LYCOMING COUNTY
ACT 167 STORMWATER MANAGEMENT PLAN

Prepared by:

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SECTION I – STORMWATER MANAGEMENT & ACT 167

The need for stormwater management in Pennsylvania, and Lycoming County, has been repeatedly demonstrated. As land development occurs, the alteration of natural ground surfaces, whether by residential, commercial, or industrial development, results in decreased infiltration of rainfall. New roads and utility corridors also contribute to increased runoff. Inadequate management of accelerated runoff of stormwater resulting from development throughout a watershed:

- Increases flood flows and velocities,
- Contributes to erosion and sedimentation,
- Overtaxes the carrying capacity of streams and storm sewers,
- Greatly increases the cost of public facilities to carry and control stormwater,
- Undermines floodplain management and flood control efforts in downstream communities,
- Reduces groundwater recharge, and
- Threatens public health and safety.

Cumulative effects of development in some areas of a watershed can contribute to flooding of natural watercourses with property damages running into millions of dollars. Recognizing the need to deal with the serious and growing problem of extensive damage from uncontrolled stormwater runoff, the Pennsylvania General Assembly enacted the Pennsylvania Stormwater Management Act 167. The statement of legislative findings at the beginning of Act 167 sums up the critical interrelationship among development, accelerated runoff, and floodplain management. Specifically, this statement points out that:

> "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."

Management of stormwater has typically been regulated on a municipal level with little or no consistency among adjoining municipalities in the same watershed concerning the types or degree of control to be practiced. Since many do not have stormwater management ordinances or controls, the impacts from stormwater runoff will only get worse.

The following relevant documents have been prepared and were a valuable source of information for the Plan:

- Lycoming County Stormwater Management Plan (Gannett Fleming Corddry and Carpenter, Inc., 1973)
- Pilot Hydrologic Study for the Lycoming Creek Watershed (Associated American Engineers, Inc., June 1982)
- Pilot Hydrologic Study for the Lycoming Creek Watershed: Selection and Calibration of a Rainfall-Runoff Model and Method (Associated American Engineers, Inc., June 1982)

- Act 167 Stormwater Management Plan for Grafius Run, McClures Run, and Miller's Run, September 1999.

According to the Act, each storm water plan shall include, but is not limited to:

1. A survey of existing runoff characteristics in small as well as large storms, including the impact of soils, slopes, vegetation and existing development (Lycoming County NRCS Soil Conservation Service soil maps provide runoff characteristics in small and large storms);
2. A survey of existing significant obstructions and their capacities (Refer to Section III of the Plan. A comprehensive survey of significant obstructions within the County will be completed as part of subsequent Watershed Plans);
3. An assessment of projected and alternative land development patterns in the watershed, and the potential impact of runoff quantity, velocity and quality (The Comprehensive Plan for Lycoming County, adopted August 10, 2006, contains an assessment of projected and alternative land development patterns);
4. An analysis of present and projected land development in flood hazard areas, and its sensitivity to damages from future flooding or increased runoff (The 2010 Lycoming County Hazard Mitigation Plan, Section 4.3.1. Floods, Flash Floods, and Ice Jams addresses the location and extent of flooding, range of magnitude, past occurrence, future occurrence, and vulnerability assessment);
5. A survey of existing drainage problems and proposed solutions (refer to Section III of the Plan);
6. A review of existing and proposed storm water collection systems and their impacts (refer to Section III of the Plan);
7. An assessment of alternative runoff control techniques and their efficiency in the particular watershed (refer to Section IV of the Plan);
8. An identification of existing and proposed State, Federal and local flood control projects located in the watershed and their design capacities (The 2010 Lycoming County Hazard Mitigation Plan, Appendix I, contains maps and summaries of proposed Federal, State, and local flood control projects);
9. A designation of those areas to be served by storm water collection and control facilities within a ten-year period, an estimate of the design capacity and costs of such facilities, a schedule and proposed methods of financing the development, construction and operation of such facilities, and an identification of the existing or proposed institutional arrangements to implement and operate the facilities (refer to Section III of the Plan);
10. An identification of flood plains within the watershed (refer to FEMA Floodplain Maps for Lycoming County and Section III of the Plan);
11. Criteria and standards for the control of storm water runoff from existing and new development which are necessary to minimize dangers to property and life and carry out the purposes of this act (refer to Section IV of the Plan);
12. Priorities for implementation of action within each plan (refer to Section VII of the Plan); and
13. Provisions for periodically reviewing, revising and updating the plan (refer to Section VIII of the Plan).

The Act also states that each watershed storm water plan shall:

1. Contain such provisions as are reasonably necessary to manage storm water such that development or activities in each municipality within the watershed do not adversely affect health, safety and property in other municipalities within the watershed and in basins to which the watershed is tributary (refer to Attachment A - Model Ordinance); and
2. Consider and be consistent with other existing municipal, county, regional and State environmental and land use plans (refer to Section V).

These Act 167 requirements are addressed in detail in the existing Comprehensive Stormwater Plans for the Grafius/Millers/McClures Run and Lycoming Creek watershed; and will be addressed in future watershed plans as they are developed.

SECTION II – LYCOMING COUNTY STORMWATER MANAGEMENT INITIATIVE

Lycoming County and the Department of Environmental Protection (DEP) have entered into a grant agreement that will provide for the development of a County Stormwater Plan and implementing Ordinance that will apply to the remaining watersheds within the County that are not covered under an adopted Act 167 Plan. The Ordinance will provide the basis for comprehensive stormwater management in Lycoming County. Stormwater peak runoff standards for each watershed will be added upon subsequent completion of detailed hydrologic models. Once the County Act 167 Stormwater Plan and Model Ordinance are adopted, municipalities will be required to adopt a Comprehensive Stormwater Ordinance or update their Ordinance to be consistent with the Act 167 Ordinance. The County will also offer an option for Stormwater Ordinance administration.

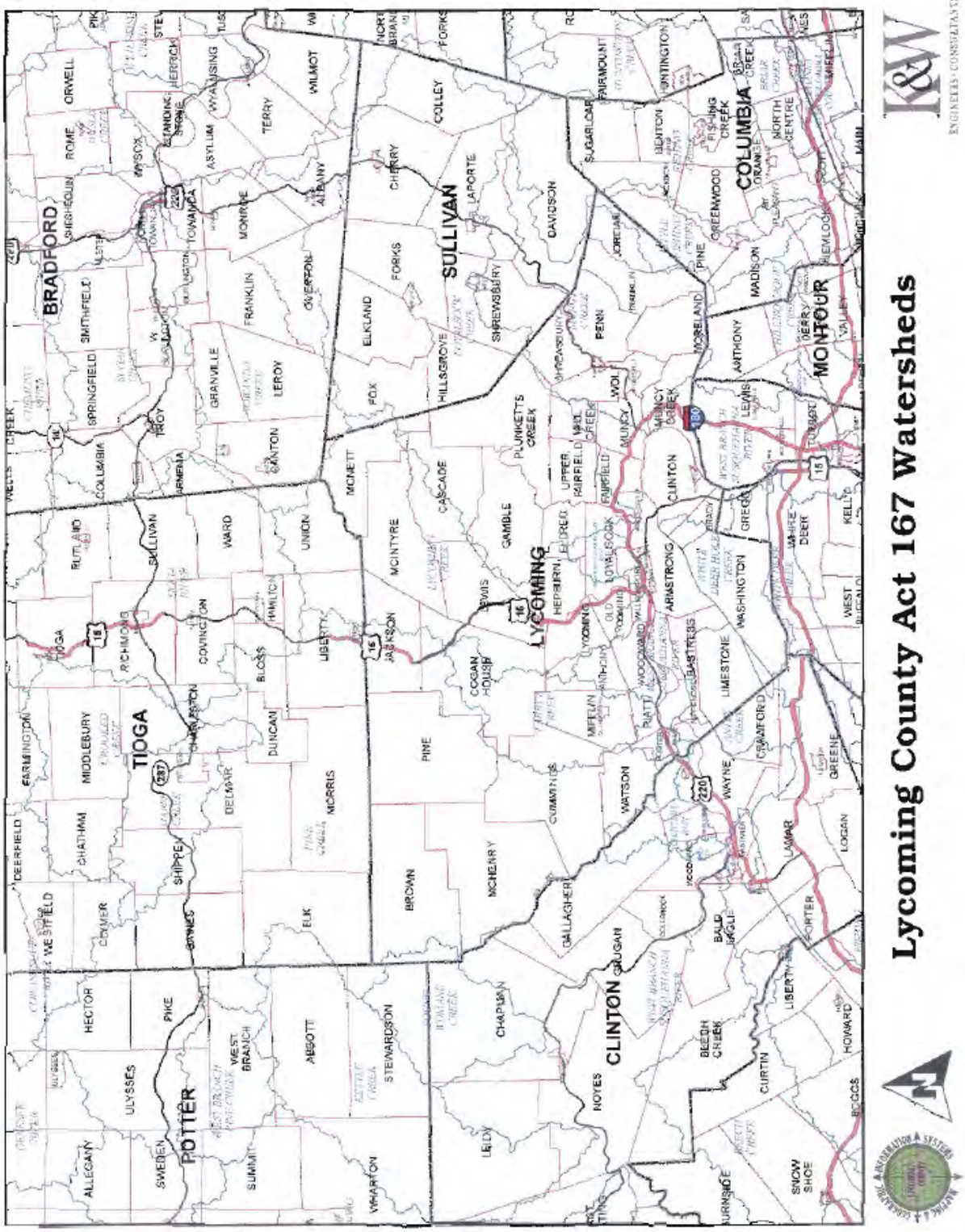
Three (3) Regional Advisory Meetings were held in November, 2006, to present more details about the County Stormwater Initiative, and to solicit input regarding existing stormwater problems. Another round of meetings will be held in the Winter of 2009 to present and review the draft County Stormwater Plan and Model Ordinance.

