

APPENDIX I: STORMWATER ORDINANCE RECOMMENDATIONS

In the past, DEP Act 167 Stormwater Management Plans were developed on a watershed basis based on the condition of a watershed. This methodology resulted in the preparation of the Lackawanna River Watershed Stormwater Management plan (1991), which does not contain the entire County, nor does it contain all of the SAPA area. Of the eleven (11) municipalities comprising SAPA, seven (7) are located within or partially within the Lackawanna River watershed. The remainder of the SAPA area, outside of the Lackawanna River watershed, does not have a Stormwater Management plan. A hydrologic features map that presents the watershed boundaries is provided in Chapter 2.

The Lackawanna River Act 167 was adopted in 1991 and has not been updated since its adoption. For these municipalities located wholly or partially within this DEP Act 167 Watershed, recommendations are presented to modify the existing Stormwater Ordinance. For the remaining SAPA area located outside of the Lackawanna River watershed it is recommended to adopt the existing DEP Model Ordinance (March, 2008) since no existing Ordinance is available for updating. The current DEP Model Ordinance is provided with this Comprehensive Plan as Appendix 2.

It should be noted that a DEP Act 167 Stormwater Management Plan is anticipated to be complete by 2011 for all of Lackawanna County. This county-wide approach will allow for a detailed investigation of all the watersheds in Lackawanna County, and will serve as a mechanism for all municipal officials and watershed stakeholders to provide input on stormwater management. The result will be a comprehensive Stormwater Management Plan for the county. In the interim, however, it is recommended that municipal officials of SAPA municipalities in the Lackawanna River watershed review the recommendations for stormwater management presented in this document. These recommendations are based on incorporating updated stormwater management criteria from the current DEP Model Ordinance into the existing Lackawanna River Stormwater Management Plan and Ordinance.

The Lackawanna River Stormwater Ordinance produced in 1991 focused on several stormwater management techniques:

- Control accelerated runoff;
- Utilize and preserve existing natural drainage;
- Encourage recharge of groundwater;
- Maintain existing flows and water quality of streams;
- Preserve and restore the flood carrying capacity of streams;
- Provide for proper maintenance of all stormwater management structures.

Act 167 Plans in the past have been directed towards water *quantity* control thereby focusing on release rates for specific management districts in order to minimize flooding. The purpose of future plans is still to minimize flooding through 100% Post-Construction to Pre-Construction release rate methodology but also to improve water *quality*. The minimum Water Quality Volume (WQV) which is the amount of runoff to be mitigated to protect water quality was determined by the DEP to be WQV = ½ inch (at the time of the Lackawanna River Stormwater Management Plan adoption). The DEP has now determined the minimum WQV to be 1 inch in order to mitigate pollutants generated by new impervious surfaces. However, the Lackawanna River Stormwater Management Plan requires 1.5 inches of runoff to be infiltrated, which is more stringent than the new requirements. Therefore, the recommendations presented in this document will utilize some criteria from the existing Lackawanna River Stormwater Management Plan in order to not reduce existing standards that may supersede new regulations. This logic is also true of the Stormwater Management Districts that were developed for the Lackawanna River Stormwater Management Plan; these districts for release rate control will continue to be used through the recommended update, and future Plan updates.

The process of developing a Stormwater Ordinance requires certain minimum standards to be met as set forth by the DEP. Once these standards are met, the Municipality can decide to adopt more stringent standards based on the specific needs of the area.

RECOMMENDATIONS FOR THE LACKAWANNA RIVER STORMWATER ORDINANCE

The following are recommended changes to be made to the existing Stormwater Ordinance included in the Lackawanna River Stormwater Management Plan. Each municipality may pursue any of the recommendations, and make changes to the recommendations to create a practical and implementable Ordinance. To readopt a Stormwater Ordinance, a public hearing must be held in each municipality that chooses to do so.

