

X. PLAN ADOPTION AND UPDATING PROCEDURES

The purpose of this Section of the Plan is to detail processes for adoption of the Plan by Somerset County and future updating of the Plan.

X.A Plan Adoption

Somerset County will transmit the completed Plan to the official planning agency and governing body of each involved municipality, each member of the WPAC and the PADEP by official correspondence. Refer to Plan distribution list in Table X-1. The involved municipalities, WPAC and PADEP will then review the Plan. Their review will include an evaluation of the Plan's consistency with other plans and programs affecting the watershed. The reviews and comments will be submitted to Somerset County by official correspondence. The review comments will be received, tabulated, and responded appropriately and the Plan will be revised accordingly.

Somerset County will then hold a public hearing concerning the Plan. A notice for the public hearing will be published at least two weeks before the hearing date. The public hearing notice will contain a brief summary of the principal provisions of the Plan and a reference to the places within each affected municipality where copies of the Plan may be examined or purchased at cost. The comments received at the public hearing will be reviewed by Somerset County, and appropriate modifications in the Plan will be made if applicable.

The Somerset County Commissioners will vote by resolution on the adoption of the Plan. The resolution will require an affirmative vote of at least a majority of the Commissioners, and, will refer expressly to the maps, charts, textual matter and other materials intended to comprise the Plan. This action will then be recorded on the adopted Plan.

Somerset County will then submit to the PADEP a letter of transmittal, and three copies each of:

1. The adopted Plan.
2. The review by the official planning agency and governing body of each municipality, and the Somerset County Planning Commission.
3. Public hearing notice and minutes.
4. The resolution of the adoption of the Plan by the Somerset County Commissioners.

The letter of transmittal will state that Somerset County has complied with all procedures outlined in Act 167 and will request PADEP to approve the adopted Plan. Subsequent to PADEP approval of Plan, a copy of the adopted Plan will be distributed to the governing body of each involved municipality.

X.B Plan Update

As a part of the implementation strategy for the Plan, specific steps and/or procedures are specified by Act 167 to be established for pursuing and completing updates of the Plan.

No specific circumstances that would “trigger” the update of the Plan are apparent at this point in time. As such, the update of the Plan in the maximum 5-year time frame identified in Act 167 is appropriate.

**MODEL STORMWATER MANAGEMENT ORDINANCE
COXES CREEK ACT 167 STORMWATER MANAGEMENT PLAN
SOMERSET COUNTY, PENNSYLVANIA**

Final December 2003

Background

This Model Stormwater Management Ordinance for the Coxes Creek Watershed has been prepared in association with the Coxes Creek Act 167 Stormwater Management Plan (Plan). The Plan is being developed in accordance with the requirements of the Stormwater Management Act (Act 167, P.L. 864, No. 167 of October 4, 1978, as amended 32 P.S. 680 et. seq.).

Somerset County is required to adopt the Plan, including associated Model Stormwater Management Ordinance. Prior to adoption, Somerset County is required to hold a Public Hearing concerning the Plan. A notice for the Public Hearing will be published at least two weeks before the Public Hearing date. The Public Hearing notice will contain a brief summary of the principal provisions of the Plan and a reference to the places within each affected municipality where copies of the Plan may be examined. The comments received at the Public Hearing will be reviewed by Somerset County and appropriate modifications to the Plan will be made if applicable. Somerset County currently envisions that the Public Hearing and subsequent adoption of the Plan will occur in June 2003. Upon adoption, the Plan is required to be submitted to and approved by the PADEP.

Within six (6) months of approval of the adopted Plan by the PADEP, each municipality in the Coxes Creek Watershed (including Black Township, Brothersvalley Township, Milford Township, Rockwood Borough, Somerset Borough, Somerset Township, and Stonycreek Township) will be required to adopt or amend, and implement, such ordinances and regulations as are necessary to regulate development within the Coxes Creek Watershed and within the municipality, in a manner consistent with the Plan. Failure of a municipality to adopt implementing ordinances may ultimately result in a course of action that could result in withholding of funds due the municipality by the State Treasurer, as detailed in the Stormwater Management Act.

MODEL STORMWATER MANAGEMENT ORDINANCE
COXES CREEK ACT 167 STORMWATER MANAGEMENT PLAN
SOMERSET COUNTY, PENNSYLVANIA

SECTION 1. PURPOSE

The purpose of this Ordinance is to control stormwater in a manner consistent with the Coxes Creek Watershed Act 167 Stormwater Management Plan as adopted by Somerset County.

SECTION 2. DEFINITIONS

Accelerated Erosion – The removal of the surface of the land through the combined action of man’s activities and natural processes, at a rate greater than would occur because of the natural processes alone.

Alteration – As applied to land, a change in topography as a result of the moving of soil and rock from one location or position to another; the changing of surface conditions by causing the surface to be more or less impervious; or, earth disturbance.

Applicant – A landowner, developer or other person who has filed an application for approval of a Drainage Plan under Section 5 of this Ordinance.

BMP (Best Management Practice) – Activities, facilities, measures or procedures used to manage stormwater impacts from land development, to protect and maintain water quality and groundwater recharge and to otherwise meet the purposes of this Ordinance, to including but not limited to infiltration, filter strips, low impact design, bioretention, wet ponds, permeable paving, grassed swales, forested buffers, sand filters and detention basins.

Building Permit – A permit or other approval issued by a municipality for construction and/or earth disturbance.

Channel Erosion – The widening, deepening, and headward cutting of small channels and waterways, due to erosion caused by increased rate or volume of stormwater runoff.

Conservation District – The Somerset County Conservation District.

Coxes Creek Watershed - area bounded peripherally by water parting and draining to the main stem of Coxes Creek including subwatershed of Bromm Run, Dempsey Run, East Branch of Coxes Creek, Kimberly Run, Laurel Run, Parson Run, Rice Run, West Branch of Coxes Creek, and Wilson Creek. Refer to Exhibit A of this Ordinance for a map of the Coxes Creek Watershed.

Developer – A person or persons, partnership, association, corporation or other entity, or any responsible person therein or agent thereof, that undertakes the activities covered by this Ordinance.

Development Site / Project Site – The specific tract of land where any land development in the municipality is planned, conducted or maintained.

Downslope Property Line – That portion of the property line of the lot, tract, or parcels of land being developed located such that all overland or pipe flow from the site would be directed towards it.

Erosion – The process by which the surface of the land, including channels, is worn away by water, wind, or chemical action.

Erosion & Sedimentation Control Plan (E&S Plan) - written, site-specific plan prepared in accordance with the requirements of 25 Pa Code Chapter 102 as associated with earth disturbance activities.

Existing Condition / Pre-Development Condition – The initial condition of a project site prior to the proposed development.

Forest Management Operations – Planning and activities necessary for the management of forest land. These include timber inventory and preparation of forest management plans, silvicultural treatment, cutting budgets, logging road design and construction, timber harvesting, site preparation and reforestation.

Groundwater Recharge – Replenishment of existing natural underground water supplies.

Impervious Surface – A surface that prevents the percolation of water into the ground. Impervious surface includes, but is not limited to, any roof, parking or driveway areas, and any new streets and sidewalks. Any surface areas designed to initially be gravel or crushed stone shall be assumed to be impervious surfaces.

Land Development – (i) 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 buildings, or (b) the division or allocation of land or space between or among two or more existing or prospective occupants by means of, or for the purpose of streets, common areas, leasehold, condominiums, building groups or other features; (ii) a subdivision of land.

Land/Earth Disturbance – Any activity involving grading, tilling, digging, or filling of ground, or stripping of vegetation, or any other activity that causes any alteration to the natural condition of the land.

Municipality – _____(city, borough, township)_____, Somerset County, Pennsylvania.

Nonpoint Source Pollution – Pollution that enters a watery body from diffuse origins in the watershed and does not result from discernible, confined, or discrete conveyances.

Open Channel – A drainage element in which stormwater flows with an open surface. Open channels include, but shall not be limited to, natural and man-made drainageways, swales, streams, ditches, canals, and pipes flowing partly full (for computational purposes).

Outfall – Point where water flows from a conduit, stream, or drain.

PADEP – The Pennsylvania Department of Environmental Protection.

PADEP Erosion and Sediment Pollution Control Program Manual (PADEP E&S Manual) - PADEP Document No. 363-2134-008 dated March 13, 2000 with an effective date of April 15, 2000.

Peak Discharge – The maximum rate of stormwater runoff from a specific storm event.

Pennsylvania Handbook of Best Management Practices For Developing Areas (PA Handbook For Developing Areas) - Document dated November 14, 1997 and prepared under the guidance of the Pennsylvania Association of Conservation Districts, Inc.; the Keystone Chapter, Soil and Water Conservation Society; the Pennsylvania Department of Environmental Protection; and the Natural Resources Conservation Service.

Person – An individual, partnership, association, corporation or other entity.

Post-Development Condition - The condition of the site after completion of construction established by the subdivision or land development plans and termination of requirements for implementation of the associated E&S Plan.

Project Site – The specific tract of land where any land development in the municipality is planned, conducted or maintained.

Runoff – Any part of precipitation that flows over the land surface.

Sediment – Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by water.

Sediment Pollution – The placement, discharge or introduction of sediment into the waters of the Commonwealth.

Stormwater – The total amount of precipitation reaching the ground surface.

Somerset County Subdivision & Land Development Ordinance - The Ordinance as adopted by the Somerset County Board of Commissioners on December 16, 1997 with an effective date of January 1, 1998.

Stormwater Management Plan – The plan for managing stormwater runoff adopted by County as required by the Act of October 4, 1978, P.L. 864, (Act 167), and known as the “Storm Water Management Act”.

Subdivision – The division or re-division of a lot, tract or parcel of land by any means into two or more lots, tracts, parcels or other divisions of land including changes in existing lot lines for the purpose, whether immediate or future, of lease, transfer of ownership or building or lot development. The definition does not include subdivision by lease of land for agricultural purposes into parcels of more than ten acres, not involving any new street or easement of access, or any residential dwellings.

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

Watercourse – A stream of water; river; brook; creek; or a channel or ditch for water, whether natural or manmade.

Waters of the Commonwealth – Any and all rivers, streams, creeks, rivulets, impoundments, ditches, watercourses, storm sewers, lakes, dammed water, wetlands, ponds, springs, and all other bodies or channels of conveyance of surface and underground water, or parts thereof, whether natural or artificial, within or on the boundaries of this Commonwealth.

Water Quality Requirements – As defined under state regulations – protection of designated and existing uses (refer to Pa. Code Chapters 93 and 96):

- a. Each stream segment in Pennsylvania has a “designated use,” such as “warm water fishes” or “potable water supply” or “Trout Stocking,” which is listed in Chapter 93. These uses must be protected and maintained, under state regulations.
- b. “Existing uses” are those attained as of November, 1975, regardless whether they have been designated in Chapter 93. Land development must be designed to protect and maintain existing uses and maintain the level of water quality necessary to protect those uses in all streams, and to protect and maintain water quality in special protection streams.
- c. Water quality involves the chemical, biological and physical characteristics of surface water bodies. After land development these characteristics can be impacted by addition of pollutants such as sediment, and changes in habitat through increased flow volumes and/or rates. Therefore, discharges to surface waters must be designed and managed to protect the stream bank, streambed and structural integrity of the waterway, to prevent these impacts.

Wetland – Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, ferns, and similar areas.