SECTION III – LYCOMING COUNTY WATERSHED CHARACTERISTICS

3.1 Act 167 Designated Watersheds

There are sixteen (16) designated watersheds within Lycoming County and environs as shown in Plate 1, taken from the official DEP Watershed Map. The watersheds are Antes Creek, Chatham Run - Clinton Co., Chillisquaque, Fishing Creek/Cedar Run, Grafius/Millers/McClure Runs, Larry's Creek, Loyalsock Creek (including Rose Valley/Mill Creek), Lycoming Creek, Muncy Creek, Pine Creek - Lycoming Co), Towanda Creek, West Branch Susquehanna River (including Black Hole Creek). White Deer Creek, White Deer Hole Creek, and Young Womans Creek. Lycoming County is the downstream County for the major West Branch tributaries of Pine, Loyalsock, Lycoming and Muncy Creeks. Watershed Associations have been formed, or are in the process of forming, in all of the major drainages.

Comprehensive watershed Stormwater Management Plans have been prepared for the Grafius/Millers/McClures Run designated watershed, adopted in 1999 by the City of Williamsport, Loyalsock Township, Hepburn Township, and Eldred Township. Lycoming County has completed a Watershed Stormwater Plan for the Lycoming Creek Watershed. Small portions of Lycoming County in the headwaters of Chatham Run and Fishing Creek Watersheds are also covered under other County Watershed Plans. By adoption of this Plan, the 2006 Clinton County Plan will be adopted and implemented in the portion of the Fishing Creek watershed and the portion of the Chatham run watershed within Lycoming County.


Lycoming County Act 167 Watersheds
K&W
ENGINEERS · CONSULTANTS
BRADFORD
SULLIVAN
TIOGA
POTTER
CLINTON
LYCOMING
COLUMBIA
MONTOUR

3.2 Sub-Watershed Descriptions

The Lycoming County Stormwater Management Plan of 1973, Prepared by Gannett Fleming Corddry and Caprenter, Inc. identified 21 drainage areas within the county. A summary of each area is found below.

Potter
This small drainage area in the northwest corner of the county covers a 7.5 square mile area of Brown Township and drains westerly into Potter and Clinton Counties through small tributaries to Young Womans Creek. The area is undeveloped and is comprised primarily of state forest land.

Clinton North
The Clinton North drainage area covers 1.7 square miles of the western extremity of McHenry Township and drains into Clinton County through small tributaries to Hunter Run. The area is undeveloped, contains little if any population, and consists mainly of state forest lands.

Clinton South
The Clinton South drainage area covers 1.1 square miles of Watson Township and drains into Clinton County through Lick Run. The area is undeveloped, contains little if any population, consists principally of state forest land, and contains no area of projected development.

Pine Creek
Pine Creek drains a total area of 785.7 square miles, 189.8 of which lie in the western sector of Lycoming County between the county's northern boundary and the West Branch of the Susquehanna River. The municipal composition of the area consists of portions of six (6) townships and 0.6 square miles (46.2%) of the Borough of Jersey Shore. A large portion of the area lies in state forest and game lands and only minimal development is projected for this drainage area in the future. Outside of the county, Pine Creek drains a 595 square mile area of Potter, Clinton, and Tioga Counties. This area is generally mountainous and sparsely settled. The area is extensively forested.

Little Pine Creek
Little Pine Creek, a major tributary to Pine Creek, drains a total area of 181.7 square miles, 139 of which lie within Lycoming County. A large portion of this drainage area is mountainous state forest and game land. Outside of the county, Little Pine Creek drains a 42.7 square mile area of Tioga County which is sparsely settled.

West Nippenose
Located on the south side of the Susquehanna River, the West Nippenose area is comprised of a 2.1 square mile portion of Nippenose Township that drains directly to the river.

Jersey Shore
The Jersey Shore drainage area comprises 5.0 square miles of localized drainage into the Susquehanna River through intermittent streams of Pfouts and Lawshe Runs. The area drained includes portions of the Borough of Jersey Shore (53.8%) and Porter and Piatt Townships.

Antes Run
Antes Run drains a 55.8 square mile area, of which 32.7 square miles are in Lycoming County. The municipal composition of the area within the county includes portions of three townships located in Nippenose Valley south of the river, between the Bald Eagle and North White Deer Ridges. Development in the area consists of farming enterprises and the three (3) small villages of Oval, Oriole and Collomsville.

Bald Eagle Mountain
This area includes 56.6 square miles of Bald Eagle Mountain, a prominent topographic feature of the county, located south of the river. Ender Run, Mosquito Creek, Hagermans Run, and a number of smaller streams drain the area northward to the river. The municipal composition of the area in includes portions of five (5) townships, all of Armstrong and Susquehanna Townships, the Village of Nisbet, and two (2) urbanized boroughs. The development in this area is generally concentrated along the river, on the base and lower slopes of the mountain, and along State Route 654. Some development also exists along U.S. Route 15 as it traverses the face of the mountain in Armstrong Township.

Black Hole Creek
Black Hole Creek drains a 12.6 square mile area on the south side of Bald Eagle Mountain, west of the river, and small localized waterways drain an additional 13.8 square miles to the river. The combined drainage area includes portions of Brady and Clinton Townships and all of the Borough of Montgomery.

Larrys Creek
Larrys Creek drains an 83.4 square mile area of the county and flows southerly to the Susquehanna River. The area drained includes portions of seven (7) townships, the Village of Larryville, and the Borough of Salladasburg. Development in the area is primarily located in Salladasburg and in the sparsely settled valley south of the borough along State Route 284. Some residential development also exists in the northern part of the area along State Route 184 in Cogan House Township.

Woodward
This area includes a 31.6 square mile area of the county which drains south to the river through three (3) runs: Pine, Quenshukeney, and Daugherty. The area drained includes portions of six (6) townships and the western and relatively undeveloped end of the City of Williamsport. Development in the Pine Run area is principally residential with some trailer parks and commercial development along U.S. 220. Several projected suburban development areas lie in the Pine and smaller Woodward Run area.

Lycoming Creek
Lycoming Creek drains an area of 265.9 square miles of which 215.5 square miles are in Lycoming County. The area extends from McNett Township on the Bradford County line south to the Susquehanna River. The municipal composition of the area consists of portions of thirteen (13) townships, all of McIntyre Township, five (5) villages, and 1.6 square miles of urbanized area in the City of Williamsport. Outside the county, Lycoming Creek drains a 50.4 square mile area of Tioga and Sullivan Counties.

Williamsport
The Williamsport area covers 19.9 square miles and includes portions of three (3) townships as well as the major (52.7%) portions of the City of Williamsport. Cemetary, Grafius, Miller, and Bull Runs are the principal streams draining sections of the area directly to the river. Development in the Williamsport area is highly urbanized.

Loyalsock Creek
Loyalsock Creek drains 505.5 square miles, of which 166.1 square miles are in Lycoming County. The municipal composition of the drainage area includes portions of eleven (11) townships, the Borough of Montoursville, and five (5) unincorporated villages.

Fairfield-Muncy
This area drains 36.6 square miles of the county to the Susquehanna River principally through Bennetts Run, Carpenters, Run, and Wolf Creek. Localized drainage channels also exist in the area. The area includes portions of six (6) townships and the eastern side of Montoursville Borough.

Muncy Creek
Muncy Creek drains 191.2 square miles, 127.4 of which are in Lycoming County. The municipalities drained include two (2) boroughs, portions of nine (9) townships and all of Penn Township.

Muncy
This area covers 9.5 square miles and drains to the Susquehanna River principally through Glade Run and localized drainage channels. The area contains the Borough of Muncy and peripheral suburban development in Muncy Creek Township. The borough lies in the flood plains of the river and Glade Inn.

Montour
This area covers 2.6 square miles and drains into Montour County through the West Branch tributary of the Chillisquaque Creek.

Columbia
The Columbia area covers 8.3 square miles along the eastern boundary of the county and drains into Columbia County through tributaries to Little Fishing Creek.

White Deer Hole
White Deer Hole Creek drains a 52.7 square mile area of the county through Northumberland County to the Susquehanna River. Portions of three (3) townships and the village of Elimsport lie within the area. A large section of the area lies in state forest land and on the steep mountain slopes of White Deer Ridge.

Section 3.3 Impaired Waters of Lycoming County

PADEP has an ongoing program to assess the quality of waters in Pennsylvania and identify streams and other bodies of water that are impaired by sediment/siltation, nutrients, metals, and pathogens. Lycoming County has generally excellent water quality as evidenced by the Special Protection High Quality and Exceptional Value

watersheds that cover much of the County, as shown on Plate 32 of the Lycoming County Comprehensive Plan. Impaired Lycoming County streams from the 2010 Pennsylvania Integrated Water Quality Monitoring and Assessment Report (formerly the 303d list) are included in Lycoming County's Implementation Plan for the Chesapeake Bay Tributary Strategy, prepared by the Lycoming Conservation District. These streams include portions of Lycoming/Larry's/Antes Creeks, W. Branch Susquehanna River, Loyalsock Creek, Muncy/Little Muncy Creeks, Pine Creek, White Deer Hole Creek, and Fishing Creek. Small residential and urban runoff contributes to water quality problems on several of these stream, as detailed in the Implementation Plan.

Some of these areas of impairment will require the establishment of a Total Maximum Daily Load (TMDL) of pollutants. TMDLs are the maximum amount of pollutants that a waterbody can assimilate and still be able to meet state water quality standards. TMDLs for acid mine drainage have been established by DEP for portions of Loyalsock Creek, Otter Run/Right Fork Otter Run (Lycoming Creek tributary), and the W. Branch Susquehanna. A TMDL for the entire Chesapeake Bay Watershed is currently being drafted by DEP.