The recommendations presented here follow the general methodology: **BOLD TEXT** refers to the section of the **EXISTING** Lackawanna River Stormwater Ordinance (1991). The *RECOMMENDATION* following each section is from the current DEP Model Stormwater Ordinance (March, 2008) or from a recently completed Stormwater Management Plan that incorporates criteria suitable for use in the Lackawanna River watershed.

TABLE OF CONTENTS

RECOMMENDATION –

Add the following Articles to the Table of Contents and revise the Article numbering scheme to be consistent (i.e. in the proper order, as Article VIII is currently Adoption):

Article VIII - Prohibitions

Section 801.	Prohibited Discharges and Connections
Section 802.	Roof Drains
Section 803.	Alteration of SWM BMPs

Article IX - Enforcement and Penalties

Section 901.	Right-of-Entry
Section 902.	Inspection
Section 903.	Enforcement
Section 904.	Suspension and Revocation
Section 905.	Penalties
Section 906.	Appeals

Change **Article VIII Adoption** to *Article X Adoption*

Article X - Adoption

Section 1001.	Adoption
Section 1002.	Public Hearing
Section 1003.	Adoption Date

ARTICLE I – GENERAL PROVISIONS

SECTION 101. STATEMENT OF FINDINGS

RECOMMENDATION –

Replace with the following:

Section 101. Statement of Findings

The governing body of the Municipality finds that:

- A. Inadequate management of accelerated runoff of stormwater resulting from development throughout a watershed increases 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, threatens public health and safety, and increases non-point source pollution of water resources.

- B. 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 people of the Commonwealth, their resources and the environment.
- C. Stormwater is an important water resource, which provides groundwater recharge for water supplies and base flow of streams, which also protects and maintains surface water quality.
- D. Federal and state regulations require certain municipalities to implement a program of stormwater controls. These municipalities are required to obtain a permit for stormwater discharges from their separate storm sewer systems under the NPDES.

SECTION 102. PURPOSE

RECOMMENDATION –

Replace with the following:

Section 102. Purpose

The purpose of this Ordinance is to promote health, safety, and welfare within the Lackawanna River Watershed by minimizing the damages described in Section 101(A) of this Ordinance by provisions designed to:

- A. Meet legal water quality requirements under state law, including regulations at 25 Pa. Code Chapter 93 to protect, maintain, reclaim and restore the existing and designated uses of the waters of this Commonwealth.
- B. Conserve the natural drainage systems as much as possible.
- C. Manage stormwater runoff close to the source.
- D. Provide procedures and performance standards for stormwater planning and management.
- E. Maintain groundwater recharge, to prevent degradation of surface and groundwater quality and to otherwise protect water resources.
- F. Prevent scour and erosion of stream banks and streambeds.
- G. Provide proper operation and maintenance of all permanent Stormwater Management (SWM) Best Management Practices (BMPs) that are implemented within the Municipality.
- H. Provide standards to meet NPDES permit requirements.

SECTION 103. STATUTORY AUTHORITY

RECOMMENDATION –

Section 103 should read as follows:

Section 103. Statutory Authority

A. Primary Authority

The [municipality] is empowered to regulate these activities by the authority of the Act of October 4, 1978, P.L. 864 (Act 167), the “Storm Water Management Act” and the [appropriate municipal code].

B. Secondary Authority

The Municipality also is empowered to regulate land use activities that affect runoff by the authority of the Act of July 31, 1968, P.L. 805, No. 247, The Pennsylvania Municipalities Planning Code, as amended.

SECTION 104. APPLICABILITY

RECOMMENDATION –

The 4th Paragraph of Section 104 should read as follows:

The following activities are defined as Regulated Activities and shall be regulated by this Ordinance.

RECOMMENDATION –

The last two sentences of the last paragraph in Section 104 should be removed:

“Any areas...” and “No waiver...”

SECTION 105. EXEMPTIONS

RECOMMENDATION –

Replace entire section with the following:

Section 105. Exemptions

- A. Regulated Activities that create Disconnected Impervious Areas smaller than (x) sq. ft. are exempt from the Peak Rate Control and the SWM Site Plan preparation requirement of this Ordinance.
- B. Regulated Activities that create Disconnected Impervious Areas equal to or greater than (x) sq. ft. and less than (y) sq. ft. are exempt only from the peak rate control requirement of this Ordinance.