SECTION 3. APPLICABILITY

The following activities are subject to the provisions of this Ordinance:

- Land Development
- Subdivision

SECTION 4. STORMWATER MANAGEMENT REQUIREMENTS

Section 4.1: The following general requirements apply to all activities regulated by this Ordinance:

- A. Stormwater runoff – The character of stormwater runoff must be managed in a manner which prevents injury to human health, the environment, safety, or other property. Such measures are to assure that the maximum rate of stormwater runoff is no greater after development than prior to development activities. Such measures are to manage the quantity, velocity, and direction of resulting stormwater runoff in a manner which otherwise adequately protects human health, the environment, and property from possible injury.
- B. Erosion and sedimentation – Measures to prevent accelerated erosion and resulting sedimentation must at a minimum meet the standards of the Conservation District.

- C. Water quality - The character of stormwater runoff must be managed in a manner that protects the Water Quality Requirements of waters of the Commonwealth. Such measures are to include consideration to protection of existing groundwater recharge conditions and protection from non-point source pollution.

Section 4.2: No approval of any subdivision plan or land development plan, or issuance of any building or occupancy permit, or the commencement of any earth disturbance activity at a project site in the Coxes Creek Watershed, shall proceed until a Drainage Plan, as defined in Section 5 of this Ordinance, is submitted to and approved by, as evidenced by written notice from, the municipality. Except that, the following activities are exempt from requirements of the preparation of a Drainage Plan:

- A. Land disturbances associated with existing dwellings.
- B. Development activities involving less than 5,000 square feet of impervious surface when the project site is less than 1.0 acre.
- C. Development activities involving less than 10,000 square feet of impervious surface when the project site is equal to or greater than 1.0 acre.
- D. Minor Subdivision as defined in the Somerset County Subdivision & Land Development Ordinance.
- E. Agriculture when operating in accordance with practices recommended by the Conservation District.
- F. Forest management operations completed in accordance with an E&S Plan.

Section 4.3: The following permit requirements apply to certain land development activities, and must be met prior to municipal approval of subdivision plans or land development plans, or issuance of building or occupancy permits, where applicable:

- A. All earth disturbance activities subject to the standards and possible permit requirements by the PADEP under regulations at 25 Pa. Code Chapter 102.
- B. Work within waterways, any construction located in or adjacent to surface water of the Commonwealth including wetlands, or any facility which may constitute a dam subject to permit, subject to the standards and possible permit requirements by the PADEP under regulations at 25 Pa. Code Chapter 105.
- C. Any stormwater management facility that would be located on a State highway right-of-way subject to the standards and possible permit requirements of the Pennsylvania Department of Transportation (PennDOT).

SECTION 5. DRAINAGE PLAN REQUIREMENTS

Section 5.1: A Drainage Plan shall be prepared, except for exempted activities, for subdivision and land development activities. The Drainage Plan shall be prepared under the supervision of, and certified by, a Registered Professional Engineer or Surveyor.

Section 5.2: The Drainage Plan shall include the following:

- A. Plan drawings reflecting the proposed land development and/or subdivision activity.
- B. Stormwater runoff computations and descriptive narrative. Runoff computations shall be completed using either the Rational Method or the NRCS Soil Cover Complex Method, and shall be completed using standard engineering practices as established in the PADEP E&S Manual or the PA Handbook for Developing Areas. Stormwater runoff computations shall compare pre-development runoff conditions with post-development runoff conditions and shall demonstrate, at a minimum, that post-development peak discharge does not exceed pre-development peak discharge for the 2-year, 10-year, and 25-year storm events. If structures are required to attenuate post-development peak runoff, then computations demonstrating adequacy of design for the structures shall be provided.
- C. Groundwater recharge computations and descriptive narrative. Groundwater recharge computations shall be completed using standard engineering practices as established in the PA Handbook for Developing Areas. Recharge computations shall demonstrate that any net increase in stormwater runoff volume (i.e, post-development runoff volume minus pre-development runoff volume) from the 2-year, 24-hour storm is recharged to groundwater. Alternately, recharge computations shall justify why any net increase in stormwater runoff volume cannot be recharged to groundwater at the project site.
- D. Written plan for post-construction, long-term operation and maintenance of all permanent stormwater management facilities including designation of parties responsible for operation and maintenance activities, detailed descriptions of maintenance activities, and inspection frequency (minimum annual inspection shall be required).
- E. E&S Plan prepared in accordance with the requirements of 25 Pa. Code Chapter 102, including copy of written notification from the Conservation District approving same.
- F. For projects involving innovative practices for stormwater management involving application of Best Management Practices (BMPs), narrative and computations for proposed BMPs. BMPs can be as detailed in the PA Handbook for Developing Areas, or other industry accepted sources. Incentives/credits for implementation of innovative practices are identified in Exhibit B.
- G. For land development activities involving an earth disturbance in excess of one acre, copy of individual or general NPDES Permit for control of stormwater during construction as provided by the Conservation District and/or the PADEP. If disturbance involves in excess of one acre but an NPDES Permit is determined not to be required by the Conservation District or PADEP, then a copy of written documentation from the Conservation District or the PADEP indicating same shall be provided.
- H. For land development involving waterways, any construction located in or adjacent to waters of the Commonwealth including wetlands, or any facility which may constitute a dam subject to permit, as defined under regulations at 25 Pa. Code Chapter 105, copy of permit(s) from the PADEP authorizing same.
- I. For projects involving any stormwater management facility that would be located on a State highway right-of-way subject to the approval PennDOT, evidence of written approval of same from PennDOT shall be provided.

Section 5.3: Completed Drainage Plans, accompanied by the requisite fees as identified in Section 7 of this Ordinance, are to be submitted to the municipality for approval. Submittal of the Drainage Plan shall include an executed Drainage Plan Submittal Form as provided in Exhibit C of this Ordinance. The municipality shall notify the applicant within fifteen (15) business days of its decision regarding a submitted Drainage Plan. An approval of the Drainage Plan shall be in the form of written notice from the municipality to the applicant. A disapproval of an applicant's Drainage Plan shall be in the form of a written notice from the municipality to the applicant containing the reasons for the disapproval.

SECTION 6. INSPECTIONS

The applicant shall notify the municipality two (2) business days prior to the commencement of any activity covered by this Ordinance so that appropriate inspections to insure compliance with this Ordinance can be made.

The applicant shall notify the municipality of completion of construction of stormwater management facilities within 30 calendar days of completion of the construction. The notice of completion shall include submittal of three copies of as-built documentation of constructed stormwater management facilities. As built documentation shall include a revised Drainage Plan meeting all requirements of Section 5 of this Ordinance with specific statement that the Drainage Plan accurately represents the constructed facilities, and shall be prepared under the supervision of and certified by a Registered Professional Engineer or Surveyor.

SECTION 7. FEES

Fees imposed under this Ordinance are provided in Exhibit D to this Ordinance.

SECTION 8. FINANCIAL GUARANTEES

In order to insure that any required stormwater management controls are properly installed, operated, and maintained, the applicant shall provide a financial guarantee of a type acceptable to the municipality as defined in Exhibit E to this Ordinance.

SECTION 9. ENFORCEMENT AND PENALTIES

This section includes penalties for violations of this Ordinance.

- A. Duly authorized representatives of the municipality have the right to enter private property at reasonable times to investigate any condition associated with this Ordinance.
- B. Anyone violating the provisions of this Ordinance shall be guilty of a misdemeanor, and upon conviction shall be subject to a fine of not more than \$ _____ for each violation, recoverable with costs, or imprisonment of not more than ____ days, or both. Each day that the violation continues shall be a separate offense. In addition, the municipality may institute injunctive, mandamus or any other appropriate action or proceeding at law or in equity for the enforcement of this Ordinance. Any court of competent jurisdiction shall have the right to issue restraining orders, temporary or permanent injunctions, mandamus or other appropriate forms of remedy or relief.

**MODEL STORMWATER MANAGEMENT ORDINANCE
COXES CREEK ACT 167 STORMWATER MANAGEMENT PLAN
SOMERSET COUNTY, PENNSYLVANIA**

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Exhibit A - Map of Coxes Creek Watershed

Exhibit B - Incentives/Credits for Innovative Stormwater Management

Stormwater Credit	Description
Natural Area Conservation	Conservation of natural areas such as forest, wetlands, or other sensitive areas in a protected easement thereby retaining their pre-development hydrologic and water quality characteristics. Using this credit, a designer may subtract conservation areas from total site area when computing the required water quality volume. Additionally, the post-development curve number (CN) for these areas may be assumed to be forest in good condition.
Disconnection of Rooftop Runoff	Credit is given when rooftop runoff is disconnected and then directed over a pervious area where it may either infiltrate into the soil or filter over it. Credit is typically obtained by grading the site to promote overland flow or by providing bioretention on single-family residential lots. If a rooftop area is adequately disconnected, the impervious area may be deducted from the total impervious cover. Additionally, the post-development CNs for disconnected rooftop areas may be assumed to be forest in good condition.
Disconnection of Non-Rooftop Runoff	Credit is given for practices that disconnect surface impervious cover by directing it to pervious areas where it is either infiltrated or filtered through the soil. As with rooftop runoff, the impervious area may be deducted from the total impervious cover thereby reducing the required water quality volume.
Stream Buffer Credit	Credit is given when a stream buffer effectively treats stormwater runoff. Effective treatment constitutes capturing runoff from pervious and impervious areas adjacent to the buffer and treating the runoff through overland flow across a grass or forested area. Areas treated in this manner may be deducted from total site area in calculating and may contribute to meeting requirements for groundwater recharge.
Grass Channel (Open Section Roads)	Credit may be given when open grass channels are used to reduce the volume of runoff and pollutants during smaller storms. Use of grass channels will automatically meet the minimum groundwater recharge requirement. If designed according to appropriate criteria, these channels may meet water quality criteria for certain types of residential development.
Environmentally Sensitive Rural Development	Credit is given when a group of environmental site design techniques are applied to low density or rural residential development. This credit eliminates the need for structural practices to treat both the required recharge volume and water quality volume. The designer must still address the channel protection volume, the overbank protection and overbank/extreme flood event requirements for all roadway and connected impervious surfaces.

Exhibit C - Drainage Plan Application Form
Exhibit D - Fee Schedule
Exhibit E - Requirements for Financial Guarantees

These exhibits should be developed on a municipality-specific basis by consultation between Municipal Officials and their Solicitor and Engineer.

R-1. REFERENCES

- (Aron, 1981) Aron, Gert, "Procedure PSU-IV for Estimated Design Flood Peaks on Ungauged Pennsylvania Watersheds," 1981.
- (Aron, 1986) Aron, Gert, "Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts PDT-IDF," 1986.
- (Aron 1995) Aron, Gert, "PC Rainfall Program PDT-IDF, Design Storm and SCS Excess Storm Hyetograph Estimates," 1995.
- (Chow, 1959) Chow, Ven Te, "Open Channel Hydraulics," 1959.
- (Hess, 1991) R.K.R. Hess Associates, and Somerset County Planning Commission, "Act 167 Watershed Stormwater Management Plan, Scope Of Study, Coxes Creek Watershed, Somerset County, PA, File No. SWMP, Project No. 89002.01," April 14, 1991.
- (Lancaster County, 2003) Lancaster County, PA, County Engineers Office, "STREMTUL – Graphical User Interface For SCS TR20 (TR-20) Hydrology Program", Version 2.3, www.co.lancaster.pa.us, 2003.
- (PADEP, 1998) Pennsylvania Association of Conservation Districts, Inc., Keystone Chapter Soil and Water Conservation Society, Pennsylvania Department of Environmental Protection, and Natural Resources Conservation Services, "Pennsylvania Handbook of Best Management Practices for Developing Areas," prepared by CH2M Hill, Spring 1998.
- (PADEP, 2000a) The Department of Environmental Protection, and Somerset County, "Agreement for Phase II Watershed Storm Water Management Plan Grant, Coxes Creek Watershed, Agreement #ME350166," November 15, 2000.

