facilities shall be required to pay a specified amount to the Municipal Stormwater Maintenance Fund to help defray costs of periodic inspections and maintenance expenses. The amount of the deposit shall be determined as follows:

a. If the storage facility is to be privately owned and maintained, the deposit shall cover the cost of periodic inspections performed by the municipality for a period of ten (10) years, as estimated by the municipal engineer. After that period of time, inspections will be performed at the expense of the municipality.

b. If the storage facility is to be owned and maintained by the municipality, the deposit shall cover the estimated costs for maintenance and inspections for ten (10) years. The municipal engineer will establish the estimated costs utilizing information submitted by the applicant.

c. The amount of the deposit to the fund shall be converted to present worth of the annual series values. The municipal engineer shall determine the present worth equivalents which shall be subject to the approval of the governing body.²

2. If a storage facility is proposed that also serves as a recreation facility (e.g., ballfield, lake), the municipality may reduce or waive the amount of the maintenance fund deposit based upon the value of the land for public recreation purposes.

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

Section 106 - Stormwater plan requirements

A. General requirements

1. No final subdivision/land development plan shall be approved, no permit authorizing construction issued, or any earthmoving or land disturbance activity initiated until the final stormwater management plan for the development site is approved in accordance with the provisions of this ordinance.

B. Exemptions for small developments

1. At the time of application, the municipality shall determine if the subdivision/land development qualifies as a "small development" and, therefore, is eligible for a simplified stormwater plan submission. For the purposes of this ordinance, a small development is any subdivision or land development which results (or will result when fully constructed) in the creation of 5,000 or less square feet of impervious area and 1 acre or less of any land cover change.

² The required deposit would be equal to an amount that with interest would generate sufficient income annually to pay the maintenance and inspection costs over ten (10) years. If the estimated maintenance/inspection cost is \$500 per year, instead of requiring a deposit of \$5,000 (\$500 x 10 years), the deposit would be reduced to \$3,690 with the present worth approach, assuming a six (6) percent annual interest rate and that the funds would be reduced to zero at the end of ten (10) years.

2. Applications for small developments shall include a plan which describes the type and location of proposed on-site stormwater management techniques or the proposed connection to an existing storm sewer system. The plan should show accurately site boundaries, two-foot interval contours, locations of watershed and/or subarea boundaries on the site (if applicable) and any watercourses, floodplains, or existing drainage facilities or structures located on the site. Contingent upon the approval of the municipal engineer, alternative runoff computational techniques such as the Rational Method may be used where applicable. The municipality reserves the right to require that the plan be prepared by a registered professional engineer, surveyor or landscape architect.

3. The municipal engineer shall review and approve the proposed provisions for stormwater management in accordance with the standards and requirements of this ordinance.

C. Stormwater plan contents

1. General Format: The stormwater plan shall be drawn to a scale of not less than 1 inch = 200 feet. All sheets shall contain a title block with; Name and address of applicant and engineer, scale, north arrow, legend and date of preparation.

2. Existing and Proposed Features: The plan shall show the following:

a. Watershed location - Provide a key map showing the location of the development site within the watershed(s) and watershed subarea(s). On all site drawings, show the boundaries of the watershed(s) and subarea(s) as they are located on the development site and identify watershed names(s) and subarea number(s).

b. Floodplain boundaries - Identify 100-year floodplains on the development site (as appropriate) based on the municipal Flood Insurance Study maps.

c. Natural features - Show all bodies of water (natural or artificial), watercourses (permanent and intermittent), swales, wetlands and other natural drainage courses on the development site, or which will be affected by runoff from the development.

e. Soils - Provide an overlay showing soil types and boundaries within the development site (consult county, SCS and U.S. Geological Survey for information).

f. Contours - Show existing and final contours at intervals of two (2) feet; in areas with slopes greater than fifteen (15) percent, five (5) foot contour intervals may be used.

g. Land cover - Show existing and final land cover classifications as necessary to support and illustrate the runoff calculations performed.

h. **Drainage area delineations** - Show the boundaries of the drainage areas employed in the runoff calculations performed.

i. **Stormwater management controls** - Show any existing stormwater management or drainage controls and/or structures, such as sanitary and storm sewers, swales, culverts, etc. which are located on the development site, or which are located off-site but will be affected by runoff from the development.

3. **Professional certification:** The stormwater management plan (including all calculations) must be prepared and sealed by a registered professional engineer, surveyor or landscape architect with training and expertise in hydrology and hydraulics. Documentation of qualifications may be required by the municipality.