3.4 County Watershed Plan Advisory Committee Issues and Concerns

The County was divided into four (4) planning areas. They are as follows:

Table 3.1 – Planning Areas

PLANNING AREA	MUNICIPALITIES INCLUDED IN EACH PLANNING AREA
PA-1*	Cascade Township, Eldred Township, Gamble Township, Hepburn Township, Jackson Township, Lewis Township, Loyalsock Township, Lycoming Township, McIntyre Township, McNett Township, Old Lycoming Township, Williamsport City
PA-2	Fairfield Township, Franklin Township, Hughesville Borough, Jordan Township, Moreland Township, Muncy Borough, Muncy Creek Township, Muncy Township, Penn Township, Picture Rocks Borough, Plunketts Creek Township, Shrewsbury Township, Upper Fairfield Township, Wolf Township
PA-3	Armstrong Township, Bastress Township, Brady Township, Clinton Township, Duboistown Borough, Limestone Township, Montgomery Township, Nippenose Township, South Williamsport Borough, Susquehanna Township, Washington Township
PA-4	Anthony Township, Brown Township, Cogan House Township, Cummings Township, Jersey Shore Borough, McHenry Township, Mifflin Township, Piatt Township, Porter Township, Pine Township, Salladasburg Borough, Watson Township, Woodward Township

* PA-1 is comprised of municipalities located within the Lycoming Creek Watershed Stormwater Planning Area.

A. Initial Advisory Committee Meetings. Three Regional Advisory Committee meetings (PA-2, 3, and 4) were held in November, 2006 to solicit input from municipal officials and Watershed Associations to initiate the planning process.

1. Summary Notes from PA-2 - Eastern Lycoming County:

   East Region - Hughesville Area Public Library
   November 13, 2006 – 7:00 PM

   - Pine Creek Issues: Floodplain development, esp. trailer parks. Trailers wash downstream and clog up/damage bridges. Water quality a concern.
   - Use of Biosolids in Ag - potential to contaminate water supplies
   - Montoursville: Development upstream in Floodway impacts downstream properties
   - Black Hole Creek Watershed Association concerns:
   - Streambank erosion
   - Pond on prison property is nutrient rich, water quality and temperature concern
   - Working with White Deer Hole Golf Course to establish riparian buffers – more are needed
   - Flooding on Muncy Creek when it rains in upstream Co. – flooding occurs twice a year in addition to less frequent major flooding
   - Municipalities may be disappointed if REDEVELOPMENT AND RETROFIT is NOT included
   - Water table concern, especially during dry years – scattered development, homes going into recharge areas
   - Stormwater problems cross municipal boundaries, how can these problems be dealt with?
   - Should E & S and Stormwater Ordinances be combined?

2. Summary Notes from PA-3 - Central Lycoming County

   Central Region – S. Williamsport Borough Office
   November 14, 2006 - 2:00 PM

   - Jon Dangle, South Williamsport Borough
   - Road drains and pipes were previously allowed to discharge into storm sewer inlets – now DEP prohibits this practice – problem for the Boro
   - Jerry Walls said we will look at steep slope, built up areas like that in South Williamsport
   - Loyalsock Creek Watershed Association - streambank erosion a concern
   - Muncy, Blackhole “same”
   - Upland municipalities must control runoff
   - Utility Companies clear cutting and increasing runoff
   - Joan Sattler, DEP: Riparian Buffers, how far will the Ordinance go? Back buffers are required for CAFOs (Concentrated Animal Feeding Operations), CAOs (Concentrated Animal Operations), but not other agricultural (Ag) operations.
   - The Pennsylvania Department of Transportation (PennDOT) roadwork causing increases in runoff

- Ralph, Tioga Co: Historic development patterns and standards within Floodplain a concern, overly wide streets with curbs and dropped inlets instead of retention areas
- Bill Burdette, Loyalsock Twp – Ordinances don't deal with existing stormwater problems, how do we encourage retrofit? How will we address expansion of existing uses? Plan will address potential solutions such as technical assistance for design, regional stormwater authorities. HB 660 to establish a financing mechanism to deal with existing problems. What are funding sources?
- Rose Valley/Mill Creek: Concerned about downstream impacts of development in the Rose Valley area.
- Jerry Walls: Countywide floodplain management plan is underway and it will emphasize consistency among municipalities.
- Williamsport City: Confined space BMP's in Urban areas and small residential development should be included.
- Joe Neyhart, Lycoming County Conservation Director, Lycoming County Planning Commission (LCPC) Member - Role of the Lycoming County Conservation District (LCCD)? – LCCD staff was unable to attend but will be involved. LCCD also important for MS4 (Municipal Separate Storm Sewer System). Need to coordinate on erosion & sedimentation and buffer policy.
- Dr. Zimmerman – outreach and education of municipal officials important

3. Summary Notes from PA-4 - Western Lycoming County

   West Region – Wheeland Center, Jersey Shore
   November 14, 2006 – 7:00 PM

   - Lycoming Creek Watershed Assoc., Mike Ditchfield/Russ Coles
   - Streambank erosion and sediment transport problems – Railroad and highway have taken away river access to the floodplain.
   - Many varied solutions have been identifies by their Comprehensive Watershed Assessment
   - Logging runoff has been a problem
   - Ag Runoff – 50' Stream buffer would be beneficial
   - Cogan House Twp.
   - Cattle in the stream and bank erosion
   - Hardwood planting along streams has been beneficial
   - Cummings Twp:
   - PennDOT road runoff is a problem
   - Flooding around Pine Creek Rail Trail
   - Development of cabins in floodplain
   - Brown Twp: Logging and clear cuts – how will Ordinance apply?
   - Randy, Jersey Shore Boro: Runoff from Porter Twp. affects yards and roads, and causes bank erosion and small stream flooding
   - Dennis Norman: Land development disrupts natural flow, leads to neighbor complaints
   - Nippenose Twp: Logging and mountain runoff damaging roads, changes flow of water

- Lewis Twp, David Swift: Scour at bridges; lack of infiltration and drop in water table
- Lycoming Twp, Bob Wagner – drop in water table also a concern
- Toby – Nippenose Valley Watershed Assoc.: Nippenose Valley has sinkholes and farming up to the edge, clogged up by trash and debris, discharge of brown water after rains. Education needed.
- Mill Creek: Development changes runoff, ditches are inadequate
- Salladasburg: Runoff causes bank erosion, basement flooding. Pine Run runoff and Mifflin Manor runoff leaves stones and debris. Concerned about long term viability of streambank repairs at convergence of 2 creeks.
- Outline permitting requirements for stream maintenance such as debris removal and sand bar removal.
- Consider a sliding scale for exemptions based on tract size.
- How will preexisting problems be addressed? Can the Ordinance address correction of existing problems?

B. Final Advisory Committee Meetings. Three additional regional advisory committee meetings (PA-2, 3, and 4) were held in January, 2010 to present the Draft County Stormwater Plan and Model Ordinance and solicit input from municipal officials,. Watershed Associations, State officials, local engineers and builders, and other interested parties. Following are consolidated summary notes from the three meetings, which were held at:

Eastern Lycoming County - Jan. 26, 2010, 6:30 PM
Hughesville Area Public Library

Central Lycoming County - Jan. 27, 2010, 2:00 PM
S. Williamsport Borough Municipal Building

Western Lycoming County - Jan. 27, 2010, 6:30 PM
Jersey Shore Municipal Building

The meetings began with introductions of the attendees. Kevin McJunkin then gave about a 30 minute PowerPoint presentation (attached) which summarized the draft Plan and Ordinance. There will be a round of Ordinance adoption and implementation workshops following County and DEP approval of the Plan and Model Ordinance.

The County will administer the Ordinance, following municipal adoption, for subdivision and zoning permits which are under County jurisdiction. The municipality may request that the County administer their municipal stormwater ordinance under other circumstances, such as local jurisdiction for stormwater and zoning permits. The County would consider this request, but the details about administrative procedures and cost reimbursement would need to be worked out.

Following is a summary of the comments received, and any recommended revisions to the draft Plan and Model Ordinance:

1. Several municipal officials at the Hughesville meeting asked if the County would consider a joint Public Hearing advertisement for municipalities to adopt the model stormwater ordinance. Kurt Hausammann replied in the affirmative that we would offer a consolidated advertisement for those municipalities that wish to adopt the County Model Ordinance as is. A municipality that revises or adapts the Model Ordinance would need to advertise on their own.

2. There was some discussion at the Hughesville meeting about gas well permitting and pipelines. Permits for gas wells do require compliance with stormwater management regulations adopted under an Act 167 Plan. The municipal engineer will need to evaluate whether stoned gas well sites can be considered pervious.

3. Todd Hillegas of Bassett Engineering asked at the S. Wmspt. meeting if the stormwater modeling accounts for frozen ground conditions? Our response was that the modeling does not account for frozen ground conditions. Act 167 requires us to preserve to the maximum extent practicable, the natural storm water runoff regimes. Application of a frozen ground condition, in which stormwater could not infiltrate, would be impractical to model. In our opinion, calibrating the model to a frozen ground condition would go beyond what is practicable. Additionally, construction costs of detention/retention systems would increase tremendously to account for a significant storm event that occurs while the ground is in a frozen condition. This being said, it is also important to recognize that the January 19, 1996 flood of record on Lycoming Creek occurred during frozen ground/snow melt conditions. Floods of record are considered when establishing 100 year floodplain hazard boundaries. Development is discouraged within the 100 year floodplain, or it must be mitigated against flood damage.

4. Jerry Walls commented favorably about the Plan and Ordinance as a whole, but questioned deletion of the riparian buffer requirements. We went through the responses to the builder's group riparian buffer comment about not wanting to set up conflicting buffer requirements as buffers are already being required through the County Zoning Ordinance and DEP will soon be requiring buffers in Exceptional Value Watersheds as a condition of NPDES permits. Staff will encourage the use of riparian buffers as one of a number of low impact development stormwater management options. The County is also developing a nutrient credit trading program that will facilitate the provision of riparian buffers to generate credits for nitrogen reduction.