- (PADEP, 2000b) Commonwealth of Pennsylvania, Department of Environmental Protection, Office of Water Management, "Erosion and Sediment Pollution Control Manual, Document No. 363-2134-008," March 2000.
- (PADEP, 2002) Commonwealth of Pennsylvania, Department of Environmental Protection, "Comprehensive Stormwater Management Policy, Document ID #392-0300-002," September 28, 2002.
- (SCS, 1984) United States Department of Agriculture, Soil Conservation Service, "Engineering Field Manual For Conservation Practices, PB85-175164," July 1984.
- (SCS, 1986) United States Department of Agriculture, Soil Conservation Service, Engineering Division, "Technical Release 55, Urban Hydrology for Small Watersheds, PB87-101580," June 1986.
- (SCS, 1992) Soil Conservation Service, The Hydrology Unit and the Technology Development Support Staff, "TR-20 Computer Program for Project Formulation Hydrology," February 1992.

EXHIBIT C
DRAINAGE PLAN APPLICATION FORM – SHEET 1 of 3

[This exhibit presents an example only. The Model Ordinance and Exhibits should be developed by Municipal Officials with close coordination of the Solicitor for the municipalities.]

PART A - GENERAL INFORMATION

A.1 Landowner Information (Consistent with recorded deed for parcel):*

Owner: _____

Address: _____

Telephone Number: _____

*Attach additional sheets for additional landowners if applicable.

A.2 Applicant Information (If different from landowner):

Name: _____

Address: _____

Telephone Number: _____

A.3 Drainage Plan Preparer & Certifying Engineer or Surveyor:

Name: _____

Address: _____

Telephone Number: _____

**EXHIBIT C
DRAINAGE PLAN APPLICATION FORM – SHEET 2 of 3**

[This exhibit presents an example only. The Model Ordinance and Exhibits should be developed by Municipal Officials with close coordination of the Solicitor for the municipalities.]

PART B – DEVELOPMENT DATA & OWNER CERTIFICATION

B.1 Name and brief description of development activity and proposed use of site:

B.2 Somerset county tax map number(s) of parcel being divided or developed:

B.3 County 911 address or mailing address for parcel:

B.4 Directions to site:

B.5 Site data:

Total acreage of parcel: _____

Proposed disturbed acreage: _____

E&S Plan approval date and SCD project number: _____

Water supply system: _____

Sewer disposed system: _____

Length of new streets to be constructed: _____

Water encroachment approval date and project number (If applicable): _____

Wetlands encroachment approval dates project number (If applicable): _____

PennDOT occupancy approval date and project number (If applicable): _____

B.6 Owner Certification:

Upon signing this application, the owner does hereby grant permission to the municipality, their staff, and/or their agent(s) to enter upon the above-mentioned parcels for the purposes of site-inspection(s) until such time as the application is formally withdrawn; or if development activities are implemented, so long as developed facilities exist.

Signature of Owner(s) _____ Date _____

Signature of Owner(s) _____ Date _____

EXHIBIT C
DRAINAGE PLAN APPLICATION FORM – SHEET 3 of 3

[This exhibit presents an example only. The Model Ordinance and Exhibits should be developed by Municipal Officials with close coordination of the Solicitor for the municipalities.]

PART C – APPLICATION CHECKLIST and PROFESSIONAL CERTIFICATE

C.1 Application checklist:

Yes No N/A

- Plan drawings per Ordinance Section 5.2.A.
- Stormwater runoff computation and descriptive narrative per Ordinance Section 5.2.B.
- Groundwater recharge computations and descriptive narrative per Ordinance Section 5.2.C.
- Written plan for post-construction, long-term operation and maintenance of all permanent stormwater management facilities per Ordinance Section 5.2.D.
- E&S Plan and written notification from the Conservation District approving same per Ordinance Section 5.2.E.
- Narrative and computations for proposed BMPs per Ordinance Section 5.2.F.
- For projects involving an earth disturbance in excess of one acre, copy of NPDES Permit for Control of Stormwater During Construction per Ordinance Section 5.2.G.
- If disturbance involves in excess of one acre but an NPDES Permit is determined not to be required by the Conservation District or PADEP, then a copy of written documentation from the Conservation District or the PADEP indicating same per Ordinance Section 5.2.G.
- For projects involving encroachment of waterways, wetlands, or dams subject to permit(s) as defined under regulations at 25 Pa. Code Chapter 105, copy of permit(s) from the PADEP authorizing same per Ordinance Section 5.2.H.
- For projects involving encroachments to State highway right-of-way subject to PennDOT occupancy permit(s), copy of permit(s) from PennDOT authorizing same per Ordinance Section 5.2.I.

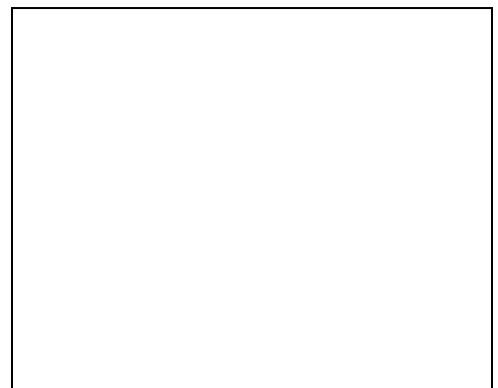
C.2 Professional Certification:

I hereby certify that the Drainage Plan was prepared by myself, or under my direct supervision and further certify that the Drainage Plan meets all design standards and criteria of the Ordinance.

Signature

Printed name and title

Date



SEAL

**EXHIBIT D
FEE SCHEDULE**

[This exhibit presents an example only. The Model Ordinance and Exhibits should be developed by Municipal Officials with close coordination of the Solicitor for the municipalities.]

D.1 Drainage Plan Application Fee.....	\$100.00
D.2 Drainage Plan Review Fee – Initial Review	\$ 50.00
(Review to be completed by engineer for municipality. To be submitted with application).	
D.3 Drainage Plan Review Fee – Supplemental Reviews.....	\$ 25.00
(Review by engineer for municipality of supplemental information submitted by applicant in response to written disapproval of an application).	
D.4 Drainage Plan – Construction Inspection Fee	\$ 25.00
(Applicant shall notify the municipality two business days prior to any construction related to the Drainage Plan per Section 6 of the Model Ordinance).	
D.5 Drainage Plan – Completion Notification Fee.....	\$ 25.00
(To be submitted with documentation of completion of construction per Section 6 of the Ordinance. Fee to cover review of documentation by engineer for the municipality).	

**EXHIBIT E
REQUIREMENTS FOR FINANCIAL GARANTEES BY
OPERATIONS AND MAINTENCE AGREEMENT**

[This exhibit presents an example only. The Model Ordinance and Exhibits should be developed by Municipal Officials with close coordination of the Solicitor for the municipalities.]

THIS AGREEMENT, made and entered into this _____ day of _____, 20__, by and between _____, (hereinafter the "Landowner"), and _____, Somerset County, Pennsylvania, (hereinafter "Municipality");

WITNESSETH

WHEREAS, the Landowner is the owner of certain real property as recorded by deed in the and records of _____ County, Pennsylvania, Deed Book _____ at Page____, (hereinafter "Property").

WHEREAS, the Landowner is proceeding to build and develop the Property; and

WHEREAS, the Drainage Plan approved by the Municipality (hereinafter referred to as the "Plan") for the property identified herein, which is attached hereto as Appendix A and made part hereof, as approved by the Municipality, provides for management of stormwater within the confines of the Property through the use of Best Management Practices (BMP's) and

WHEREAS, the Municipality, and the Landowner, his successors and assigns, agree that the health, safety, and welfare of the residents of the Municipality and the protection and maintenance of water quality require that on-site stormwater Best Management Practices be constructed and maintained on the Property; and

WHEREAS, for the purposes of this agreement, the following definitions shall apply:

BMP – "Best Management Practices." Activities, facilities, designs, measures or procedures used to manage stormwater impacts from land development, to protect and maintain water quality and groundwater recharge and to otherwise meet the purposes of the Model Stormwater Management Ordinance, including but not limited to infiltration

trenches, seepage pits, filter strips, bioretention, wet ponds, permeable paving, rain gardens, grassed swales, forested buffers, sand filters and detention basins.

WHEREAS, the Municipality requires, through the implementation of the plan, that stormwater Management BMP's as required by said Plan and the Model Stormwater Management Ordinance be constructed and adequately operated and maintained by the Landowner, his successors and assigns. and

NOW, THEREFORE, in consideration of the foregoing promises, the mutual covenants contained herein, and the following terms and conditions, the parties hereto agree as follows:

1. The BMPs shall be constructed by the Landowner in accordance with the plans and specifications identified in the Plan.
2. The Landowner shall operate and maintain the BMP(s) as shown on the Plan in good working order acceptable to the Municipality and in accordance with the specific maintenance requirements noted on the Plan.
3. The Landowner hereby grants permission to the Municipality, its authorized agents and employees, to enter upon the property, at reasonable times and upon presentation of proper identification, to inspect the BMP(s) whenever it deems necessary. Whenever possible, the Municipality shall notify the Landowner prior to entering the property.
4. In the event the Landowner fails to operate and maintain the BMP(s) as shown on the Plan in good working order acceptable to the Municipality, the Municipality or its representative may enter upon the Property and take whatever action is deemed necessary to maintain said BMP(s). This provision shall not be construed to allow the Municipality to erect any permanent structure on the land of the Landowner. It is expressly understood and agreed that the Municipality is under no obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the Municipality.

5. In the event the Municipality, pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner shall reimburse the Municipality for all expenses (direct and indirect) incurred within 10 days of receipt of invoice from the Municipality.
6. The intent and purpose of this Agreement is to ensure the proper maintenance of the onsite BMP(s) by the Landowner; provided, however, that this Agreement shall not be deemed to create or effect any additional liability of any party for damage alleged to result from or be caused by stormwater runoff.
7. The Landowner, its executors, administrators, assigns, and other successors in interests, shall release the Municipality's employees and designated representatives from all damages, accidents, casualties, occurrences or claims which might arise or be asserted against said employees and representatives from the construction, presence, existence, or maintenance of the BMP(s) by the Landowner or Municipality. In the event that a claim is asserted against the Municipality, its designated representatives or employees, the Municipality shall promptly notify the Landowner and the Landowner shall defend, at his own expense, any suit based on the claim. If any judgment or claims against the Municipality's employees or designated representatives shall be allowed, the Landowner shall pay all costs and expenses regarding said judgment or claim.
8. The Municipality shall inspect the BMP(s) at a minimum of once every three years to ensure their continued functioning.

This Agreement shall be recorded at the Office of the Recorder of Deeds of Somerset County, Pennsylvania, and shall constitute a covenant running with the Property and/or equitable servitude, and shall be binding on the Landowner, his administrators, executors, assigns, heirs and any other successors in interests, in perpetuity.

ATTEST:

WITNESS the following signatures and seals:

(SEAL)

For the Municipality:

(SEAL)

For the Landowner:

ATTEST:

_____ (City, Borough, Township)

County of Somerset, Pennsylvania

I, _____, a Notary Public in and for the County and State aforesaid, whose commission expires on the _____ day of _____, 20____, do hereby certify that _____ whose name(s) is/are signed to the foregoing Agreement bearing date of the _____ day of _____, 20____, has acknowledged the same before me in my said County and State.