4. **Runoff calculations:** Calculations for determining pre- and post-development discharge rates and for designing proposed stormwater control facilities must be submitted with the stormwater management plan. All calculations shall be prepared using the methods and data prescribed by Section 102 of this ordinance.

5. **Stormwater controls:** All proposed stormwater runoff control measures must be shown on the plan including methods for collecting, conveying and storing stormwater runoff on-site, which are to be used both during and after construction. Erosion and sedimentation controls shall be shown in accordance with applicable municipal and County Conservation District requirements. The plan shall provide information on the exact type, location, sizing, design and construction of all proposed facilities and relationship to the existing watershed drainage system.

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

b. A schedule for the installation of all temporary and permanent stormwater control measures and devices shall be submitted.

c. If appropriate, a justification should be submitted as to why any preferred stormwater management techniques, as listed in Section 103, are not proposed for use.

6. **Easements, rights-of-way, deed restrictions:** All existing and proposed easements and rights-of-way for drainage and/or access to stormwater control facilities shall be shown and the proposed owner identified. Show any areas subject to special deed restrictions relative to or affecting stormwater management on the development site.

7. Other permits/approvals: A list of any approvals/permits relative to stormwater management required from other governmental agencies (including DER Chapter 105 and 106 permits) and anticipated dates of submission/receipt should be included with the stormwater plan submission. Copies of permit applications may be requested by the municipality where they may be helpful for the plan review.

8. Maintenance program: The application shall contain a proposed maintenance plan for all stormwater control facilities in accordance with the following:

a. Identify the proposed ownership entity (e.g., municipality, property owner, private corporation, homeowner's association, or other entity).

b. Include a maintenance program for all facilities, outlining the type of maintenance activities, probable frequencies, personnel and equipment requirements and estimated annual maintenance costs.

c. Identify method of financing continuing operation and maintenance if the facility is to be owned by other than the municipality or governmental agency.

d. Submit any legal agreements required to implement the maintenance program and copies of the maintenance agreement as required by this ordinance.

9. Financial guarantees: Submit financial guarantees in accordance with the provisions of this ordinance.

Section 107 - Plan review procedures

A. Pre-application phase

1. Before submitting the stormwater plan, applicants are urged to consult with the municipality, County Planning Department and County Conservation District on the requirements for safely managing from the development site in a manner consistent with the municipal ordinances and applicable watershed stormwater management plan. These agencies may also be helpful in providing necessary data for the stormwater management plan.

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

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

B. Stormwater plan reviews

1. Submission of plans: Stormwater plan applications shall be submitted with the preliminary and final subdivision/land development applications.

2. Notification of affected municipalities: The municipality shall notify municipalities upstream and downstream of the development site, which may be affected by the stormwater runoff and proposed controls for the site. Copies of the plans will be made available to the municipalities upon request. Comments received from any affected municipality will be considered by the municipal engineer and county agencies in their reviews.

(Note: The following section should be used by Westmoreland County municipalities. The definition of the extent and depth of County Conservation District review activities should be formulated by each municipality in consideration of the capabilities of that municipality and a definition of responsibilities mutually agreeable to the municipality and County Conservation District. The following definition represents the minimal recommended level of County Conservation District involvement in the review process.)

3. Review by municipal engineer and County Conservation District: Stormwater plans shall be reviewed by the municipal engineer and County Conservation District. At its discretion, the municipality and/or county may also engage other specialists in hydrology or hydraulics to assist with the stormwater plan review. The Conservation District will review the plan for general compliance with the watershed plan standards and criteria and watershed-wide impacts, and, where appropriate, may consult with adjacent counties for their comments. If the Conservation District's review identifies the improper application of the watershed standards and criteria or the possibility of harmful impacts downstream from the development site's proposed stormwater management system, the applicant and municipal engineer will be notified so that the necessary modifications can be made to promote safe stormwater management.

(Note: the following section should be used by Allegheny County Municipalities.)

4. County planning review:

a. A copy of the stormwater plan, along with all runoff calculations, shall be forwarded to the Allegheny County Planning Department. A report of the findings will be returned to the municipality within 30 days.

b. If the Planning Department review identifies that the plan fails to comply with the watershed standards and criteria or that a possibility exists for harmful downstream impacts from the development site, the applicant will be advised so that the necessary modifications can be made to the stormwater management controls for the development site. The municipal engineer shall not approve the development site's stormwater management plan until modifications are made and the plan receives a positive review from the County Planning Department.