5. Jerry Walls also pointed out that the land development definition on pg. 6 differs from the MPC. We explained that we decided to use the development definition from the County Zoning Ordinance since it is more inclusive of developments that may generate stormwater runoff. For example, the MPC land development definition exempts certain accessory structures which could be quite large.

6. Judy Balzer asked some questions about Minor Stormwater Plans and suggested that we work through a sample Minor Stormwater Management Plan at our Stormwater Ordinance Administration and Implementation workshops.

Staff responded that we will develop a Minor Stormwater Plan exercise as part of the training.

7. Tom Yarnall, Design System Technician for the Lycoming Sewer and Water Authority, complimented the County for taking a proactive approach to stormwater management.

8. Several attendees at the Hughesville and Jersey Shore meetings asked about timber harvesting and stormwater runoff. The Ordinance specifically exempts timber harvesting as long as it complies with the requirements of 25 PA Code Chapter 102 (Erosion and Sedimentation). Proposed changes to Ch 102 will require riparian buffers for timber harvest operations in EV watersheds that require NPDES permits. Eric Beaver and Curtis Swanger of the County Conservation District elaborated about erosion and sedimentation control requirements for forestry and agricultural operations.

9. At the Jersey Shore meeting, there were concerns expressed about the large drainage area in Porter Twp that drains into a culvert that enters Jersey Shore. This ordinance will help manage future development in the drainage area. Other problems were discussed including spring seeps and increased ponding resulting from fixing the sewer drain inflow and infiltration problems. Existing problems will need to be rectified in cooperation with PennDOT and affected private property owners. The Plan and Model Ordinance focuses on prevention of future problems, but does identify some procedures for addressing existing problems.

3.5 Suggested Solutions

Tthere are several types of general solutions to the existing problem areas within the watershed. Solutions range from structural measures (such as the construction of stormwater detention/infiltration facilities, increasing the capacity of culvert and bridge openings, or armoring stream banks that experience erosion) to operation and maintenance measures (such as enforcing regular inspection for and removal of debris and silt at existing stormwater conveyance structures).

Suggested solutions are intended to restore or increase the current hydraulic capabilities within the watershed. They are not intended to minimize the amount of new controls associated with the additional runoff generated by future development.

Funding for stormwater management programs are available, although it takes creativity, public education, and strategic alliances to make them happen[(2)]. Several funding options include:

1. Enterprise Funds

An enterprise fund is a fund created by local governments for a specific purpose (i.e. providing stormwater services) that is self supporting from the revenue it creates. Examples of such funds are refuse collection, sewer maintenance, water service, and any other designated service. Fees for these services are charged to consumers by the local governments which create them. Stormwater Enterprise Funds sometimes face controversy when bringing the idea to the

taxpayers. This is due in part to residents and businesses not always being able to see the need for such an entity. If an enterprise fund is to be considered, prior public outreach and education is essential.

2. Special Districts

When developing programs within a certain geographical area, special districts, or districts defined and based on legally described physical boundaries, can be considered. Properties within these boundaries are assessed fees for these programs. Landscaping, annual catch basin maintenance, and other Operation and Maintenance activities could all benefit from this fee.

3. Development Fees

Development fees are a one-time fee assessed as part of an action on part of a property. An example of development fees are building permit fees. These fees, however, are limited in that they can not be used for ongoing maintenance of the system.

4. Bond Financing

Bond financing is essentially a loan with re-payment by the taxpayers. Major infrastructure projects which may be mandated within a municipality by a higher governing body, may find that bonds are the best option. As with enterprise funds, public outreach and education is essential because taxpayers must vote to basically tax themselves.

5. Grants

Funding for stormwater programs are available from various state and federal agencies. Grants can cover anywhere from a small portion of the necessary funds to completely funding the entire project. Websites for several federal agencies providing grant opportunities are listed below.

Also listed below are links to the Department of Environmental Protection (DEP) Grant and Loan Programs website. DEP has grants and loans available to assist individuals, groups, and businesses with a variety of environmental issues, including stormwater. This website lists the available loans and grants, a description of each program, links to applications and eligibility information.

Specific to Pennsylvania and funded through such agencies as DEP, the Department of Conservation and Natural Resources (DCNR), the Pennsylvania Department of Agriculture (PDA), the Department of Community and Economic Development (DCED), the Pennsylvania Fish and Boat Commission (PFBC) and the Pennsylvania Game Commission (PCG), is Growing Greener II, “a voter-approved plan that invests $625 million to clean up rivers and streams; protect natural areas, open spaces and working farms; and shore up key programs to improve quality of life and revitalize communities across the Commonwealth.” A link to this website is listed below.

Available Web Sites:
State: http://www.dep.state.pa.us/grantscenter/GrantAndLoanPrograms.asp, www.depweb.state.pa.us/growinggreener
Federal: www.grants.gov, www.fedgrants.gov, www.cfda.gov
EPA: www.epa.gov, www.grants.gov
www.epa.gov/owow/watershed/funding.html#general
US Bureau of Reclamation: www.usbr.gov
Fish & Wildlife Service: www.fws.gov
USGS: www.usgs.gov
National Oceanic and Atmospheric Administration (NOAA):
www.csa.noaa.gov/funding
USDA: www.csrees.usda.gov/fo/funding.cfm

SECTION IV – RUNOFF CONTROL TECHNIQUES AND THEIR EFFICIENCIES

The policy and purpose of Act 167 is to:

1. Encourage planning and management of storm water runoff in each watershed which is consistent with sound water and land use practices.

2. Authorize a comprehensive program of storm water management designated to preserve and restore the flood carrying capacity of Commonwealth streams; to preserve to the maximum extent practicable natural storm water runoff regimes and natural course, current and cross-section of water of the Commonwealth; and to protect and conserve ground waters and ground-water recharge areas.

3. Encourage local administration and management of storm water consistent with the Commonwealth's duty as trustee of natural resources and the people's constitutional right to the preservation of natural, economic, scenic, aesthetic, recreational and historic values of the environment.

To prevent adverse impacts at both individual sites and downstream, this mandate requires the development of criteria and standards for managing stormwater as well as watershed-level comprehensive stormwater planning.

These standards address four (4) aspects of effective stormwater management and are as follows:

1. Peak Discharges
2. Groundwater Recharge
3. Water Quality
4. Streambank Protection

4.1 Application of Assigned Release Rate Percentages

Assigned release rates are a watershed-level stormwater management performance standard developed to address peak discharges. This method will allow an individual applicant to select and design site-specific drainage and outlet control measures in order to meet the applicable release rate for the individual subbasin in which the development is to occur.

An applicant should follow this general sequence of actions in order to employ the release rate percentage method.

1. Determine the pre-development and post-development runoff for the development site based on a 2-, 5-, 10- 25-, 50-, and 100-year storm event (do not include existing or proposed stormwater detention techniques). If the post-development peak runoff rate is less than or equal to the pre-development peak runoff rate, the requirements of this plan and the Act 167 Plan have been met. If the post-development peak runoff rate is greater than the pre-development peak runoff rate then the applicant must proceed to Step 2.

2. Apply site-specific stormwater management techniques to infiltrate, and reduce the amount of impervious surfaces. Determine the new post-development peak runoff rate for the 2-, 5-, 10- 25-, 50-, and100-year storm events. If the new post-development peak runoff rate is less than or equal to the pre-development peak runoff multiplied by the assigned release rate, the requirements of this plan and the Act 167 Plan have been achieved. If the post-development peak runoff rate is still greater than the pre-development peak runoff rate multiplied by the assigned release rate, then the applicant must proceed to Step 3.

3. Determine the allowable total peak runoff rate from the individual site by multiplying the pre-development peak runoff rate by the assigned release rate. Design detention/retention or other necessary stormwater management techniques in order to meet the allowable peak runoff rate.

Please note that stormwater discharge can be provided on or off site. Regional facilities may provide a more efficient means to provide the required storage volumes. Both cost and land requirements need to be considered before a determination can be made as to whether to provide on-site or off-site facilities. In many instances several developing areas may share a joint facility. Municipalities may also benefit by maximizing the prime development areas or by providing storage through lakes floodplains or other areas which may not be suitable or accessible for development. Applicants proposing off-site storage facilities must ensure that no flooding or harm will be caused by runoff between the development and the off-site facility.

Release rates are assigned as a result of a detailed watershed hydrologic model and analysis.

The Act 167 Stormwater Management Plan for Grafius Run, McClures Run, and Miller's Run was prepared in September 1999. This plan identified Peak Stormwater Runoff Rates for development within these watersheds. The following four (4) design storm events in the following table are percent of existing condition (pre-development) peak stormwater runoff rates:

Design Storm Event	Within Grafius & McClure's Run	Within Miller's Run
1-Year	50%	50%
10-Year	50%	50%
25-Year	55%	100%
100-Year	55%	100%

4.2 Best Management Practices (BMPs)

Best Management Practices (BMPs) are a series of land and water management strategies intended to minimize the adverse impacts on land and water. BMPs include design and techniques that have been shown to be effective in providing treatment or reduction in pollutants from stormwater runoff. BMPs are either "structural" or "non-structural". Structural BMPs are measures that require the design and physical construction of a facility or feature to help reduce or eliminate a source of pollution. Structural BMPs are often applied to agricultural operations and stormwater management. Non-structural BMPs are approaches to planning or site design that positively affect the water quality and reduce stormwater runoff. Non-structural BMPs are often applied to planning, design and regulation of land development (e.g., conservation easements). [(3)]

Examples of 'Non-Structural' BMPs

1. Reducing Imperviousness
2. Maintaining Natural Swales and Filter Strips
3. Protect Sensitive and Special Value Resources
4. Cluster and Concentrate (development)
5. Minimize Disturbance and Minimize Maintenance
6. Disconnect/Distribute/Decentralize (i.e., rooftops and storm sewers)
7. Source Control (i.e., street sweeping)
8. Environmentally Sensitive Development

Examples of 'Structural' BMPs

1. Volume/Peak Rate Reduction by Infiltration BMPs (e.g., pervious pavement, infiltration basin, infiltration trench, rain garden/bioretention, dry well/seepage pit, vegetated swale, vegetated filter strip)
2. Volume/Peak Rate Reduction BMPs (e.g. vegetated roof, runoff capture and reuse)
3. Runoff Quality/Peak Rate BMPs (e.g. constructed wetland, retention basin, dry extended detention basin, water quality filters)
4. Restoration BMPs (e.g. riparian buffer, landscape, floodplain and soils restoration)
5. Other BMPs related to Structural Measures (e.g. level spreader, parking lot and rooftop detention areas)

SECTION V – EXISTING MUNICIPAL ORDINANCE INFORMATION (as of 2007)

5.1 Lycoming County Stormwater and Floodplain Management Regulations Summary:

The following municipalities are under the jurisdiction of the county subdivision and land development ordinance.