GIVEN UNDER MY HAND THIS _____ day, of _____, 20____,

NOTARY PUBLIC

(SEAL)

I. INTRODUCTION

This Stormwater Management Plan (Plan) was developed for the Coxes Creek Watershed based on the requirements of the Stormwater Management Act, P.L. 864 (No. 167), October 4, 1978 (Act 167). Refer to Exhibit 1 for a copy of Act 167. The watershed covers approximately 65 square miles and includes portions of seven municipalities, all in Somerset County, Pennsylvania, including portions of Black Township, Brothersvalley Township, Milford Township, Rockwood Borough, Somerset Borough, Somerset Township, and Stonycreek Township.

New land development inherently involves the creation of additional impervious areas, i.e. roofs, parking lots, driveways, etc. over areas that were previously natural. A much greater percentage of rainfall cannot infiltrate into the ground and thereby runs off the site after development. Without proper controls, development will cause an increase in total stormwater flows, peak flows, stream velocities (causing soil erosion and sedimentation), and floodwater elevations. Also, without proper controls, development will decrease groundwater recharge with adverse impacts to base flows of streams and the environmental integrity of waterways and wetlands.

At the present, stormwater management requirements throughout the Coxes Creek Watershed vary with regards to municipality and permit authorization desired. Furthermore, portions of the existing municipal ordinances are inconsistent with state requirements and sound water and land-use practices. Therefore, the goal of this Plan is to develop a consistent watershed-wide plan, using sound engineering judgment, for controlling the excess runoff created by new land development. In association with development of this Plan, a Model Stormwater Ordinance has been developed to guide municipalities in the watershed in the adoption of appropriate ordinances consistent with the conclusions of this Plan.

Act 167 requires the adoption, by the Somerset County Commissioners, of a Stormwater Management Plan for the Coxes Creek Watershed. Upon PADEP approval of the Plan adopted by the Somerset County Commissioners, each municipality is required under the provisions of Act 167 to adopt ordinances for control of stormwater consistent with the conclusions and recommendations of the Plan. Act 167 also authorizes funding to support municipal implementation of ordinances adopted under an Act 167 Plan. Failure of a municipality to adopt such ordinances can result in penalties to the municipality as defined by Act 167 including, but not limited to, withholding of funds payable to the municipality from the Pennsylvania General Fund.

The Plan is a two-volume document. Volume I of the Plan is a stand-alone document intended to fully document the Plan, for the purpose of providing all necessary information to municipalities, planning agencies, and the public. Volume II is a compilation of modeling data for TR-20 modeling completed in support of the Plan. Volume II is on file at the Somerset County Planning Commission, to support future updates of the Plan. Full size (1"=2000' Scale) copies of plates in Appendix A of the Plan are also on file with Volume II.

II. ACT 167 PLANNING AND IMPLEMENTATION

The purpose of this Section of the Plan is to provide a synopsis of the Act 167 planning process.

II.A Act 167

Act 167, known as the “Storm Water Management Act”, was enacted by the General Assembly of the Commonwealth of Pennsylvania in 1978 to address the following findings:

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

Act 167 prescribes evaluation and planning for stormwater management on a watershed-level basis. Since watersheds typically encompass multiple municipalities, Act 167 establishes county-level responsibility for development and adoption of a watershed Stormwater Management Plan for each watershed in the state. A total of 358 watersheds in the Commonwealth of Pennsylvania are required to have county-adopted Stormwater Management Plans. To date, 105 of the 358 watersheds have had plans adopted. Coxes Creek is the first of 15 watersheds in Somerset County subjected to an Act 167 planning process. Act 167 planning for a second watershed in Somerset County, the Stonycreek watershed, is currently in progress.

Act 167 mandates local municipality adoption of ordinances to manage stormwater consistent with the county-adopted Act 167 Plan. Local municipalities are also thus responsible for enforcement of proper stormwater management in conjunction with land development.

II.B PADEP Policy

The PADEP established a “Comprehensive Stormwater Management Policy” on September 28, 2002, (PADEP, 2002). A copy of the policy is provided in Exhibit 2 of this Plan. The policy is germane to PADEP regulation of stormwater under requirements of Act 167, as well as other programs including PADEP responsibilities under the federal Clean Water Act.

Excerpts from the policy regarding intent and purpose are as follows:

1. **Policy:** The Department will ensure activities and plans approved under its authority will employ stormwater management plans utilizing best management practices to protect and maintain ground water resources, preserve ground water supplies, maintain stream base flows, and protect, preserve, and maintain the physical stability, and environmental integrity of waters of the Commonwealth.
2. **Purpose:** Clean, reliable ground water and surface water resources are critical for sustaining the environmental health of our natural resources, protecting the public’s health and safety, and maintaining the economic vitality of the Commonwealth. The purpose of this policy is to ensure effective stormwater management to minimize the adverse impacts of stormwater on ground water and surface water resources to support and sustain the social, economic and environmental quality of the Commonwealth, and to integrate federal Clean Water Act Stormwater Management requirements.

The policy reflects current conventional scientific and engineering recommendations for comprehensive stormwater management. The policy is consistent with the Act 167 mandates related to management for groundwater recharge and comprehensive management of resources and the environment. It is noted that conventional scientific and engineering recommendations for comprehensive stormwater management have evolved appreciably since passage of Act 167 in the 1970’s, at which time conventional recommendations typically focused on aspects related to flood flows and protection of public property and safety.

II.C Coxes Creek Plan

Somerset County initially embarked on an Act 167 planning process for the Coxes Creek Watershed in the early 1990’s. The first phase of planning culminated in a “Scope of Study” document (Hess, 1991) which outlined the approach for the development of a comprehensive Stormwater Management Plan for the Coxes Creek Watershed.

The second phase of the development of the Plan for the Coxes Creek was initiated in 2000. At that time, Somerset County entered into an agreement (PADEP, 2000a) with the PADEP to develop the Plan with 75 percent of funding required to complete the Plan provided by the PADEP. Crouse & Company was retained to develop the Plan. The Plan reported herein culminates the second phase of the Act 167 planning for the Coxes Creek Watershed.

The third and final phase of Act 167 planning for the Coxes Creek Watershed will involve local municipality implementation of Plan recommendations through adoption and enforcement of municipal ordinances consistent with the Plan. Somerset County is required by Act 167 to re-evaluate and update the Plan on an ongoing basis (5-year minimum frequency for updates required).

III. COXES CREEK WATERSHED CHARACTERISTICS

The purpose of this Section of the Plan is to summarize characteristics of the Coxes Creek Watershed.

Coxes Creek drains a total surface area of approximately 65 square miles and originates as tributaries to Lake Somerset in Somerset Township and ultimately discharges into the Casselman River at Rockwood Borough. Coxes Creek is located in the central portion of Somerset County and is contained within seven municipalities including portions of Black Township, Brothersvalley Township, Milford Township, Rockwood Borough, Somerset Borough, Somerset Township, and Stonycreek Township as indicated in Table III-1 and illustrated on Figure 1.

III.A Data Collection

Data was compiled on the physical features of the watershed and integrated into an Arcview Geographical Information System (GIS) for the watershed. Figures 1 through 12 in Appendix A summarize GIS data for the watershed. Primary data sources for the GIS are as follows:

1. **Base Map:** The base map, as shown on Figure 1, for the GIS was generated from United States Geologic Survey (USGS) 1:24,000 scale topographic quadrangles and from files downloaded from Pennsylvania Spatial Database Access (PASDA). The outline of the Coxes Creek Watershed was determined by digitizing ridgeline locations surrounding the major tributaries of the watershed. The location of lakes, municipal boundaries, roads, and streams were downloaded from PASDA and incorporated into the digitized boundaries of the watershed.
2. **Topography:** Subwatersheds or subareas used in the watershed modeling process, as shown on Figures 1A and 2, were delineated utilizing digital elevation models (DEMs) downloaded from the USGS. Spatial Analyst for ArcView Version 3.2 was used to identify the subareas, drainage courses, land slopes and lengths, and drainage element lengths and slopes from the DEMs. To check the output of the GIS, the subareas were also delineated utilizing 1:24,000 USGS topographic quadrangles.

3. **Soils:** Soil mapping, as shown on Figure 3, was obtained utilizing the Soil Survey Geographic (SSURGO) database for Somerset County, PA. This database is a digital soil survey prepared by the U. S. Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS). Prime Farmlands and Hydrologic Soil Groups are shown on Figures 4 and 4A. Soil Erodibility is shown on Figure 5.
4. **Geology:** The surface geology information, presented, as shown on Figure 6, was obtained from PASDA and incorporated into the overall GIS mapping.
5. **Land Use/Zoning:** Existing land use data, as shown on Figures 7A and 7B, was determined from a review of Somerset County tax maps, USGS topographical quadrangles and information obtained from the Somerset County Assessment Office. In addition, aerial photographs, soil survey maps, field verification, and personal knowledge were used in this determination.
6. **Wetlands:** Wetland quadrangle maps, as shown on Figure 12, were obtained from the United States Fish and Wildlife Services National Wetlands Inventory and incorporated into the overall GIS mapping.

Data collection also involved interaction with municipalities in the watershed and with county-level planning agencies. This interaction involved collection and evaluation of existing information regarding control and management of stormwater in the watershed. Interaction also involved completion of Watershed Plan Advisory Committee meetings (WPAC) including meetings conducted on September 27, 2001 and November 15, 2001. PADEP representatives participated in the meetings. At said meetings, the approach to development of the plan as outlined in the “Scope of Study” document was confirmed by virtue of minimal comment from municipal officials. Said meetings indicated no systematic stormwater management problems or issues for the watershed by virtue of minimal comment on the matter from municipal officials. In addition, a “Municipalities Questionnaire” was distributed in conjunction with the meetings. However, no completed questionnaires were received. Subsequently, meetings were completed by Crouse & Company individually with representatives of most of the municipalities. Said meetings confirmed input from municipalities received from the WPAC meetings (e.g., minimal comment on the approach to development of the Plan and no identification of systematic stormwater problems or issues for the watershed). A draft of the Model Ordinance was presented and distributed to officials of municipalities comprising the Coxes Creek Watershed at a meeting conducted on March 26, 2003. At that time, comments were requested to be received from attending officials. No comments were

subsequently received. The Model Ordinance in Appendix D is the same as the draft Model Ordinance presented/distributed on March 26, 2003, except for revisions to associated Exhibits C, D, and E. Pertinent documentation related to interaction with municipalities and with county-level planning agencies is provided in Appendix E. Said documentation includes a listing of WPAC Committee members; Attendance Sheets for the September 27, 2001 and November 15, 2001 meetings; the Municipalities Questionnaire; and list of invitees and attendance sheet for the March 26, 2003 meeting.

III.B Physical Characteristics

III.B.1 Drainage Area

Coxes Creek drains a watershed area of approximately 65 square miles and begins as tributaries to Lake Somerset in Somerset Township. Coxes Creek then flows southwest through Somerset Borough and then acts as the boundary between Milford and Black Townships and Rockwood Borough before discharging to the Casselman River.

There are no United States Geological Survey (USGS) stream gages or water quality monitoring stations in the watershed.

The eight major tributaries of Coxes Creek are Bromm Run, Dempsey Run, East Branch Coxes Creek, Kimberly Run, Laurel Run, Rice Run, West Branch Coxes Creek, and Wilson Creek as indicated on Figure 1. Smaller tributaries include Parson Run, and several other unnamed tributaries. A total of 141 subwatersheds were established for watershed modeling with subwatersheds based on existing roadway obstructions as indicated on Figures 1A and 10.