5. **Municipal engineer's review:** The municipal engineer shall approve or disapprove the stormwater management plan based on the requirements of the municipal ordinances, the standards and criteria of the watershed plan and good engineering practice. The engineer shall submit a written report, along with supporting documentation, stating their reasons for approval or disapproval.

6. **Status of the engineer's determination:** The approval/disapproval of the site's storm water management plan by the municipal engineer shall be considered final. The governing body³ shall not reverse the engineer's determination by approving or disapproving the site's stormwater management plan or any specific control measure in contradiction to the engineer's action. The governing body may request modifications or alternative approaches to the stormwater management controls, provided these are agreed to by the municipal engineer and the applicant's engineer.

(Note: It is important that the applicant's engineer concur with the requested modifications because he/she is certifying the development's stormwater management system.)

7. **Permits required from other governmental agencies:** Where the proposed development requires an obstruction permit from the Pennsylvania DER or an erosion/sedimentation permit from the County Conservation District, then final stormwater management plan approval shall be conditional upon receipt of such permits. However, no building permit shall be issued, nor construction started, until the permits are received and copies filed with the municipality.

Section 108 - Status of the stormwater plan after final approval

A. Upon final stormwater plan approval and receipt of all necessary permits, the applicant may commence to install or implement the approved stormwater management controls.

B. If site development or building construction does not begin within two years of the date of final approval of the stormwater management plan, then before doing so, the applicant shall resubmit the stormwater management plan to verify that no condition has changed within the watershed that would affect the feasibility or effectiveness of the previously approved stormwater management controls. Further, if for any reason development activities are suspended for two years or more, then the same requirement for resubmission of the stormwater management plan shall apply.

³ If the municipal Planning Commission has the final authority for approving for plans, then this section should be changed as appropriate.

Section 109 - Stormwater plan modifications

A. If the request for a plan modification is initiated before construction begins, the stormwater plan must be resubmitted and reviewed according to the procedures contained in Section 107 above.

B. If the request for a plan modification is initiated after construction is underway, the municipal engineer shall have the authority to approve or disapprove the modification based on field inspection provided: (1) the requested changes in stormwater controls do not result in any modifications to other approved municipal land use/development requirements (e.g., building setbacks, yards, etc.) and (2) the performance standards in Section 102 are met. Notification of the engineer's action shall be sent to the governing body which may issue a stay of the plan modification within five (5) days and require the permittee to resubmit the plan modification for full stormwater plan review in accordance with Section 107 above.

Section 110 - Inspections of stormwater management controls

(Note: This section outlines a model schedule for performing inspections of stormwater controls during construction. However, the inspection procedures will have to be tailored to each municipality's needs and resources.)

A. The municipal engineer or a designated representative shall inspect the construction of the temporary and permanent stormwater management system for the development site. The permittee shall notify the engineer 48 hours in advance of the completion of the following key development phases:

1. At the completion of preliminary site preparation including stripping of vegetation, stockpiling of topsoil and construction of temporary stormwater management and erosion control facilities.
2. At the completion of rough grading but prior to placing topsoil, permanent drainage or other site development improvements and ground covers.
3. During construction of the permanent stormwater facilities at such times as specified by the municipal engineer.
4. Completion of permanent stormwater management facilities including established ground covers and plantings.
5. Completion of final grading, vegetative control measures or other site restoration work done in accordance with the approved plan and permit.

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

C. If during construction, the contractor or permittee identifies any site condition, such as subsurface soil conditions, alterations in surface or subsurface drainage which could affect the feasibility of the approved stormwater facilities, he/she shall notify the municipal engineer within 24 hours of the discovery of such condition and request a field inspection. The municipal engineer shall determine if the condition requires a stormwater plan modification.

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

Section 111 - Financial guarantees and dedication of public improvements

A. Guarantee of completion: A completion guarantee in the form of a bond, cash deposit, certified check or other negotiable securities acceptable to the municipality, shall be filed. The guarantee shall cover all streets, sanitary sewers, stormwater management facilities, water systems, fire hydrants, sidewalks and other required improvements; it shall be in the amount and form prescribed by the Municipal Planning Code (Section 509).

B. Release of completion guarantee: The completion guarantee shall be returned or released upon written certification by the municipal engineer or a designated agent that improvements and facilities have been installed and completed in accordance with the approved plan and specifications. The procedures for requesting and obtaining a release of the completion guarantee shall be in a manner prescribed by the Municipalities Planning Code (Section 510).