- C. Agricultural plowing and tilling are exempt from the rate control and SWM Site Plan preparation requirements of this Ordinance provided the activities are performed according to the requirements of 25 Pa. Code Chapter 102.
- D. Forest management and timber operations are exempt from the rate control and SWM Site Plan preparation requirements of this ordinance provided the activities are performed according to the requirements of 25 Pa. Code Chapter 102.
- E. Exemptions from any provisions of this Ordinance shall not relieve the applicant from the requirements in Sections 301.D. through L.

**NOTE: Values of 250 to 1,000 are recommended for “x” and values of 1,000 to 5,000 are recommended for “y”.

ARTICLE II - DEFINITIONS

RECOMMENDATION –

It is recommended that all of Article II be replaced with Article II from the current (2008) DEP Model Stormwater Ordinance. Careful attention should be paid to the terms used in the Ordinance, and any extemporaneous terms should be removed from the Definitions. Replace Article II as follows:

For the purposes of this Ordinance, certain terms and words used herein shall be interpreted as follows:

- A. Words used in the present tense include the future tense; the singular number includes the plural, and the plural number includes the singular; words of masculine gender include feminine gender; and words of feminine gender include masculine gender.
- B. The word “includes” or “including” shall not limit the term to the specific example but is intended to extend its meaning to all other instances of like kind and character.
- C. The words “shall” and “must” are mandatory; the words “may” and “should” are permissive.

Agricultural Activity - The work of producing crops including tillage, land clearing, plowing, disking, harrowing, planting, harvesting crops, or pasturing and raising of livestock and installation of conservation measures. Construction of new buildings or impervious area is not considered an Agricultural Activity.

Applicant - A landowner, developer or other person who has filed an application to the Municipality for approval to engage in any Regulated Activity at a project site in the Municipality.

Best Management Practice (BMP) - Activities, facilities, designs, measures or procedures used to manage stormwater impacts from Regulated Activities, to meet State Water Quality Requirements, to promote groundwater recharge and to otherwise meet the purposes of this

Ordinance. Stormwater BMPs are commonly grouped into one of two broad categories or measures: “structural” or “non-structural”. In this ordinance, non-structural BMPs or measures refer to operational and/or behavior-related practices that attempt to minimize the contact of pollutants with stormwater runoff whereas structural BMPs or measures are those that consist of a physical device or practice that is installed to capture and treat stormwater runoff. Structural BMPs include, but are not limited to, a wide variety of practices and devices, from large-scale retention ponds and constructed wetlands, to small-scale underground treatment systems, infiltration facilities, filter strips, low impact design, bioretention, wet ponds, permeable paving, grassed swales, riparian or forested buffers, sand filters, detention basins, and manufactured devices. Structural Stormwater BMPs are permanent appurtenances to the project site.

Cistern – An underground reservoir or tank for storing rainwater.

Conservation District - A conservation district, as defined in section 3(c) of the Conservation District Law (3 P. S. § 851(c)), which has the authority under a delegation agreement executed with the Department to administer and enforce all or a portion of the erosion and sediment control program in this Commonwealth.

Culvert – A pipe, conduit, or similar structure including appurtenant works which carries surface water.

Design Storm - The magnitude and temporal distribution of precipitation from a storm event measured in probability of occurrence (e.g. a 5-year-storm) and duration (e.g. 24 hours), used in the design and evaluation of stormwater management systems. Also see Return Period.

Detention - The volume of runoff that is captured and released into the waters of this Commonwealth at a controlled rate.

DEP - The Pennsylvania Department of Environmental Protection.

DER - The Pennsylvania Department of Environmental Resources.

Detailed Study Area – Study areas outside of the Lackawanna River Boundaries themselves for which plans have been prepared previously by The United States Army Corps of Engineers and/or DER. Modeling for these areas was undertaken with the Penn State Runoff Model.