Subwatersheds within the overall Coxes Creek Watershed have Designated Uses including Cold Water Fishes (CWF), Warm Water Fishes (WWF), and Trout Stocking (TSF) per Chapter 93, Title 25 of Pennsylvania Code. Designated Uses for specific subwatersheds are indicated in Table III-2.

III.B.2 Topography and Streambed Profile

The topography of the watershed is characterized by rolling, gentle to steep hills of moderate relief. Elevations within the watershed range from a low of 1790 feet above sea level (USGS datum) at the confluence with Casselman River to 2720 feet at the unnamed hill just south of where S.R.219 exits the watershed. Figure 2 is a digital elevation model for Coxes Creek Watershed.

The valleys of the streams are broad and the streams slope gently. The streams generally have shallow beds with gravel obstructions. The average streambed slope of Coxes Creek is approximately 0.7 percent.

III.B.3 Soils

Soils are grouped together into soil series, which are groups of soils that exhibit a regularly repeating pattern. There are a total of twenty-five soil series identified within the Coxes Creek Watershed, as illustrated on Figure 3. These twenty-five soil series belong to two soil associations, the Rayne-Gilpin-Wharton-Cavode and Hazelton-Cookport soil associations. The Rayne-Gilpin-Wharton-Cavode soil association accounts for about 80 percent of the soil within Coxes Creek Watershed. These soils are nearly level to very steep tops and side slopes of hills and ridges predominantly found on broad uplands on hills and ridges that are dissected by streams. Soils belonging to this association typically form in material weathered from shale and sandstone. The Hazelton-Cookport association on the other hand accounts for 20 percent of the soils in the watershed and are described nearly level to very steep, deep, well drained and moderately well drained soils on foot slopes of hills and mountains.

Soil properties are known to influence the process of runoff generation. Hydric soils and soils showing hydric inclusions are shown on Figure 4. The USDA-NRCS has established criteria determining how soils will affect runoff by placing all soils into Hydrologic Soil Groups (HSGs). HSGs are broken down into four sub-groups (A through D) based on infiltration rate and depth. Group A soils have the lowest runoff potential and are typically sands and gravels whereas the Group D soils have a high runoff potential and are typically comprised of clay soils. Group B is characterized as having moderate infiltration rates and consists primarily of moderately deep-to-deep, moderately well-to-well drained soils that exhibit a moderate rate of water transmission. Group C soils have slow infiltration rates when thoroughly wetted and contain fragipans, a layer that impedes downward movement of water and produces a slow rate of water transmission. The soils within the Coxes Creek Watershed are comprised equally of B, C, and D hydrologic soil groups as indicated on Figure 4A. There are no Group A soils in the watershed.

The USDA-NRCS soil survey for Somerset County includes indications of the erodibility potential of soils in response to surface water runoff. Erodibility potential is categorized as slight, moderate, or severe. The soils in the Coxes Creek Watershed are identified with regards to relative erosion potential on Figure 5.

III.B.4 Geology

The surface geology observed within Coxes Creek is illustrated on Figure 6 and primarily consists of the Allegheny Group and Glenshaw Formation, with lesser amounts of the Casselman Formation and Pottsville Group. The characteristics of the surface geology are detailed below:

- **Allegheny Group:** The Allegheny Group is composed predominantly of shale, siltstones, and sandstones, with freshwater limestones only occurring in the upper third of the Allegheny Group. Although coal only comprises approximately 10 percent of the group, it is important because of its commercial value.
- **Casselman Formation:** This formation lacks good key beds such as marine beds. The unit contains as many as fifteen thin, non-persistent coals and eight freshwater limestones or calcareous zones, most of which are discontinuous and similar in appearance.
- **Glenshaw Formation:** The Glenshaw Formation contains units which are generally more persistent and contains marine shales and limestones, a greater abundance of red beds, and a scarcity of freshwater limestones.
- **Pottsville Group:** Pottsville rocks generally form the crests and upper flanks of ridges and consist of alternating sequences of sandstones and coals. The typical thickness of this unit is 200 feet; however, thicknesses of only 80 feet have been observed in Somerset County.

III.B.5 Wetlands

Wetlands established by the National Wetlands Inventory (NWI) program are identified on Figure 12. Primary NWI riparian wetlands in the Coxes Creek Watershed include 1) the system of wetlands along the West Branch of Coxes Creek north and south of S.R.031,) the system of wetlands along the East Branch of Coxes Creek in/about Somerset Borough in the Pennsylvania Turnpike interchange area, and 3) the system of wetlands in the Kimberly Run Subwatershed.

There are numerous wetlands in Somerset County and the Coxes Creek Watershed which were not identified by the NWI program. However, no systematic mapping of these wetlands exists. The occurrence of hydric soils or soils with hydric inclusions is often an appropriate indicator for potential wetlands occurrence. Hydric soils and soils with hydric inclusions are indicated on Figure 4. Also, riparian areas for perennial and intermittent streams are potential wetlands areas. Streams are indicated on the Coxes Creek base map shown on Figure 1.

III.B.6 Climate

Somerset County is generally cool and humid with one-third of the precipitation falling in the form of snow. The average annual precipitation is about 45 inches of which slightly more than half falls between the months of April and September. The rugged topography of the area influences storm patterns, which in turn influences precipitation. The heaviest one-day rainfall event between 1951 and 1975 occurred at the town of Confluence on October 16, 1954 when 4.93 inches of rainfall was recorded. Thunderstorms occur on about 35 days each year with the majority occurring during the summer months. Average seasonal snowfall is 66 inches. Rapid snow-pack melt in conjunction with spring rains is a typical event affecting minor and major flood events for water courses in the Coxes Creek Watershed.

III.C Developed Characteristics

III.C.1 Land Use

Land use within the watershed consists of agricultural, commercial, industrial, public, and residential uses. Table III-3 displays the overall land use by category within the watershed while Figures 7A and 7B illustrates the existing land use within the watershed. Lumber, maple syrup, and Christmas tree production are important agricultural uses for the county. Although the land use in the Coxes Creek Watershed is diversified, large portions of the land are undeveloped with the potential for future development.

The Borough of Somerset, located on the East Branch of Coxes Creek, is the major center for industrial and commercial land use in the watershed today. Rockwood Borough, located at the confluence of Coxes Creek with the Casselman River, is the second major area of industrial and commercial land use. Some additional developments of industrial and commercial ventures are located along the larger state routes (i.e. Routes S.R.031, S.R.219, S.R.281, and S.R.601) within the watershed.

Prime agricultural areas, including areas designated as Prime Farmland Areas and Farmland of Statewide Importance, are indicated on Figure 4. Farmland management is subject to various programs administered by the Somerset Conservation District.

III.C.2 Land Development Patterns

Current residential and commercial growth is primarily occurring around the Somerset Borough area, which is situated near all of the major roadways (i.e., Pennsylvania Turnpike, S.R.031, S.R.219, S.R.281, and S.R.601) within the Coxes Creek Watershed. Growth is principally in portions of Somerset Township which surround Somerset Borough or the noted major roadways.

A primary factor affecting growth in the Coxes Creek Watershed is water and sewer infrastructure. Water supply and sewer infrastructure is extensive in/about Somerset Borough. Existing primary water systems operated by the Somerset Borough Municipal Authority and the Somerset Township Municipal Authority have basic capacity to support further development. This water system capacity is expected to be made more reliable with capacity for long-term growth by interconnection with the proposed Quemahoning Water Project in the next five years. Existing primary sewer systems operated by the Somerset Borough Authority and Township Authority have basic capacity to support further development in the watershed. The existing sewage treatment plant operated by the Somerset Borough Authority currently discharges to the East Branch of Coxes Creek at the southern limit of Somerset Borough. The existing Wells Creek Sewage Treatment Plant operated by the Somerset Township Authority discharges to Wells Creek outside the Coxes Creek Watershed but serves areas in the watershed. A sewage treatment plant proposed by the Somerset Township Authority will serve areas in the vicinity of Lavansville and support future growth in areas along S.R. 031 west of Somerset Borough.

Slow growth within the Coxes Creek Watershed is expected to continue for the next 5 to 10 years with primary developed areas growing in portions of Somerset Township about Somerset Borough and about primary roadways. For purposes of hydrologic and hydraulic modeling of the Coxes Creek Watershed, 23 subwatersheds including subwatersheds 1, 2, 3, 8, 16, 17, 18, 27, 30, 32, 33, 34, 35, 43, 45, 47, 51, 65, 69, 71, 72, 136, and 138 are estimated to experience slow to moderate growth in the next five years. These areas are indicated on Figure 8.

Somerset County is currently embarked on developing an updated Comprehensive Plan for the county. The Comprehensive Plan will provide a more detailed assessment and projection of development within the Coxes Creek Watershed. The Coxes Creek Watershed is central to Somerset County and Comprehensive Plan assessments and projections should be considered and incorporated in future updates of the Coxes Creek Stormwater Management Plan.

III.C.3 Obstructions

Significant watercourse obstructions in the Coxes Creek Watershed were inventoried in support of development of the Plan. Obstructions were established based upon existing roadway encroachments to intermittent and perennial streams in the watershed. The inventory effort included review of available mapping then field reconnaissance of each obstruction location to confirm/refine the inventory. A total of one hundred forty one (141) obstructions were established as identified in Appendix C of this Plan. For modeling purposes, a subwatershed was established for each of the 141 obstructions. Subwatersheds and obstructions are identified on Figure 10.

Estimated flow capacities were established for each of the obstructions in the inventory. For culverts, flow capacities were estimated assuming inlet control and a 1-foot headwater depth. For bridges, capacities were estimated assuming open channel flow by Manning's equation. Slopes for culverts and channels were estimated based in existing mapping and select field reconnaissance. It is noted that capacities for existing obstructions as reported herein are approximate. Detailed assessments of capacity, if necessary, should be established by site-specific evaluations. Estimated capacities for inventoried obstructions are presented in Appendix C.

Flood flows were estimated for each obstruction location for existing and future conditions for 2-, 5-, 10-, 25-, 50-, and 100-year rainfall events. Flood flows were estimated by TR-20 modeling. Refer to Section IV of this Plan for a summary of TR-20 modeling for the Coxes Creek Watershed. Flood flow estimates for each obstruction location are provided in Table III-4. A comparison of estimated flood flows and estimated obstruction capacities are also provided in Table III-4. Estimated flood flows by TR-20 modeling are approximate. Typically, the modeling effort would be expected to provide estimates on the order of ± 50 percent. Estimates of capacity of existing obstructions are similarly approximate. The comparison of flood flows and existing obstruction capacity in Table III-4 should thus be considered a planning-level assessment. Site-specific evaluations should be completed for specific obstructions, if appropriate.

The 25-year flood flow is an appropriate design flow for obstructions in the Coxes Creek inventory as typically associated with local and private roadways. Based upon information presented in Table III-4, obstructions for which the 25-year flood flow exceeds the obstruction capacity are indicted on Figure 11.

III.C.4 Development in Flood Hazard Areas

The U.S. Department of Housing and Urban Development, Federal Insurance Administration, and the Federal Emergency Management Agency (FEMA) have prepared Flood Insurance Studies and/or Flood Insurance Rate Maps for all municipalities included within the Coxes Creek Watershed. The 100-year floodplain as established from available FEMA Flood Insurance Rate Maps for the Coxes Creek Watershed were obtained from PASDA and added to the GIS base map. Available FEMA Flood Insurance Rate Studies and Flood Insurance Rate Maps for areas in the Coxes Creek Watershed are summarized on Table III-5. FEMA-delineated flood plains in the Coxes Creek Watershed are shown on Figures 9A and 9B.