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

D. Dedication of public improvements:

1. When streets, sanitary sewers, stormwater management facilities, water lines or other required improvements in the development have been completed in accordance with the final approved plan, such improvements shall be deemed private until such time as they have been offered for dedication to the municipality and accepted by separate ordinance or resolution or until they have been condemned for use as a public facility.

2. Prior to acceptance of any improvements or facilities, the municipal engineer shall inspect it to ensure that it is constructed in accordance with the approved plan and is functioning properly. In the case of any stormwater control facility, it must be free of sediment and debris.

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

E. **Maintenance guarantee:** Prior to acceptance of any improvements or facilities, the applicant shall provide a financial security to secure the structural integrity and functioning of the improvements. The security shall: (1) be in the form of a bond, cash, certified check or other negotiable securities acceptable to the municipality, (2) be for a term of 18 months, and (3) be in an amount equal to 15 percent of the actual cost of the improvements and facilities so dedicated.

Section 112 - Fee Schedule

The municipal governing body may adopt by resolution from time to time a reasonable schedule of fees to cover the cost of plan reviews, inspections and other activities necessary to administer the provisions of this ordinance. All fees shall be set in accordance with the applicable provisions of the Municipalities Planning Code and any dispute over the fee amount shall be resolved in the manner prescribed by the Planning Code.

Section 113 - Enforcement procedures and remedies

(Note: This section is drafted to be consistent with the new provisions of the Municipalities Planning Code for enforcement of a municipal subdivision and land development ordinance. If the municipality adopts a separate, single-purpose stormwater management ordinance, then this section should be modified as appropriate to meet the provisions of the municipal code.)

A. **Right of entry:** Upon presentation of proper credentials, duly authorized representatives of the municipality may enter at reasonable times upon any property to investigate or ascertain the condition of the subject property in regard to an aspect regulated by this ordinance.

B. **Notification:** In the event that the applicant, developer, owner or his/her agent fails to comply with the requirements of this ordinance or fails to conform to the requirements of any permit, a written notice of violation shall be issued. Such notification shall set forth the nature of the violation(s) and establish a time limit for correction of the violation(s). Upon failure to comply within the time specified, unless otherwise extended by the municipality, the applicant, developer, owner or his/her agent shall be subject to the enforcement remedies of this ordinance.

C. Preventive remedies:

1. In addition to other remedies, the municipality may institute and maintain appropriate actions by law or in equity to restrain, correct or abate a violation, to prevent unlawful construction, to recover damages and to prevent illegal occupancy of a building or premises.
2. In accordance with the Planning Code (Sec. 515.1), the municipality may refuse to issue any permit or grant approval to further improve or develop any property which has been developed in violation of this chapter.

D. Enforcement remedies

1. Any person, who has violated or knowingly permitted the violation of the provisions of this Ordinance shall, upon being found liable therefor in a civil enforcement proceeding commenced by the municipality, pay a fine of not less than \$50.00 and not more than \$500.00 plus court costs, including reasonable attorney fees incurred by the municipality. No judgement shall commence or be imposed, levied or be payable until the date of the determination of a violation by the district justice.
2. If the defendant neither pays nor timely appeals the judgement, the municipality may enforce the judgement pursuant to applicable rules of civil procedure.
3. Each day that a violation continues shall constitute a separate violation unless the district justice further determines that there was a good faith basis for the person violating the ordinance to have believed that there was no such violation. In such case there shall be deemed to have been only one such violation until the fifth day following the date of the district justice's determination of a violation; thereafter each day that a violation continues shall constitute a separate violation.
4. All judgements, costs and reasonable attorney fees collected for the violation of this Ordinance shall be paid over to the municipality.
5. The court of common pleas, upon petition, may grant an order of stay, upon cause shown, tolling the per diem fine pending a final adjudication of the violation and judgement.
6. Nothing contained in this section shall be construed or interpreted to grant to any person or entity other than the municipality the right to commence any action for enforcement pursuant to this section.

E. Additional remedies: In addition to the above remedies, the municipality may also seek remedies and penalties under applicable Pennsylvania statutes, or regulations adopted pursuant thereto, including but not limited to the Storm Water Management Act (32 P.S. Section 693.1-693.27) and the Erosion and Sedimentation Regulations (25 Pennsylvania Code, Chapter 102). Any activity conducted in violation of this ordinance or any Pennsylvania approved watershed stormwater management plan may be declared a public nuisance by the municipality and abatable as such.