Anthony Twp, Brown Twp, Cogan House Twp*, Cummings Twp, Gamble Twp, Jackson Twp, Jordan Twp, Limestone Twp, McHenry Twp, McIntyre Twp, McNett Twp, Mifflin Twp*, Mill Creek Twp, Moreland Twp*, Muncy Twp, Penn Twp, Piatt Twp, Porter Twp, Shrewsbury Twp*, & Watson Twp
Borough of Hughesville, Borough of Picture Rocks, & Borough of Salladasburg

*****=Driveway Permit Ordinance

The County Subdivision and Land Development ordinance (SLDO) became effective in 1989. The SLDO ordinance contains the Stormwater Management Regulations, found in Article IV 4.10. Section 4.104 A states that stormwater management controls must be designed so that the rate of runoff before development, subdivision, and construction shall not be greater than the rate of runoff in its predevelopment condition. Section 4.104. B states that improvements to stormwater systems shall be designed to increase the amount of water that infiltrates the soil and to control the rate of runoff being released. This could possibly lead to off-site storage areas. The ordinance also states that stormwater management plans will be reviewed by the County Planning Commission and the Municipality. The Planning Commission has the right to require improvements of the stormwater management plan if they deem it inadequate.

The SLDO also contains the Floodplain Management Regulations, found in Article IV 4.11. Development in the floodplain can be approved by the Planning Commission as long as it meets two standards of the National Flood Insurance Program. The new proposal may not cause an increase in flood heights and all new structures must be elevated to or above the one-hundred year floodplain or flood-proofed in accordance with all flood-proofing regulations or techniques by the U.S. Army Corps of Engineers. Section 4.114 A. states that new streets may not be more than one foot below the one-hundred year flood plain and drainage openings may not greatly increase flood heights. Section 4.114. B. states that all new/replacement water and sanitary sewer facilities/systems shall be constructed to minimize or eliminate flood damage and the infiltration of flood waters. Section 4.114 C. states that any part of a sewage system shall not be located within the floodplain. Section 4.114 D. states that all other utilities must be constructed so that the risk of impairment during a flood is minimal. The Subdivision and Land Ordinance does not contain standards for peak discharge, water quality, and infiltration.

The County Zoning Ordinance was adopted in 1992 and contains floodplain regulations. The list of regulations starts in Article V Section 5160. The purpose of these regulations is protecting the public health, safety, and welfare to remain in a

positive condition. The zoning ordinance also reinforces one of the provisions from the National Flood Insurance Program that is required by the county Floodplain Management Regulations. In Section 5160C. 1. c. (1) it states that any new constructions, development, use, activity or encroachment that would cause any increase in flood heights shall be prohibited.

Lycoming County's floodplain regulations exceed the minimum requirements for the National Flood Insurance Program.

The County Zoning Ordinance, adopted in 1992, originally applied to twelve townships. Since that time, three additional Townships and Salladasburg Borough have joined the Partnership, bringing the total number of Municipalities to sixteen, as shown in the attached map. Of the sixteen Municipalities, six rescinded their individual floodplain ordinances and have come under the floodplain regulations contained within the County Zoning Ordinance. Responsibility for administering the floodplain regulations for those six townships now falls on the County. Additionally, as a result of the Federal Emergency Management Agency's requirement for every municipality to update their floodplain regulations, five additional townships and Salladasburg Borough are actively petitioning the County to assume their floodplain regulation responsibilities.

Jackson and Jordan townships also joined the Floodplain Management Partnership delegating the regulation of their floodplains to County Planning staff.

5.2 Municipal Stormwater and Floodplain Management Regulations Summary:

The following municipalities have their own regulations and are not under the jurisdiction of the County SLDO:

Cascade Twp

Cascade Township has Stormwater management regulations within their own municipal subdivision and land development ordinance, enacted on 9/4/70. The Township requires that surface water drainage at road intersections adequate to carry normal water runoff, with adequate ditches along each road and approved cross pipes not less than 15 inches in diameter at cross road intersections.

Lycoming Twp, Susquehanna Twp, & Woodward Twp

All three of these townships have similar stormwater management regulations within their subdivision and land development ordinance. An objective of these regulations is to provide protection against uncontrolled stormwater runoff, to make sure that downstream property owners and water courses are not affected by increases in stormwater runoff from subdivision and land development. These regulations state that peak discharge can be no greater after development than before. They also state that improvements to systems should be designed to increase the amount of water that infiltrates into the soil and control the rate of runoff offsite through temporary storage. Facilities should be designed to handle surface runoff and carry it to a suitable outlet. Drainage easements by waterways are granted and should be as wide as necessary to preserve the flow of drainage. Plans should also include the

anticipated impact from future development. These regulations do not address parking lot regulations, water quality or channel protection.

Armstrong Twp, Brady Twp, Plunketts Creek Twp, & Wolf Twp

All three of these townships have similar stormwater management regulations within their subdivision and land development ordinance. The objective of these regulations is to provide protection against uncontrolled stormwater runoff, to make sure that downstream property owners and water courses are not affected by increases in stormwater runoff from subdivision and land development. The peak discharge shall be no greater than before a subdivision and land development than after unless modified by a stormwater management plan. Channel protection must be upheld except where changes can be justified on a basis of other design standards. Excess runoff of natural conditions should be recharged to the ground water table or stored, if possible. Stormwater facilities should be incorporated into the overall design of a subdivision or land development. Examples would be a wildlife area, recreation area, or a fire protection pond. If construction is going to disturb five or more acres a National Pollutant Discharge Elimination System (NPDES) permit from the DEP is needed. Existing trees and shrubs should be preserved and protected to the maximum extent. Also all detention basins should have an emergency spillway for a one-hundred year storm and drain within twenty-four hours. If a subdivision is traversed by a water course drainage easements shall be necessary and have a minimum width of twenty feet. They also should preserve the flow of drainage as much as possible. These regulations do not cover parking lot regulations and infiltration. Armstrong Township has developed a draft comprehensive stormwater ordinance.

Franklin Twp

The subdivision and land development ordinance for this municipality contains stormwater management regulations. The objective of these regulations is to provide protection against improperly managed stormwater runoff, to assure that downstream property owners and water courses are not adversely affected by increases in stormwater runoff from subdivision and land development. It states that the peak discharge can not be greater after development than it was before. The natural infiltration and water resource potential of development shall guide design, construction, and vegetation decisions. Improvements on systems should be designed to increase the amount of water that infiltrates into the soil and control the rate of runoff. Channel protections, natural streams, swales, and areas of surface water concentration shall be maintained in existing condition except where design standards can justify a change. Runoff in excess of natural conditions from surfaces shall be recharged to the groundwater table or stored for non-potable uses. Stormwater facilities should be incorporated into the overall design of a subdivision or land development. Examples would be a wildlife area, recreation area, or a fire protection pond. If the construction is going to disturb one or more acres than a NPDES permit is required from the DEP. Existing trees and shrubs should be preserved and protected to the maximum extent. Also all detention basins should have an emergency spillway for a one-hundred year storm and should drain within twenty-four hours. A subdivision is traversed by a water course drainage easements

shall be necessary and have a minimum width of twenty feet. They also should preserve the flow of drainage as much as possible. The regulation does not cover parking lot regulations or water quality.

Hepburn Twp, Eldred Twp, Loyalsock Twp, & The City of Williamsport

All of these municipalities have a free standing Comprehensive Stormwater Ordinance that was initially developed to implement the Grafius/Miller's/McClure's Run Stormwater Management Plan. These municipalities each have a separate ordinance regarding Stormwater Management. The objective is to manage accelerated stormwater runoff problems at their source by regulating activities that cause them. Also to provide standards for design, installation, maintenance of stormwater structures to minimize the danger to public health, safety, welfare, and damages to property. Peak discharge can not be greater after development than it was prior to development. Maximum velocity, runoff values, and time of peak flow must be accounted for. To reduce runoff and encourage groundwater recharge developed areas are permitted to use underground basins, infiltration trenches, and cisterns. Drainage easements are provided and are supposed to conform to the line of watercourses. They should run parallel to the watercourse, drainage way, stream, or channel. The easements prohibit any alterations that may affect the flow of stormwater. A plan is not needed for gardening, home occupations, and agriculture when operated with conservation plans, erosion, and sedimentation control plans. There is no plan needed for forest management operations as long as the DEP's "Soil Erosion and Sedimentation Guidelines for Forestry" and an approved soil, erosion, and sediment pollution control plan are used. It is encouraged that impervious surfaces be minimized and infiltration of stormwater runoff through seepage beds, infiltration trenches, etc be applied where soil conditions permit. Facilities should permit the unimpeded flow of natural watercourses and insure adequate drainage of low points along the curb line of streets. Storm water detention facilities are to drain within twenty-four hours, detention basins forty-eight hours, and infiltrations facilities seventy-two hours. Roof drains are not allowed to discharge directly into storm sewers. Stormwater facilities should minimize danger to public health, safety, and damages to property. Soil erosion and sedimentation plans are required under this ordinance. The ordinance contains regulations for storm sewers, detention/retention basins, bridges, culverts, sinkhole protection, erosion & sedimentation control, and information regarding impervious surfaces. They do not cover water quality.