Some existing development has occurred in FEMA-delineated flood plains as indicated by comparison of Figures 7A and B versus Figures 9A and B. This existing development principally occurs along the East Branch of Coxes Creek in Somerset Borough. Said existing development principally occurred long ago prior to establishment of programs to delineate floodplains and prior to regulation of development in the floodplains under the direction of FEMA. Said existing development also typically occurred prior to systematic PADEP regulation of development in/about waterways under Chapter 105, Title 25 of Pennsylvania Code.

III.C.5 Drainage Problems

The topic of drainage problems was discussed with municipal and planning officials at WPAC meetings and subsequently at individual meeting with most involved municipalities. Information regarding drainage problems indicated at those forums suggests that no systematic flood-related problems are apparent in the Coxes Creek Watershed. Rather, identified problems appear to be local in nature and related to undersized or clogged inlets, drainage channels, or culverts. Localized flooding at local and private roads is consistent with data for obstruction capacities in comparison to various flood flows indicated in Table III-4 and on Figure 11.

Areas along the East Branch of Coxes Creek in and about Somerset Borough were identified as prone to recurrent nuisance flooding. That problem is principally related to historic development in the flood plain prior to robust consideration of flood plains currently addressed by FEMA flood insurance programs or waterways regulation by PADEP under Chapter 105, Title 25, of Pennsylvania Code. The areas along the East Branch of Coxes Creek about 2,000 feet upstream and 6,000 feet downstream of the S.R.031 crossing are particularly prone to nuisance flooding. Flooding in these areas is exasperated by the occurrence of heavy vegetative growth in the channel and damming of the channel by beavers. Maintenance of the channel in this area is hampered by state requirements to maintain existing habitat.

An area near the Rockwood Borough and Milford Township border along S.R.3015 near the Meadow View Heights development was also identified as subject to recurrent nuisance flooding. This problem is apparently related to inadequate channel/culvert capacity with corrective measures hampered by requirements for construction in PennDOT right-of-ways.

III.C.6 Storm Sewer Systems

Storm sewer systems of varying complexity exist for developed areas within the Coxes Creek Watershed. Notable systems which affect the character of stormwater runoff in the watershed include the following:

- **Somerset Borough:** Somerset Borough has an existing storm sewer system which collects stormwater on roads and streets in the Borough and outfall to the East Branch of Coxes Creek and Parson Run. The system does not have detention facilities. The system serves an area of less than 50,000 people and thus was exempt from MS-4 program activities and associated permitting in 2003 under the direction of PADEP.
- **Lake Somerset and Trolls Dam:** Major impoundments in the upper reaches of the watershed include Lake Somerset (owner Pennsylvania Fish and Boat Commission, drainage area 3.97 sm, storage 3,392 ac-ft.) on the East Branch of Coxes Creek and Trolls Dam (privately owned, drainage area 0.8 sm, storage 170 ac-ft. at spillway crest) on the West Branch of Coxes Creek. While neither impoundment was designed for flood control purposes, the impoundments attenuate storm flows to an undetermined degree.
- **Pennsylvania Turnpike:** The Pennsylvania Turnpike crosses the upper reaches of the watershed. Reconstruction of the segment in the Coxes Creek Watershed is ongoing in 2003. Reconstruction includes the main roadway, the Somerset interchange in the Borough, and existing service

plazas in Somerset Township. Reconstruction involves upgrades to storm sewers and detention structures.

- **Interchange Area Development:** Commercial developments in the interchange area and the S.R.601 corridor typically involve onsite storm sewers. Some onsite systems have detention. System designs typically have been affected by requirements related to occupancy or access to PennDOT right-of ways.
- **NWI Wetlands:** NWI Wetlands in the East and West Branches of Coxes Creek present overbank and recharge areas for the upper reaches of the watershed. For the wetlands in the East Branch, the area upgradient of the former railroad right-of-way serves as a natural storm flow detention feature by virtue of limiting cross drain capacity.
- **Systems for Major Subdivisions:** The current county land development regulations were enacted in 1991. Major subdivisions under the regulations (involving more than three lots) typically include onsite stormwater controls, including stormwater detention for higher-density developments.

III.C.7 State, Federal, and Local Flood Control Projects

Flood control projects in the watershed include the following:

- The Pennsylvania Department of Environmental Protection performed a channel improvement project on the East Branch of Coxes Creek to the East of Somerset Borough in 1985.
- Rockwood Borough has a system of levees along Coxes Creek and the Casselman River to limit floodwaters completed under the supervision of USACOE. The Rockwood Borough Flood insurance Study, dated June 18, 1990, concluded that the existing levee system did not have sufficient freeboard to meet FEMA specifications.

There are no known planned or proposed flood control projects within the Coxes Creek Watershed.

III.C.8 Regional Storm Water Control Facilities

There are no known or proposed regional stormwater control facilities for the Coxes Creek Watershed.

IV. COXES CREEK TECHNICAL ANALYSIS

The purpose of this Section of the Plan is to summarize the hydrologic and hydraulic modeling completed for the Coxes Creek Watershed (Coxes Creek Model).

IV.A Model Development

IV.A.1 Setup

The first step of the modeling process required delineation of the watershed area on the base mapping as indicated on Figure 1. The watershed was then subdivided into 141 smaller sub-watersheds based on significant obstructions (bridges, culverts, etc.) and confluence points of tributaries as shown on Figure 1A.

The next step was the choice of a hydrologic model. Following review of the available methods and consultation with representatives of the PADEP, the Soil Conservation Service Technical Release 20 model (TR-20; SCS, 1992), utilizing the STREMTUL TR-20 Interface (Lancaster County, 2003), was determined to be the best fit for the Coxes Creek Watershed. The TR-20 computer program, Release 2.04TEST, as embedded in the STREMTUL computer program, Version 2.3, was specifically used to model the Coxes Creek Watershed. STREMTUL provides pre-and post- processing functions for TR-20 modeling data. STREMTUL was developed by Lancaster County to support their completion of Act 167 planning processes.

The required hydrologic model inputs included the development of the following:

1. SCS Curve numbers were calculated for existing and future land-uses from values recommended in SCS Technical Release 55 (TR-55; SCS, 1986) for each subarea utilizing the GIS hydrologic soil group and land-use data as shown on Figures 4A, 7B and 8. Weighted curve numbers for each watershed subarea for existing and future conditions respectively are presented in Table IV-1.
2. The time of concentration is defined in TR-55 as the time for runoff to travel from the hydraulically most distant point within the watershed. For each subarea, a time of concentration was calculated using the procedures outlined in TR-55 and data from the watershed base map and digital elevation model as shown on Figures 1A and 2.
3. Drainage areas for each sub-watershed were determined from the base mapping as summarized in Table IV-1.

4. Channel slopes and cross-section information for channels and overbanks were obtained from field reconnaissance, available data, and available mapping.
5. Input values for the Manning's n for channel routing were obtained from Table 5-6 of *Open Channel Hydraulics* (Chow, 1959). Rating curves for channel sections at each obstruction location were estimated from cross-section data and Manning's n using STREMTUL pre-processing functions.
6. *PC Rainfall Program PDT-IDF, Design Storm and SCS Excess Storm Hyetograph Estimates* (Aron, 1995) which is based on *Field Manual of Pennsylvania Department of Transportation Storm Intensity-Duration-Frequency Charts PDT-IDF* (Aron, 1986) was used to determine rainfall depths for the watershed. The subject area falls within PennDOT Region 3.

The design storms of interest were the 2, 5, 10, 25, 50 and 100-year storms. Design storms were run utilizing TR-20 and STREMTUL. The hydrograph for each subarea was routed through the watershed, so that at the confluence of Coxes Creek and the Casselman River in Rockwood Borough, all 141 subareas were contributing to the storm flows.

As discussed in Section III.C.2, the only areas expected to realize significant future development are those located near major transportation routes and/or in areas with availability of public water and sewage. Knowledge of proposed land developments, sewer extensions and road improvements, as well as information provided by the Somerset County Planning Commission were used in analysis of current and projected growth trends. As a result, the following subareas are expected to exhibit growth of watershed-wide significance in the next ten years: 1, 2, 3, 8, 16, 17, 18, 27, 30, 32, 33, 34, 35, 43, 45, 47, 51, 65, 69, 71, 72, 136, and 138. These subareas are shown in Figure 8. Should development occur in these areas without proper stormwater controls, the increase in impervious area would be expected to cause an increase in runoff and peak flows. Significant development within the selected subareas was assumed to cause a 10% increase in impervious area. Therefore, the curve numbers used in the modeling of future conditions were increased by 10% as shown in Table IV-1.

IV.A.2 Calibration

All hydrologic models have inherent variability. Therefore, it is necessary to fine-tune the chosen model by comparison with available data and models. This calibration is accomplished by adjusting the model variables within their acceptable ranges to obtain model output that best matches the available data.

The preferred data to compare model output would be actual stream gage information. Unfortunately, there are no existing gages installed within the Coxes Creek Watershed. The only other available sources of information are the 100-year peak discharges included in the existing FEMA Flood Insurance Studies (FIS) as indicated in Table III-5 and other hydrologic models.

Results of the Coxes Creek Model were compared to available Flood Insurance Studies. The only areas in the Coxes Creek Watershed where a detailed FIS has been performed are within and adjoining to Somerset and Rockwood Boroughs. These FIS's are summarized as follows:

- **Somerset FIS:** The hydrologic analysis contained in the Somerset FIS, dated March 3, 1992, was prepared by Michael Baker, Jr., Inc. The Somerset FIS determined that of the available USGS gaging records of nearby watersheds, the existing gaging station on Big Piney Run, near Saltsburg, PA was the most similar to Coxes Creek. After adjusting for differences in area between the two watersheds, the Somerset FIS estimated peak flows for Coxes Creek using the regional curves contained in the report entitled *Floods in Pennsylvania, Frequency and Magnitude* (additional reference information on this source appears to have been inadvertently omitted from the FIS). The Somerset FIS estimated a 100-year flood of 6,680 cfs for the East Branch of Coxes Creek at South Center Avenue in Somerset Borough (e.g., the discharge point of Subwatershed 61).
- **Rockwood FIS:** The Rockwood FIS, dated June 18, 1990 and prepared by the USGS, utilized data from an existing USGS stream gage located near Markelton, PA along the Casselman River downstream of the confluence of Coxes Creek and the Casselman River. The Rockwood FIS analyzed annual gage peaks of record using USGS methods. The Rockwood FIS computed peak flows by weighted discharge estimates determined from regional regression equations. The Rockwood FIS then used drainage area ratios to determine the fraction of total flow contributed by the Coxes Creek Watershed. The Rockwood FIS estimated a 100-year flood of 8,980 cfs for Coxes Creek at the confluence with the Casselman River (e.g., the discharge point of Subwatershed 137).

Results of the Coxes Creek Model were also compared to peak flows calculated using *Procedure PSU-IV for Estimating Design Flood Peaks on Ungauged Pennsylvania Watersheds* (Aron, 1981). PSU-IV is a statistical peak flow estimating procedure based on hydrologic data from throughout Pennsylvania. PSU-IV is widely used for model calibration due to its relative ease of use, minimum of inputs, and peak outputs for storms of different return periods. PSU-IV estimates for the Coxes Creek Watershed were completed assuming a 5 percent impervious area consistent with the Coxes Creek GIS. PSU-IV estimated a 100-year flood of 5,036 cfs for the East Branch of Coxes Creek at South Center Avenue in Somerset Borough, and, a 100-year flood of 10,632 cfs for Coxes Creek at the confluence with the Casselman River.