Detention Basin – A basin designed to retard storm water runoff by temporarily storing the runoff and releasing it at a predetermined rate.

Development Plan – A detailed narrative with related mapping outlining the proposed project along with the storm water runoff measures proposed to comply with this ordinance.

Development Site (Site) - See Project Site.

Developer – A person, partnership, association, corporation or other entity, or any responsible person therein or agent thereof, that undertakes any Regulated Activity of this Ordinance.

Disconnected Impervious Area (DIA) - An impervious or impermeable surface which is disconnected from any stormwater drainage or conveyance system and is redirected or directed to a pervious area which allows for infiltration, filtration, and increased time of concentration.

Disturbed Area - An unstabilized land area where an Earth Disturbance is occurring or has occurred.

Drainage Easement – A right granted by a land owner to a grantee, allowing the use of private land for stormwater purposes.

Earth Disturbance Activity - A construction or other human activity which disturbs the surface of the land, including, but not limited to, clearing and grubbing; grading; excavations; embankments; road maintenance; building construction; the moving, depositing, stockpiling, or storing of soil, rock or earth materials.

Erosion - The natural process by which the surface of the land is worn away by water, wind or chemical action.

Existing Condition - The dominant land cover during the 5-year period immediately preceding a proposed Regulated Activity.

FEMA - Federal Emergency Management Agency.

Floodplain - Any land area susceptible to inundation by water from any natural source or delineated by applicable FEMA maps and studies as being a special flood hazard area. Included are lands adjoining a river or stream that have been or may be expected to be inundated by a 100-year flood. Also included are areas that comprise Group 13 Soils, as listed in Appendix A of the Pennsylvania DEP Technical Manual for Sewage Enforcement Officers (as amended or replaced from time to time by PADEP).

Floodway - The channel of the watercourse and those portions of the adjoining floodplains that are reasonably required to carry and discharge the 100-year flood. Unless otherwise specified, the boundary of the floodway is as indicated on maps and flood insurance studies provided by FEMA. In an area where no FEMA maps or studies have defined the boundary of the 100-year floodway, it is assumed -- absent evidence to the contrary -- that the floodway extends from the stream to 50 feet from the top of the bank of the stream.

Freeboard – The incremental depth in a storm water management structure, provided as a safety factor of design, above that required to convey the design runoff event.

Forest Management/Timber Operations - Planning and activities necessary for the management of forestland. These include conducting a timber inventory, preparation of forest management plans, silvicultural treatment, cutting budgets, logging road design and construction, timber harvesting, site preparation and reforestation.

Governing Body – The municipal entity empowered to review and/or approve of storm water management plans, development site plans, facilities and maintenance agreements. The governing body may authorize at the municipal planning commission or other appropriate body to undertake any or all of the above responsibilities.

Groundwater Recharge – Replenishment of existing natural underground water supplies.

Hydrologic Soil Group (HSG) - Infiltration rates of soils vary widely and are affected by subsurface permeability as well as surface intake rates. Soils are classified into four HSG's (A, B, C, and D) according to their minimum infiltration rate, which is obtained for bare soil after prolonged wetting. The NRCS defines the four groups and provides a list of most of the soils in the United States and their group classification. The soils in the area of the development site may be identified from a soil survey report that can be obtained from local NRCS offices or conservation district offices. Soils become less pervious as the HSG varies from A to D (NRCS ^{3,4}).

Impervious Surface (Impervious Area) - A surface that prevents the infiltration of water into the ground. Impervious surfaces (or areas) shall include, but not be limited to, roofs, additional indoor living spaces, patios, garages, storage sheds and similar structures, and any new streets or sidewalks. Decks, parking areas, and driveway areas are not counted as impervious areas if they do not prevent infiltration.

Infiltration Structure – A structure designed to direct runoff into the ground, e.g. French drain, seepage pit or seepage trench.