Loyalsock Twp and The City of Williamsport have updated their Comprehensive Ordinance to meet MS4 standards for pre and post construction stormwater management and elimination of illegal discharges. They have a list of allowable discharges based on the fact that they do not significantly contribute to the pollution of surface waters. Groundwater recharge capacity of the area being developed is required to be maximized. Best management practices (BMPs) should be designed to protect and maintain uses and level of water quality to protect those uses in streams. There are regulations from the DEP that require municipalities to ensure that the design, implementation, and maintenance of BMP that control runoff from new development and redevelopment after regulated earth disturbance activities are complete. This includes requirements needed to implement post-construction stormwater BMP with assurance of long-term operations and maintenance of those

BMPs. These ordinances also contain information regarding groundwater recharge and water quality requirements.

Eldred Township's subdivision and land development ordinance does not contain specific stormwater management regulations but does contain runoff related standards. The objective of these regulations are to require that facilities permit the unimpeded flow of natural water, take surface water from the bottom of vertical grades, lead water away from springs, avoid excess use of cross gutters at street intersections and elsewhere, and to prevent excess runoff onto adjacent properties. It states that storm drainage must be provided within an entire subdivision or land development. Also, drainage easements shall exist where a subdivision is traversed by a watercourse. When this occurs there will be a drainage easement or right of way conforming to the watercourse and the width (minimum fifteen feet). This easement should be ample enough to maintain natural drainage and not damage adjacent properties. It is a violation of this regulation to alter or relocate a watercourse without obtaining a permit from the Department of Environmental Protection (DEP). All standards of the US Conservation Service and DEP shall be met. The regulation does not contain information on peak discharge, water quality, infiltration, channel protection, or parking lot regulations.

Washington Twp

Washington Township has stormwater regulations within their subdivision and land development ordinance. The objectives of these regulations are that stormwater management facilities should be provided to permit the unimpeded flow of natural watercourses, ensure drainage of low points along streets, and intercept stormwater runoff along streets. The quantity, velocity of stormwater should be managed to protect the public health, safety, and welfare. Where stormwater improvements are installed the applicant is not released from his guarantee until facilities are inspected and passed. Details and calculations are also needed: for the area of stormwater, flow of stormwater, catch basins, channels, culverts, swales, conduits, headwalls, and other related facilities. Other details, calculations are needed for the design and the construction for the disposal of stormwater. A summary of the design data and information for existing and proposed structures, land disturbances, and impervious surfaces should also be provided. Subdivides are allowed, when possible, to connect to existing sewers. If a subdivision is traversed by a watercourse a drainage easement is to be provided and the width as wide as necessary. This easement should be ample enough to maintain natural drainage and not to damage adjacent properties. There is no disturbance permitted to existing waterways other than construction of bridges or erosion control measures. Some items not included in these regulations would be water quality, infiltration, channel protection, peak discharge, or parking lot policies. Porter Twp contains additional regulations. Stormwater facilities could be required to eliminate or reduce surface water erosion and to ensure proper drainage.

Upper Fairfield Twp

Within the subdivision and land development ordinance for this municipality is the "stormwater control" section. Within these regulations storm sewer, culverts,

detention basins, etc are required to permit the unimpeded flow of natural water, to take surface water away from the bottom of vertical grades, to lead water away from springs, to avoid excessive use of cross gutters at street intersections, and to prevent excessive runoff onto adjacent properties. If a subdivision is traversed by a watercourse a drainage easement should be provided and the width as wide as needed. This should be ample enough to maintain natural drainage and not to damage adjacent properties. All designs of facilities must meet US Soil Conservation Service and DEP standards. The regulation does not contain information regarding water quality, parking lot regulations, peak discharge, or infiltration.

Clinton Twp

This township has stormwater management regulations within their subdivision and land development ordinance but they also have a Comprehensive Stormwater Ordinance. Their subdivision and land development ordinance has a more general description of the regulations. It states that the section is to provide protection against uncontrolled runoff, downstream property owners, and water courses not affected by increases in stormwater runoff from a subdivision or land development. It states that when a subdivision is traversed by a watercourse drainage easements shall be wide enough to preserve the flow of natural drainage and any changes to the drain way are subject to approval by the DEP. Stormwater facilities should be designed in accordance with the Clinton Twp Stormwater Management Ordinance and incorporated into the overall design of the subdivision and land development. Existing trees and shrubs should be preserved and protected to the fullest extent. Channel protection shall be maintained unless when changes can be justified on basis of other design standards. Runoff in excess of natural conditions should be recharged to the groundwater table or stored when possible. When possible a subdivision or land development may connect to an existing stormwater system. Storm sewers are required when stormwater runoff can not be satisfactory handled within a street cartway.

The separate Comprehensive Stormwater Ordinance contains more stormwater management standards. It states that peak discharge after development is not allowed to be greater than before. Driveways should be designed to handle a ten year storm, Local Streets a twenty-five year, Collector Streets a fifty year, and Arterials a one-hundred year. Plans for erosion and sediment pollution control shall meet the requirements of the clean streams law. Infiltration underground in trenches, basin drains, and cisterns are allowed as long as the right conditions exist (the geologic and water table conditions exist). The township engineer may require downstream impacts to be evaluated at critical locations such as dams, tributaries, existing developments, undersized culverts, and flood prone areas. The municipality may impose water quality control measures to protect against ground and surface water pollution where nature of runoff and soils underlying stormwater control facilities would contribute a substantial risk of contamination. Swales are encouraged because they carry discharge without excessive erosion, increase time of concentration, permit water to percolate into the soil (where appropriate), reduce peak discharge, and peak velocity. The regulations list standards for peak discharges in detention and retention basins. When an elevation of an existing or proposed entrance is lower than the elevation of the public cartway serving that site,

a public grading plan must be submitted. The one thing that both of these do not cover is parking lot regulations.

Fairfield Twp & Lewis Twp

Both of these townships have stormwater management regulations within their subdivision and land development ordinance regarding storm drainage. Storm sewers, culverts, etc. are to permit the unimpeded flow of natural water, to provide adequate drainage of streets, and to intercept runoff along streets at intervals reasonably related to the extent and grade of the area drained. It states that special consideration should be taken into the design and installation of storm sewers to avoid problems which may arise from concentration of stormwater runoff over adjacent properties. A drainage easement is also granted when a subdivision is traversed by a water course. There is no minimum easement width in Lewis Twp but in Fairfield Twp the minimum width is twenty feet. These regulations do not cover peak discharge, water quality, infiltration, channel protection, or parking lot policies.

Muncy Creek Twp & Old Lycoming Twp

Both of these townships have similar stormwater management regulations within their subdivision and land development ordinance. Old Lycoming Township contains a separate Comprehensive Stormwater Ordinance. The objective of these regulations is to provide protection against uncontrolled stormwater runoff, to make sure that downstream property owners and water courses are not affected by increases in stormwater runoff from subdivision and land development. Improvements made to control drainage and stormwater runoff within a subdivision or land development should be designed to increase the amount of water which infiltrates into the soil and control the rate of runoff released offsite through temporary storage. The peak discharge shall be no greater after a subdivision and land development than before unless modified by a stormwater management plan. Peak discharge for storms in excess of a ten year storm may be required if it can be shown that a risk to downstream structures, unique natural areas, or flooding problem would be aggravated. Channel protection must be upheld except where changes can be justified on a basis of other design standards. Excess runoff of natural conditions should be recharged to the ground water table or stored, if possible. Stormwater facilities should be incorporated into the overall design of a subdivision or land development. Examples would be a wildlife area, recreation area, or a fire protection pond. Drainage swales should be designed so the banks will not erode and are able to handle a ten year storm. Detention basins should be designed not to create a hazard, be able to handle a two, ten, and one-hundred year storm. Retention basins and any open channel should be designed to handle a one-hundred year storm. If construction is going to disturb five or more acres a National Pollutant Discharge Elimination System (NPDES) permit from the DEP is needed. Existing trees and shrubs should be preserved and protected to the maximum extent. If a subdivision is traversed by a water course drainage easements shall be necessary and have a minimum width of twenty feet. They also should preserve the flow of drainage as much as possible. These regulations do not have policies on parking lots or infiltration.

The updated Comprehensive Stormwater Ordinance for Old Lycoming Township contains more stormwater management standards. It states that peak discharge after development is not allowed to be greater than before. Driveways should be designed to handle a ten year storm, Local Streets a twenty-five year, Collector Streets a fifty year, and Arterials a one-hundred year. Plans for erosion and sediment pollution control shall meet the requirements of the Clean Streams Law. Infiltration underground in trenches, basin drains, and cisterns are allowed as long as the right conditions exist (the geologic and water table conditions exist). The township engineer may require downstream impacts to be evaluated at critical locations such as dams, tributaries, existing developments, undersized culverts, and flood prone areas. The municipality may impose water quality control measures to protect against ground and surface water pollution where nature of runoff and soils underlying stormwater control facilities would contribute a substantial risk of contamination. Swales are encouraged because they carry discharge without excessive erosion, increase time of concentration, permit water to percolate into the soil (where appropriate), reduce peak discharge, and peak velocity. The regulations list standards for peak discharges in detention and retention basins. When an elevation of an existing or proposed entrance is lower than the elevation of the public cartway serving that site, a public grading plan must be submitted. Stormwater management plans are required to maximize groundwater recharge. Appendix D of the Old Lycoming Township Ordinance contains a separate section for water quality. Best Management Practices (BMPs) should be designed to protect and maintain uses and level of water quality to protect those uses in streams. There are regulations from the DEP that require municipalities to ensure that the design, implementation, and maintenance of BMPs that control runoff from new development and redevelopment after regulated earth disturbance activities are complete. This includes requirements needed to implement post-construction stormwater BMPs with assurance of long-term operations and maintenance of those BMPs.