For the Coxes Creek Model, sensitivity analysis of the model parameters was performed as recommended in Section 5.3 of the TR-20 Manual. The variables which could be modified and still stay within accepted limits included the SCS Curve numbers, times of concentration, initial soil moisture condition, and Manning's n for channel and overbank flow. These variables were adjusted in the Coxes Creek Model within accepted limits in the interest of best correlations with FEMA FIS and PSU-IV flood flow estimates.

Also, for the Coxes Creek Model, based on a comparison of the TR-20 model results with the above-referenced FEMA FIS and PSU-IV estimates, it was determined that 2, 5, 10, 25, 50 and 100-year storms with a three-hour duration exhibit the most favorable correlation with the available data. Therefore, rainfall depths for a three-hour duration were used in the final TR-20 runs of the Coxes Creek Model. These rainfall amounts are as follows: 1.51 inches for the 2-year event, 1.80 inches for the 5-year event, 2.16 inches for the 10-year event, 2.48 inches for the 25-year event, 2.92 inches for the 50-year event, and 3.28 inches for the 100-year event.

IV.A.3 Verification

Coxes Creek Model estimates of flood flows at Rockwood and Somerset Boroughs are compared with PSU-IV estimates, and available FIS estimates, as shown in Tables IV-2 and IV-3. The peak flows compare favorably, and, are within ranges of watershed modeling estimates typically reported for Act 167 studies.

IV.B Model Results

Results of TR-20 modeling effort for the Coxes Creek Watershed are presented in Table III-4. That table presents estimated flood flows for existing and projected future conditions for each of the 141 obstruction locations within the Coxes Creek Watershed. Detailed computer outputs associated with the Coxes Creek Model are provided in Volume II of the Plan.

It is noted that conventional watershed modeling techniques as defined by TR-20 and TR-55, and as used for the Coxes Creek Model reported herein, assume that extreme flooding events result from runoff from a rainfall event (e.g., specific depth of rainfall over given time period) which uniformly affects the entire watershed. For areas in Somerset County, extreme flooding events are often related to rapid snow-pack melt in conjunction with spring rains. Thus, some flood events in the Coxes Creek Watershed may result from conditions very different from the TR-20 approach of the Coxes Creek Model.

V. TECHNICAL STANDARDS AND CRITERIA FOR CONTROL OF STORMWATER RUNOFF

The purpose of this Section of the Plan is to present recommendations for management of stormwater in the Coxes Creek Watershed.

In the context of standards and criteria, and based upon data presented in prior sections of this Plan, a synopsis of the watershed situation is as follows: The Coxes Creek Watershed is largely undeveloped except for areas in/about Somerset Borough. Much of the developable area in the immediate vicinity of the Borough is already developed. Land development in the watershed has historically generally occurred slowly and slow growth in development is expected for the near future. No apparent systematic stormwater-related problems exist in the Coxes Creek Watershed.

Based on this current watershed situation, specific areas of stormwater management for which consideration of standards and criteria are appropriate include: 1) control of flooding, 2) protection of water quality, 3) maintaining groundwater recharge, 4) solution of existing drainage problems, and 5) regional stormwater management facilities. The following sections address these management topics.

V.A Flooding

The control of flooding and associated impacts on downstream properties is well-addressed by existing federal and state programs. The federal program includes the FEMA Flood Insurance Program which delineates 100-year flood plains and affects generally effective management of land development in the flood plain. Due to the rural, undeveloped nature of many areas in the Coxes Creek Watershed, detailed Flood insurance Studies have not yet been completed for many areas in the watershed. In the future, FEMA programs would be expected to address additional areas in the watershed, as appropriate. The state program for flood plain management principally involves PADEP oversight of development within floodway's under Chapter 105, Title 25 of Pennsylvania Code. Said state oversight is comprehensive with authority over all water courses defined to include any feature with "defined bed and bank" with the floodway to be 50-feet from the stream bank (or as established by FEMA). Overall, federal and state programs are adequate to manage flooding in the Coxes Creek Watershed.

Regarding control of peak flows from significant land development activities in the Coxes Creek Watershed, conventional approaches involving evaluation of the 2, 10, and 25-year storm events are appropriate with a standard that post-development peak flows not exceed pre-development peak flows for each event.

The just-discussed standards and criteria for control of flooding should be re-evaluated in time as the situation in the Coxes Creek Watershed evolves. Regular updates to the Plan as prescribed by Section X of the Plan prescribe such re-evaluations.

V.B Water Quality

Control of water quality in association with stormwater management including aspects related to stream bank erosion is the subject of increasing focus from state and federal programs. Streams in the Coxes Creek Watershed have designated uses of Cold Water Fishes (CWF), Warm Water Fishes (WWF), and Trout Stocking (TSF) as established by Chapter 93, Title 25 of Pennsylvania Code. At present, water quality in the watershed appears to be consistent with the designated use. There is no evidence to suggest that water quality is degraded by stormwater flows at present, nor expected to be degraded in the near future.

Federal and state programs to manage water quality including aspects regarding stormwater are in place. Oversight with respect to water quality related to land development is principally implemented by PADEP under Chapter 102, Title 25, of Pennsylvania Code. In the context of water quality, said oversight was importantly updated in December 2002 regarding “NPDES Phase II Standards” related to “Control of Stormwater During Construction”. That update included requirements for stormwater recharge which are expected to be protective of the CWF, WWF and TSF designated uses for the Coxes Creek Watershed. Overall, existing state and federal programs are adequate to manage water quality aspects of stormwater management for the Coxes Creek Watershed.

Again, the just-discussed standards and criteria for control of water quality should be re-evaluated in time as the situation in the Coxes Creek Watershed evolves. Regular updates to the Plan as prescribed by Section X of the Plan prescribe such re-evaluations.

V.C Groundwater Recharge

The interrelation of stormwater runoff and groundwater recharge is the subject of increasing focus from state and federal programs. Historically, design for stormwater management systems principally focused on peak flood flows and impacts on downstream areas. In the absence of stormwater management features to promote infiltration of rainwater at a site, a reduction of groundwater recharge after site development typically increased the volume of runoff away from the site.

For the Coxes Creek Watershed, recent land development has principally occurred in areas in which groundwater use was not substantial. There is no evidence to suggest that historic land development without explicit consideration to groundwater recharge has affected groundwater levels. It is noted that substantial wetland areas along the East Branch of Coxes Creek for the principally-developed areas in/about Somerset Borough may provide sufficient natural recharge areas to moderate any recharge affected by historic land development.

Federal and state programs to consider groundwater recharge as related to stormwater management are nascent. Oversight by the PADEP under Chapter 102, Title 25 of Pennsylvania Code as implemented in December 2002 (refer to discussion in Section V.B of this Plan) addresses groundwater recharge. Said oversight importantly requires evaluation of pre- and post-development runoff volumes with a goal of no increase in runoff volume for the 2-year storm event (ie, if runoff volume is maintained then infiltration/recharge is maintained). Overall, the existing state-led program is adequate for management of groundwater recharge in the Coxes Creek Watershed.

It is noted that the PADEP has initiatives underway to refine and elaborate regulations and design criteria regarding groundwater recharge. The PADEP has embarked on updating the State Water Plan based on legislation enacted in 2002 including significant consideration of the issue of groundwater recharge. In addition, the PADEP is updating its guidance on best management practices for stormwater including aspects for groundwater recharge (e.g. the development of the “Manual for Stormwater Management in Pennsylvania”) with target completion in 2004. Both of these initiatives are expected affect nascent criteria and standards for groundwater recharge in Pennsylvania.

Again, the just-discussed standards and criteria for groundwater recharge should be reevaluated as the situation for the Coxes Creek Watershed evolves per updating procedures established in Section X of the Plan.

V.D Existing Drainage Problems

As indicated in Section III.C.5 of this Plan, there are no apparent existing systematic drainage problems for the Coxes Creek Watershed.

Regarding localized nuisance flooding noted for the East Branch of Coxes Creek in the vicinity of Somerset Borough, the noted problem is principally related to historic development in the flood plain prior to modern-era regulations. Detailed evaluation of the problem is beyond the scope of this Plan. cursory evaluation indicates that efforts to remove constructed features from the flood plain would be a possible solution. The capital cost of such an approach would likely be significant. Construction of wetlands in conjunction with removal of the constructed features would benefit the watershed.

Regarding localized nuisance flooding along S.R.3015 near the Meadow View Heights development in the vicinity of Rockwood, the noted problem appears related to inadequate channel/culvert capacity. Detailed evaluation of the problem is beyond the scope of this Plan. cursory evaluation indicates that resolution of the problem is technically straight-forward with the only apparent issue lack of available funding.

V.E Regional Stormwater Management Facilities

Based upon evaluations completed in support of development of this Plan, there is no apparent need for regionalized stormwater management facilities for the Coxes Creek Watershed at this point in time.

VI. RUN-OFF CONTROL TECHNIQUES

The purpose of this Section of the Plan is to present run-off control techniques for the Coxes Creek Watershed.

Methods for control of stormwater are well established in scientific/engineering documentation and in state and federal regulations/guidance. For the Coxes Creek Watershed, reference to standard practices for evaluation and management of runoff from proposed land development is appropriate as follows:

- **Runoff Evaluation:** Runoff computations should be completed using either the Rational Method or the NRCS Soil Cover Complex Method, and should be completed using standard engineering practices as established in the PADEP Erosion and Sediment Pollution Control Manual (PADEP, 2000b) or the Pennsylvania Handbook of Best Management Practices for Developing Areas (PADEP, 1998). Stormwater runoff computations should compare pre-development runoff conditions with post-development runoff conditions and should demonstrate, at a minimum, that post-development peak discharge does not exceed pre-development peak discharge for the 2-year, 10-year, and 25-year storm events.
- **Groundwater Recharge:** Groundwater recharge computations should be completed using standard engineering practices as established in the Pennsylvania Handbook of Best Management Practices for Developing Areas. Recharge computations should demonstrate that any net increase in stormwater runoff volume (i.e., post-development runoff volume minus pre-development runoff volume) from the 2-year, 24-hour storm is recharged to groundwater consistent with PADEP requirements under Chapter 102, Title 25 of Pennsylvania Code. Alternately, recharge computations should justify why any net increase in stormwater runoff volume cannot be recharged to groundwater at the project site.
- **Water Quality Protection:** Preparation of erosion and sedimentation control plans and the NPDES permitting process in accordance with PADEP requirements Chapter 102, Title 25 of Pennsylvania Code, including review of plans by the Somerset Conservation District should be sufficient for protection of water quality within the Coxes Creek Watershed.
- **Innovative Practices:** For projects involving innovative practices for stormwater management including application of Best Management Practices (BMPs), BMPs as detailed in the Pennsylvania Handbook of Best Management Practices for Developing Areas, or other industry accepted sources should be sufficient for the Coxes Creek Watershed. Incentives/credits for implementation of innovative practices should be encouraged by the model ordinance associated with the Plan.

As noted in Sections V.B. and V.C. of this Plan, the PADEP has initiatives under way to refine and elaborate regulations and design criteria regarding groundwater recharge and water quality protection. Again, the PADEP has embarked on updating the State Water Plan including significant consideration to the issues of groundwater recharge and water quality. In addition, the PADEP is updating guidance and BMPs for stormwater management with target completion in 2004. Both of these initiatives are expected to affect design criteria and standards for groundwater recharge and water quality management in Pennsylvania. Future updates of this Plan as established already by Section X of this Plan should carefully consider updated guidance/regulations and the Plan should be made consistent with the updated guidance/regulations as they become available from the PADEP.