Section 114 - Definitions

Act: The Storm Water Management Act (Act of October 4, 1978, P.L. 864 No. 167; 32 P.S. Sections 680.1-680.17, as amended by Act of May 24, 1984, No. 63).

Applicant: A landowner or developer who has filed an application for development including his/her heirs, successors and assigns.

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

Conservation District: The Allegheny County Conservation District (Westmoreland County Conservation District).

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

Design criteria: (1) Engineering guidelines specifying construction details and materials.
(2) Objectives, results, or limits which must be met by a facility, structure, or process in performance of its intended functions.

Design storm: (see storm frequency)

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

Detention pond: A pond or reservoir, usually small, constructed to impound or retard surface runoff temporarily.

Developer: The person, persons, or any corporation, partnership, association, or other entity or any responsible person therein or agent therefor that undertakes the activities associated with changes in land use. The term "developer" is intended to include by not necessarily be limited to the term "subdivider", "owner", and "builder" even though the individuals involved in successive stages of a project may vary.

Development: Any activity, construction, alteration, change in land use or practice that affects stormwater runoff characteristics.

Discharge: The flow or rate of flow from a canal, conduit, channel or other hydraulic structure.

Drainage: In general, the removal of surface water from a given area. Commonly applied to surface water and ground water.

Drainage Area: (1) The area of a drainage basin or watershed, expressed in acres, square miles, or other unit of area. Also called catchment area, watershed, river basin. (2) The area served by a sewer system receiving storm and surface water, or by a watercourse.

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

Erosion: Wearing away of the lands by running water, winds and waves.

Erosion control: The application of measures to reduce erosion of land surfaces.

Ground Cover: Materials covering the ground surface,

Ground Water: Subsurface water occupying the saturation zone, from which wells and springs are fed.

Ground Water Recharge: Replenishment of ground water naturally by precipitation or runoff or artificially by spreading or injection.

Impervious: Not allowing or allowing only with great difficulty the movement of water; impermeable.

Infiltration: (1) The flow or movement of water through the interstices or pores of a soil or other porous medium. (2) The absorption of liquid by the soil.

Land Development: Any of the following activities:

- (1) the improvement of one lot or two or more contiguous lots, tracts or parcels or land for any purpose involving: (a) a group of two or more residential or non-residential buildings, whether proposed initially or cumulatively, or a single non-residential building on a lot or lots regardless of the number of occupants or tenure; or (b) the division or allocation of land or space, whether initially or cumulatively, between or among two or more existing or prospective occupants by means or, or for the purpose of streets, common areas, leaseholds, condominiums, building groups or other features;

(2) a subdivision of land.

Land Disturbance: Any activity involving the changing, grading, transportation, fill and any other activity which causes land to be exposed to the danger of erosion.

Maintenance: The upkeep necessary for efficient operation of physical properties.

Municipality: (name of municipality)

Natural Stormwater Runoff Regime: A watershed where natural surface configurations, runoff characteristics and defined drainage conveyances have attained the conditions of equilibrium.

Outfall: (1) The point, location or structure where drainage discharges from a sewer, drain or other conduit. (2) The conduit leading to the ultimate discharge point.

Outlet Control Structure: The means of controlling the relationship between the headwater elevation and the discharge, placed at the outlet or downstream end of any structure through which water may flow.

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

Peak Flow: Maximum flow.

Pennsylvania DER: Pennsylvania Department of Environmental Resources.

Release Rate Percentage: The watershed factor determined by comparing the maximum rate of runoff from a subbasin to the contributing rate of runoff to the watershed peak rate at specific points of interest.

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

Return Period: The average interval in years over which an event of a given magnitude can be expected to recur.

Runoff: That part of precipitation which flows over the land.

Runoff Characteristics: The surface components of any watershed which affect the rate, amount, and direction of stormwater runoff. These may include but are not limited to: vegetation, soils, slopes and man-made landscape alterations.

SCS: U.S. Department of Agriculture Soil Conservation Service.

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

Sedimentation: The process by which Mineral or organic matter is accumulated or deposited by moving water, wind or gravity.

Storage Facility: (See detention pond and retention pond).

Storm Frequency: The average interval in years over which a storm event of a given precipitation volume can be expected to occur.

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

Stormwater: That portion of precipitation which runs over the land.