Borough of Muncy

This municipality has stormwater management regulations within the subdivision and land development ordinance regarding stormwater management. Facilities should be designed to convey the flow of surface waters without damaging persons or property and to prevent discharge of excess runoff onto adjacent properties. Drainage should be provided at all points along streets, positive drainage away from buildings, and on-site waste disposal sites. All plans are subject to the approval of the borough or city. An underground system may be required to accommodate frequent floods and a secondary surface system to accommodate larger, less frequent floods. Drainage easements shall be provided when a subdivision is traversed by a waterway. It shall conform to the line of a watercourse and width to be adequate enough to preserve natural drainage without damaging the property. These regulations do not contain policies regarding peak discharge, infiltration, channel protection, and parking lots.

Bastress Twp, The Borough of Montgomery, Nippenose Twp, & The Borough of Jersey Shore

All of these municipalities do not have Comprehensive Stormwater management regulations but they do stormwater standards contained within their respective Subdivision and Land Development Ordinances. They state that storm sewers, culverts, etc are required to permit the unimpeded flow of natural water courses and ensure drainage along the street line. Stormwater facilities should be designed to handle water from the entire drainage basin. Drainage easements are provided when subdivisions are traversed by a water course and the width should be adequate enough to preserve natural drainage without damaging adjacent properties. All details, proposed and existing, of stormwater drainage plans (drawings, profiles, grades, etc) should be provided with the final plan. Special consideration should be given to prevent excess runoff onto adjacent properties. These regulations do not discuss peak discharge, water quality, infiltration, channel protection, and parking lot regulations.

Montoursville Borough, Borough of Duboistown, and The City of South Williamsport

These municipalities all have a Comprehensive Stormwater Ordinance developed to implement MS4 requirements. The ordinance applies to any regulated earth disturbance activity within the municipality. Some objectives are to manage stormwater runoff impacts at their source by regulating activities that cause problems and to utilize/prevent existing natural drainage systems. A focus is on infiltration of stormwater, maintain groundwater recharge, prevent degradation of surface/ groundwater quality, and to otherwise protect water resources. The existing flows and quality of streams are to be maintained. Water quality is to be met under state law regulations (25 Pa. Code Chapter 93.4a). The scour/erosion of stream banks and streambeds should be prevented. All land developments, non-regulated earth disturbance of 5,000 sq feet or more, and regulated earth disturbance activities must be designed, implemented, and operated/maintained to contend with three items: erosion & sedimentation control, post construction stormwater management, and water quality protection. The ordinance lists requirements for infiltration Best Management Practices (BMPs) and the size of recharge facilities. A detailed soil evaluation is needed to determine suitability of infiltration facilities. The ordinance gives a list of “stormwater hotspots”. It states that BMPs should be designed, implemented, and maintained to meet state water quality requirements. The ordinance goes on to list design criteria for stormwater management BMPs, prohibited discharges, and connections. It contains an appendix for low impact development practices for an alternative approach for managing stormwater runoff. Peak discharge can not be greater after development than before for up to the two year frequency for twenty-four hour duration of rainfall. It must be controlled for a one, two, ten, twenty-five, and one-hundred year storm. Easements are required for all areas used off-site stormwater control unless a waiver is granted by the municipal engineer.

This Borough of Montoursville also has stormwater management regulations within its subdivision and land development ordinance. An objective of these regulations is to provide protection against uncontrolled stormwater runoff and to make sure that downstream property owners and water courses are not affected by increases in stormwater runoff from subdivision and land development. These regulations state that peak discharge can be no greater after development than before. They also

state that improvements to systems should be designed to increase the amount of water that infiltrates into the soil and to control the rate of runoff offsite through temporary storage. Facilities should be designed to handle surface runoff and carry it to a suitable outlet. Drainage easements by waterways are granted and should be as wide as necessary to preserve the flow of drainage. Plans should also include the anticipated impact from future development. The subdivider shall consider accelerated soil erosion from construction of improvements, high density, and steep slopes. If this is the case the borough council may require soil erosion and sedimentation control measures to be incorporated. This should be designed to protect existing vegetation, minimize time, and area of soil exposure. To accomplish these requirements structural improvements to terraces, grassed waterways, and sedimentation basins may be needed. These regulations do not address parking lot regulations, water quality, and channel protection.

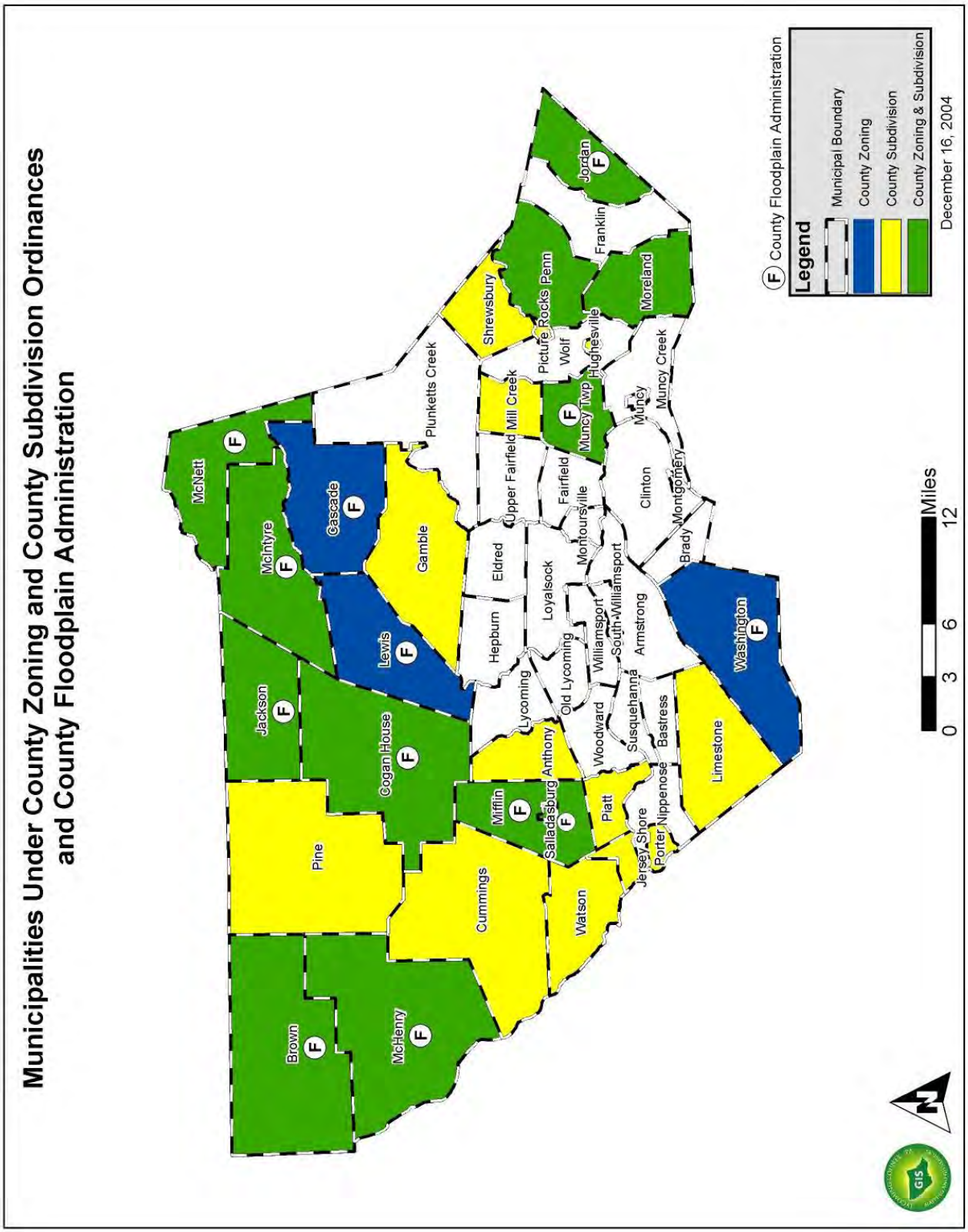
The Borough of Duboistown also has regulations within their subdivision and land development ordinance regarding stormwater management. Facilities should be designed to convey the flow of surface waters without damaging persons or property and to prevent discharge of excess runoff onto adjacent properties. Drainage should be provided at all points along streets, positive drainage away from buildings, and on-site waste disposal sites. All plans are subject to the approval of the borough or city. An underground system may be required to accommodate frequent floods and a secondary surface system to accommodate larger, less frequent floods. When altering watercourses a permit must be obtained from the DEP. Altering is not allowed if it is proposed to lower the flood carrying capacity. When altering a watercourse it is necessary to alert adjacent communities, the Department of Community and Economic Development, and the Federal Insurance Administration. These regulations do not contain policies regarding peak discharge, infiltration, channel protection, and parking lots.

The city of South Williamsport does not have a stormwater management section within their subdivision and land development ordinance but they do have regulations regarding this matter. The objective is to provide suitable sites for building and other uses, to prevent adverse impacts to properties adjoining and downstream of all proposed projects. Peak runoff after construction can't exceed the amount it was before. It is required for a subdivision and land development to show all drainage on a stormwater management plan. All land areas shall be graded to secure proper drainage away from buildings and to prevent stormwater collecting into pools. The drainage should be carried away to the nearest practical street, storm drain, or natural watercourse. National watercourses are not to be covered or piped unless required by the governing body. Stormwater management facilities are encouraged to serve more than one property or development. Drainage facilities should be designed to handle a ten year storm peak flow. The section that deals with stormwater management has detailed descriptions on what is required for sufficient stormwater drainage. Where a subdivision is traversed by a watercourse a drainage easement or right of way shall be provided. The easement shall conform substantially to the line of a watercourse and shall have a minimum width of twenty feet. This plan does not deal with water quality, infiltration, channel protection, or parking lot regulations.