VII. EXISTING MUNICIPAL ORDINANCE INFORMATION

The purpose of this Section of the Plan is to summarize existing ordinances for areas in the Coxes Creek Watershed.

Existing Land Development, Zoning and Stormwater Ordinances for each of the seven municipalities that lie within the limits of the Coxes Creek Watershed are summarized in Table VII-1. This information was obtained from the individual municipalities and the Somerset County Planning Commission.

Somerset Borough is the only municipality that addresses land development, zoning, and stormwater under individual ordinances. All other municipalities currently fall under the Somerset County Subdivision and Land Development Regulations. Said regulations contain limited stormwater management requirements for new developments. The following sections discuss provisions of the specific existing ordinances in the context of stormwater management.

VII.A Somerset Borough Ordinances

The Somerset Borough Zoning Ordinance and the Somerset Borough Subdivision and Land Development Ordinance were enacted on January 12, 1970 and February 13, 1978 respectively. The ordinances provide standards for regulating growth within the Borough. The key areas of the ordinances, as they pertain to this Plan, are summarized below.

VII.A.1 Somerset Borough Zoning Ordinance

The Somerset Borough Zoning Ordinance includes Floodway Districts and Flood-Fringe Districts as zoning categories. The floodplain includes all areas inundated by the 100-year flood, based upon flood elevations determined from the FEMA Flood Insurance Study for Somerset Borough. It is further subdivided into the floodway and flood-fringe. The floodway is defined as the floodplain area capable of carrying the 100-year storm with a less than one-foot increase in elevation. The remaining area between the floodway and edges of floodplain is referred to as the flood-fringe area. Limitations and restrictions to development within these zoning districts are listed in Section 10 of the ordinance.

VII.A.2 Somerset Borough Subdivision and Land Development Ordinance

Article IV of the ordinance contains the design standards for plan submissions. Development within flood-plain areas, including floodways and flood-fringe areas of the borough is regulated as per Section 401 of the ordinance.

Article V, Section 504 of the ordinance requires the post-development stormwater runoff rate to be less than or equal to the pre-development rate. No specific design storms or calculation method are mentioned for use in proving that a developer meets said ordinance requirements. Exceptions to the “zero increase in runoff rate” policy are allowed if the site is located within a delineated high groundwater area or if the calculated detention facility size is less than 1,000 cubic feet in certain residential developments. Minor stormwater management facilities are required to be designed to safely pass a minimum of the 10-year storm event, whereas major facilities must pass at least the 25-year event.

VII.B Somerset County Ordinances

VII.B.1 Somerset County Interchange Area Zoning Ordinance

The Somerset County Interchange Area Zoning Ordinance was enacted on May 13, 1970 and creates zoning districts in the areas in the vicinity of the interchanges of S.R.219 with S.R.30, S.R.601, S.R.281 and S.R.3041. Somerset Township is the only municipality within this Act 167 study area that is also affected by the zoning ordinance.

The ordinance does not contain any additional regulations or restrictions on development in flood-prone areas. Stormwater control is also not addressed by the ordinance.

VII.B.2 Somerset County Subdivision and Land Development Regulations

The Somerset County Subdivision and Land Development Regulations were adopted May 28, 1991. Minor amendments to the Regulations were adopted January 1, 1998. The Somerset County Planning Commission is delegated to administer and enforce the requirements.

While flood plain issues are not specifically addressed, the ordinance includes a statement that planning commission approval does not exempt a developer from “the requirements of the Pennsylvania Department of Environmental Protection, United States Army Corps of Engineers, etc.”

Article IV of the regulations contains the specifications for plan preparation, submission and approval. As more fully detailed in Section 404, prior to final plan approval, the developer's engineer or surveyor must submit to the planning commission a certification that all installed improvements, including stormwater controls, are in compliance with the ordinance provisions. In lieu of completion of all improvements, a developer has the option of submitting financial security to guarantee their installation. These options are further explained in Section 603 of the regulations.

The required standards to be utilized in designing a new major subdivision or land development are specified in Article V of the regulations. Section 506, entitled "Storm Drainage", addresses control of runoff from rainfall events. This section specifies a minimum stormwater storage volume of the difference in runoff between the post-development 10-year, Type 2 storm and the pre-development 25-year, Type 2 storm. Stormwater calculations are to be based on the methods included in the Soil Conservation Service Engineering Field Manual (SCS, 1984). For sites less than 5 acres, the use of the Rational Method is also permitted. This section of the regulations also requires the creation of a drainage easement for all new developments traversed by a water course, drainage way, channel, or stream. Said easement shall encompass all areas inundated by the 25-year storm event.

Minor subdivisions and small land-developments are exempt from many of the over-referenced requirements including certification of improvements and submission of a stormwater management plan.

It is noted that, prior to adoption of the Somerset County Subdivision and Land Development Regulations in 1991, land development within the county occurred with minimal/no local requirements for stormwater control as defined in prior "Land Development Regulations" enacted in 1963. The implementation of the stormwater standards in the 1991 regulations was an important first step in management of stormwater. Current conventional scientific and engineering recommendations for stormwater management indicate that standards more comprehensive than required by the current regulations for control of stormwater are appropriate.

VII.C Other Municipalities

Black Township, Brothersvalley Township, Milford Township, Rockwood Borough, Somerset Township, and Stonycreek Township do not have existing land development, zoning, or stormwater ordinances. Those municipalities defer design requirements and approval processes for land development activities to the Somerset County Subdivision and Land Development Regulations.

VIII. DEVELOPMENT OF MODEL STORMWATER ORDINANCE PROVISIONS

The purpose of this Section of the Plan is to present model stormwater ordinance provisions (Model Ordinance) for the Coxes Creek Watershed.

Recommended model stormwater management ordinance provisions are presented in Appendix D. The Model Ordinance is structured to be a single-purpose ordinance. Specific ordinances for each municipality should be developed in close coordination with the Solicitor of each municipality. Under Act 167, each municipality is required to adopt an ordinance consistent with the Model Ordinance within six (6) months of PADEP approval of the Plan. The adopted ordinance is required to apply to stormwater management for all areas in the Coxes Creek Watershed.

As discussed in Section IX of the Plan, it is suggested that each municipality consider adoption of consistent stormwater management ordinances which apply to all watershed/areas in the municipality. It is also suggested that Somerset County Subdivision and Land Development Regulations be updated to be consistent with provisions of the Model Ordinance for all watershed areas within the county.

A draft of the Model Ordinance was presented and distributed to officials of municipalities comprising the Coxes Creek Watershed at a meeting conducted on March 26, 2003. At that time, comments were requested to be received from attending officials. No comments were subsequently received. The Model Ordinance in Appendix D is the same as the draft Model Ordinance presented/distributed on March 26, 2003, except for revisions to associated Exhibits C, D, and E.

IX. PRIORITIES FOR IMPLEMENTATION OF TECHNICAL STANDARDS AND CRITERIA

The purpose of this Section of the Plan is to establish priorities for implementation of activities to manage stormwater in the Coxes Creek Watershed consistent with the Plan.

Recommended steps for management of stormwater in the watershed are as follows:

1. **County Adoption of Plan.** Somerset County should adopt the Plan as presented herein as required by Act 167 and as outlined in Section X of the Plan.
2. **PADEP Approval of Plan.** PADEP approval of the Plan will confirm that the Plan is consistent with requirements of Act 167, and, will confirm that the Plan is consistent with state and federal requirements/regulations for stormwater management planning efforts.
- 3A. **Local Municipality Adoption of Stormwater Ordinance.** Local municipalities should adopt ordinances for the management of stormwater in the Coxes Creek Watershed consistent with provisions of the Model Ordinance presented in the Plan as required by Act 167. Given that the Model Ordinance principally embodies modern conventions for management and protection of watersheds, local municipalities should consider adopting a comprehensive ordinance that addresses all watersheds in the municipality. Adoption of an ordinance for all watersheds would facilitate effective and protective stormwater management, and, avoid disparate standards and problems associated with differing requirements for “In Coxes Creek Watershed” versus “Outside of Coxes Creek Watershed”.
- 3B. **Somerset County Adoption of an Update to the Somerset County Subdivision And Land Development Regulations.** An update to the regulations administered by the Somerset County Planning Commission is appropriate to ensure consistency of the regulations with the adopted Plan and the Model Ordinance. Again, given that the Model Ordinance principally embodies modern conventions for management and protection of watersheds, Somerset County should consider adopting regulations consistent with provisions of the Model Ordinance for all watersheds in the county.
4. **Enforcement by Local Municipalities.** Adopted ordinances should be enforced by local municipalities.
5. **Update of Plan and Ordinances.** The Plan and model ordinance provisions should be updated at the minimum 5-year frequency as required by Act 167 and established in Section X of the Plan.

Table IV-2
Flood Estimates
Main Stream of Coxes Creek at Confluence with Casselman River in Rockwood

Act 167 stormwater Management Plan
 Coxes Creek Watershed
 Somerset County, Pennsylvania

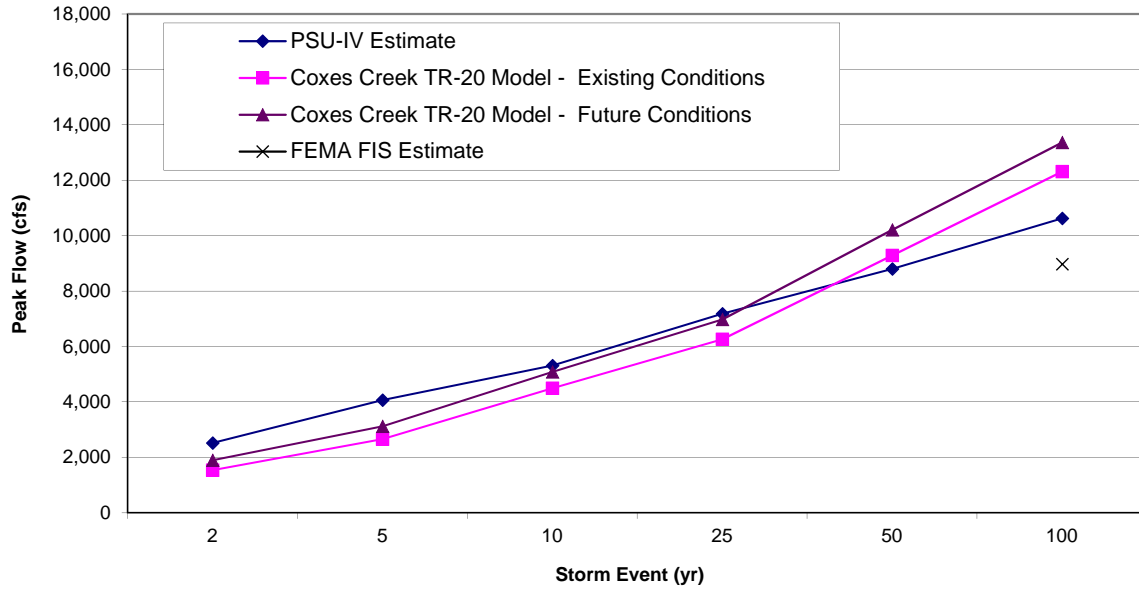


Table IV-3
Flood Estimates
East Branch of Coxes Creek at South Center Avenue in Somerset Borough

Act 167 stormwater Management Plan
Coxes Creek Watershed
Somerset County, Pennsylvania