Stormwater Collection System: Natural or man-made structures that collect and transport stormwater through or from a drainage area to the point of final outlet including, but not limited to, any of the following: conduits and appurtenant features, canals, channels, ditches, streams, culverts, streets, and pumping stations.

Stormwater Management Plan: The plan for managing stormwater runoff adopted by Allegheny County and Westmoreland County as required by the Storm Water Management Act.

Swale: A low-lying stretch of land which gathers or carries surface water runoff.

Watercourse: Any channel for conveyance of surface water having a defined bed and banks, whether natural or artificial, with perennial or intermittent flow.

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

Watershed Stormwater Management Plan: The plan for managing stormwater runoff throughout a designated watershed adopted by Allegheny County and Westmoreland County as required by the Pennsylvania Storm Water Management Act.

Subdivision/Land Development Ordinance

Appendix A

Assigned Release Rate Percentages

Release Rate Areas	Assigned Release Rate Percentage	Release Rate Areas	Assigned Release Rate Percentage	Release Rate Areas	Assigned Release Rate Percentage
1	50%	51	70%	101	50%
2	60%	52	80%	102	60%
3	80%	53	90%	103	70%
4	70%	54	80%	104	80%
5	60%	55	50%	105	50%
6	50%	56	90%	106	100%
7	50%	57	70%	107	70%
8	60%	58	100%	108	50%
9	50%	59	50%	109	70%
10	70%	60	60%	110	90%
11	70%	61	50%	111	80%
12	50%	62	60%	112	90%
13	80%	63	50%	113	90%
14	100%	64	60%	114	100%
15	50%	65	70%	115	60%
16	80%	66	90%	116	70%
17	60%	67	60%	117	90%
18	90%	68	90%	118	70%
19	70%	69	70%	119	100%
20	60%	70	80%	120	90%
21	70%	71	70%	121	80%
22	80%	72	90%	122	60%
23	50%	73	60%	123	70%
24	90%	74	60%	124	70%
25	100%	75	50%	125	90%
26	90%	76	50%	126	80%
27	60%	77	70%	127	60%
28	50%	78	50%	128	50%
29	80%	79	50%	129	100%
30	70%	80	70%	130	80%
31	50%	81	80%	131	50%
32	80%	82	70%	132	70%
33	60%	83	60%	133	90%
34	60%	84	70%		
35	90%	85	60%		
36	70%	86	50%		
37	50%	87	50%		
38	60%	88	50%		
39	60%	89	50%		
40	80%	90	80%		
41	50%	91	100%		
42	90%	92	90%		
43	80%	93	80%		
44	70%	94	60%		
45	60%	95	80%		
46	60%	96	80%		
47	70%	97	60%		
48	100%	98	80%		
49	90%	99	50%		
50	90%	100	70%		

**MODEL STORMWATER MANAGEMENT PROVISIONS FOR THE
MUNICIPAL ZONING ORDINANCE**

(Note: The following section should be added to the Supplementary Provisions of the municipality's existing zoning ordinance. This provision assures that stormwater management standards apply to all types of land uses in the municipality)

Section _____, Stormwater Management

A. All uses or lots in all zoning districts shall comply with the applicable requirements and standards for managing stormwater runoff in accordance with the municipal subdivision and land development ordinance.

(Note: The following language should be included if the municipality permits any of the following land use activities under its zoning district regulations.)

B. Agricultural activities, nurseries and forestry management operations, where permitted by this ordinance, shall be required to provide for the safe management of stormwater runoff in accordance with the requirements of the subdivision/land development ordinance. However, the submission and approval of a stormwater management plan shall be waived when:

- 1. agricultural activities are operated in accordance with a conservation plan or erosion and sedimentation control plan approved by the Allegheny County Conservation District (Westmoreland County Conservation District);**
- 2. forestry management operations are following Pennsylvania DER management practices contained in its publication Soil Erosion and Sedimentation Control Guidelines for Forestry and are operating under an erosion and sedimentation control plan.**

C. Strip mining where permitted by this ordinance shall have a plan for control of erosion and sedimentation and stormwater runoff which is approved by the Pennsylvania DER. If the strip mining operation is located within a watershed(s) for which a stormwater management plan has been approved in accordance with the requirements of the Storm Water Management Act, then the erosion/sedimentation plan and any permanent stormwater runoff controls shall be consistent with the standards and criteria of the watershed stormwater management plan. A copy of the state-approved erosion/sedimentation plan shall be filed with the municipality prior to commencing mining operations.