5.3 Summary of Municipal Ordinances:

Stormwater management ordinances are inconsistent in Lycoming County. The Greater Williamsport Area Municipalities, through the MS4 program, have developed and adopted Comprehensive Ordinances. Hepburn and Eldred Townships have adopted comprehensive Ordinances through the Grafius, McClures, and Miller's Run Act 167 Plan. Several other Townships (Clinton and Armstrong, for example) have also independently developed Comprehensive Ordinances. Some of the comprehensive ordinances lack water quality provisions, however. Most of the 52 County municipalities cover stormwater management through sections of their municipal zoning or subdivision ordinances, and the ordinances vary widely in scope and coverage. Lack of, or inconsistent, stormwater management contributes to stormwater problems which impact downstream property owners. Stormwater problems are harder to manage after the fact.

Concerned citizens look to municipal officials for help with flooding, streambank erosion/property damage, reduced groundwater recharge and lowering of the water table, and stormwater runoff from utilities and highways. After adoption and approval of an Act 167 Stormwater plan, highways and utilities are required to comply with the watershed stormwater plan. Stormwater problems may originate in one municipality but cause downstream impacts in another municipality.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Limestone
Armstrong
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Montoursville
Fairfield
Upper Fairfield
Mill Creek
Muncy Twp
Muncy
Clinton
Brady
Montgomery
Washington
Shrewsbury
Picture Rocks
Penn
Wolf
Hughesville
Moreland
Franklin
Jordan
Muncy Creek

SECTION VI – DEVELOPMENT OF MODEL STORMWATER ORDINANCE PROVISIONS

DEP has developed a model ordinance that has provided a starting point for the County Stormwater Ordinance contained in Attachment A of this Plan. The Ordinance provides a basis for consistent stormwater management in Lycoming County. The County Stormwater Ordinance references the DEP Best Management Practices (BMP) Manual. Stormwater is now considered an asset to be retained on site as much as possible. Recharge to water tables is encouraged through infiltration techniques.

SECTION VII – PRIORITIES FOR IMPLEMENTATION OF TECHNICAL STANDARDS AND CRITERIA

The Pennsylvania Stormwater Management Act, Act 167, provides the framework for improved management of the storm runoff impacts associated with the development of land. The purposes of the Act are to encourage the sound planning and management of storm runoff, to coordinate the stormwater management efforts within each watershed, and to encourage the local administration and management of a coordinated stormwater program.

The County Stormwater Plan and Implementing Ordinance will apply to the areas outside of Watersheds with adopted Act 167 Plans (primarily Lycoming Creek and Grafius/McClure's/Miller's Run). Hydrologic modeling and detailed stormwater retention standards will be developed for other watersheds as funding becomes available.

As required by Act 167, existing municipal stormwater ordinances and related stormwater provisions sin zoning and subdivision ordinances will need to be reviewed for consistency with the County Ordinance, and amended as necessary, within six months of adoption by the County and approval by DEP of the Act 167 County Stormwater Plan. The municipality is encouraged to adopt the County Model Ordinance as a free-standing Ordinance and rescind other inconsistent components. The County and DEP will help municipalities with the ordinance update process through workshops and other technical assistance.

Municipalities are eligible for 75% reimbursement from DEP of stormwater ordinance engineer and solicitor review costs. The County will offer a Stormwater administration option whereby the municipality may delegate administration of the stormwater ordinance to the County, similar to the current Floodplain and Zoning Administration Partnerships. LCPC staff and many local engineers are being trained in low impact stormwater design. The administrative body (municipality or County, if delegated) is also eligible for 75% reimbursement of administrative costs from DEP, although these costs are usually covered by developers fees.

For purposes of Act 167 Stormwater Management Plans (Plans), design policy pertaining to stormwater management facilities for PennDOT and PTC roadways and associated facilities are provided in Sections 13.7 (Antidegradation and Post Construction Stormwater Management Policy) of PennDOT Publication No. 13M, Design Manual Part 2 (August 2009), as developed, updated, and amended in consultation with PADEP. As stated in DM-2.13.7.D (Act 167 and Municipal Ordinances), PennDOT and

PTC roadways and associated facilities shall be consistent with Act 167 Plans. DM-2.13.7.B (Policy on Antidegradation and Post Construction Stormwater Management) was developed as a cooperative effort between PennDOT and PADEP. DM-2.13.7.C (Project Categories) discusses the anticipated impact on the quality, volume, and rate of stormwater runoff.

Where standards in Act 167 Plans are impracticable, PennDOT or PTC may request assistance from DEP, in consultation with the county, to develop an alternative strategy for meeting state water quality requirements and the goals and objectives of the Act 167 Plans.

For purposes of this Act 167 Plan, road maintenance activities are regulated under 25 Pa Code Chapter 102.

SECTION VIII – PLAN REVIEW ADOPTION AND UPDATING PROCEDURES

8.1 Plan Review and Adoption

The opportunity for local review of the draft Stormwater Management Plan is a prerequisite to County adoption of the Plan. The local review of the Plan is composed of four parts, the Watershed Plan Advisory Committee review, Municipal Engineer and Developer's Committee review, municipal review, and County review. Presented below is a chronological listing and brief narrative of the required local review steps through County adoptions.

1. Watershed Plan Advisory Committee (WPAC) Review – This body has been formed to assist in the development of the Lycoming County Stormwater Management Plan. Municipal members of the Committee have provided input data to the process in the form of storm drainage area documentation, storm sewer documentation, proposed solutions to drainage problems, etc. The Committee met on four (4) occasions to review the progress of the Plan. Municipal representatives on the Committee have reported on the progress of the Plan to their respective municipalities.

2. Municipal Engineers and Developer's Committee Review – This body was formed to educate the Municipal Engineers on the ordinance adoption and implementation requirements of the Plan. The committee met to receive comments and direction in the development of the model ordinance.

3. Municipal Review – Act 167 specifies that prior to adoption of the Plan by the County, the planning commission and governing body of each municipality in the study area must review the Plan for consistency with other plans and programs affecting the study area.

4. County Review and Adoption – Upon completion of the review by the Watershed Plan Advisory Committee, Municipal Engineers and Developer's Committee, and each municipality, the Plan will be submitted to the Lycoming County Planning Commission for their recommendation to the Board of Commissioners.

The Lycoming County review of the Plan will include a detailed review by the County Planning Commission and an opportunity for public input through a Public Hearing by the Board of Commissioners. The Public Hearing on the Plan must be held with a minimum two-week notice period with copies of the Plan available for inspection by the general public. Any modifications to the Plan are made by the County based upon input from the public hearings, comments received from the municipalities in the study area or their own review. Adoption of the Plan by Lycoming County includes a resolution and requires an affirmative vote of the majority of members on the County Board of Commissioners.

The adopted Plan is submitted by Lycoming County to the Department of Environmental Protection (DEP) for their consideration. Accompanying the Plan to DEP would be the review comments of the municipalities.

8.2 Procedure for Updating the Plan

Act 167 specifies that the County must review and, if necessary, revise the adopted and approved study area plan a minimum of every five years. Any proposed revisions to the Plan would require municipal and public review prior to county adoption consistent with the procedures outline above. An important aspect of the plan is a procedure to monitor the implementation of the Plan and initiate review and revisions in a timely manor. The process to be used for the Lycoming County Stormwater Management Plan will be as outlined below.

1. Monitoring of the Plan Implementation – The Lycoming County Planning Commission (LCPC) will be responsible for monitoring the implementation of the Plan by maintaining a record of all development activities within the study area. Development activities are defined and included in the recommended Municipal Ordinance. Specifically, the LCPC will monitor the following data records:

    a. All subdivision and land developments subject to review per the Plan which have been approved within the study area.
    b. All building permits subject to review per the Plan which have been approved within the study area.
    c. All DEP permits issued under Chapter 105 (Dams and Waterway Management) and Chapter 106 (Floodplain Management) including location and design capacity (if applicable).

2. Review of Adequacy of Plan – The Watershed Advisory Committee will be convened periodically to review the Stormwater Management Plan and determine if the Plan is adequate for minimizing the runoff impacts of new development. At minimum, the information to be reviewed by the Committee will be as follows:

a. Development activity data as monitored by the LCPC.
b. Information regarding additional storm drainage problem areas as provided by the municipal representatives to the Watershed Advisory Committee.
c. Zoning amendments within the study area.
d. Information associated with any regional detention alternatives implemented within the study area.
e. Adequacy of the administrative aspects of regulated activity review.

The Committee will review the above data and make recommendations to the County as to the need for revision to the Lycoming County Stormwater Management Plan. Lycoming County will review the recommendations of the Watershed Advisory Committee and determine if revisions are to be made. A revised Plan would be subject to the same rules of adoption as the original Plan preparation. Should Lycoming County determine that no revisions to the Plan are required for a period of five consecutive years, the County will adopt resolutions stating that the Plan has been reviewed and been found satisfactory to meet the requirements of Act 167 and forward the resolution to DEP.

SECTION IX – REFERENCES

1. Pennsylvania Department of Conservation and Natural Resources, Bureau of Topographic and Geologic Survey, the "Pennsylvania Geological Survey". http://www.dcnr.state.pa.us/topogeo/map1/explanation.pdf

2. Stormwater; The Journal for Surface Water Quality Professionals, "Off the Hook, Finding Funding for Stormwater Programs. September/October 2005.

3. Pennsylvania Best Management Practices Manual. The Department of Environmental Protection, Bureau of Watershed Management. Document Number 363-0300-002, Effective December 30, 2006.

4. (USDA), (NRCS). National Engineering Handbook. Part 630: Hydrology, 1969-2001. Original published as National Engineering Handbook, Section 4: Hydrology available online at: http://www.wcc.nrcs.usda.gov/hydro/hydro-techref-neh-630.html.

5. Urban Hydrology for Small Watersheds, Technical Release No. 55 (TR-55, USDA, NRCS).

6. Commonwealth of Pennsylvania, Storm Water Management Act No. 167.

7. PennDOT Drainage Manual, Publication Number 584, as amended.

ATTACHMENT A

Model County Stormwater Ordinance