Karst - A type of topography or landscape characterized by surface depressions, sinkholes, rock pinnacles/uneven bedrock surface, underground drainage and caves. Karst is formed on carbonate rocks, such as limestone or dolomite.

Land Development (Development) - Inclusive of any or all of the following meanings: (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, leaseholds, condominiums, building groups, or other features; (ii) any subdivision of land; (iii) development in accordance with Section 503(1.1) of the PA Municipalities Planning Code.

LCRPC – The Lackawanna County Regional Planning Commission

Mainstem (main channel) – Any stream segment or other runoff conveyance facility used as a reach in the Lackawanna River hydrologic model.

Manning Equation (Manning formula) – A method for calculation of velocity of flow (e.g. feet per second) and flow rate (e.g. cubic feet per second) in open channels based upon channel shape, roughness, depth of flow and slope. “Open channels” may include closed conduits so long as the flow is not under pressure.

Municipality - (municipality name), (county name) County, Pennsylvania.

Municipal Engineer - Person or firm engaged by municipality to undertake engineering type reviews for projects within the municipal boundaries.

Municipal Planning Commission - That body charged with planning related functions on the municipal level as defined in Act 247, the Pennsylvania Municipalities Code.

NRCS - USDA Natural Resources Conservation Service (previously SCS).

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

Penn State Runoff Model (calibrated) – The computer-based hydrologic modeling technique adapted to the Lackawanna River Watershed for the Act 167 Plan. The model has been “calibrated” to reflect actual recorded flow values by adjusting key model input parameters.

Pervious Area - Any area not defined as impervious.

Project Site - The specific area of land where any Regulated Activities in the Municipality are planned, conducted or maintained.

Qualified Professional - Any person licensed by the Pennsylvania Department of State or otherwise qualified by law to perform the work required by the Ordinance.

Rational Method – A method of peak runoff calculation using a standardized runoff coefficient (rational ‘C’), acreage of tract and rainfall intensity determined by return period and by the time necessary for the entire tract to contribute runoff. The rational formula is stated as follows: $Q = CIA$, where “Q” is the calculated peak flow rate in cubic feet per second, “C” is the dimensionless runoff coefficient (see Appendix B under separate cover), “I” is the rainfall intensity in inches per hour, and “A” is the area of the tract in acres.

Reach - Any of the natural or man-made runoff conveyance channels used for modeling purposes to connect the subareas and transport flows downstream.

Regulated Activities - Any Earth Disturbances Activities or any activities that involve the alteration or development of land in a manner that may affect stormwater runoff.

Regulated Earth Disturbance Activity - Activity involving Earth Disturbance subject to regulation under 25 Pa. Code Chapters 92, Chapter 102, or the Clean Streams Law.

Release Rate – The percentage of the predevelopment peak rate of runoff for a development site to which the post-development peak rate of runoff must be controlled to protect downstream areas.

Retention/Removed Runoff - The volume of runoff that is captured and not released directly into the surface waters of this Commonwealth during or after a storm event.

Return Period - The average interval, in years, within which a storm event of a given magnitude can be expected to occur one time. For example, the 25-year return period rainfall would be expected to occur on average once every 25 years. The probability of a 25-year storm occurring in any one year is 0.04 (i.e. a 4% chance).

Runoff - Any part of precipitation that flows over the land.

Seepage Pit/Seepage Trench – An area of excavated earth filled with loose stone or similar material and into which surface water is directed for infiltration into the ground.

SCS –Soil Conservation Service, U.S. Department of Agriculture.

Sediment - Soils or other materials transported by surface water as a product of erosion.

Soil-Cover-Complex Method –A method of runoff computation developed by SCS which is based upon relating soil type and land use / cover to a runoff parameter called a Curve Number.

State Water Quality Requirements - The regulatory requirements to protect, maintain, reclaim, and restore water quality under Pennsylvania Code Title 25 and the Clean Streams Law.

Storage Indication Method – A reservoir routing procedure based on solution of the continuity equation (inflow minus outflow equals the change in storage for a given time interval) and based on outflow being a unique function of storage volume.

Stormwater - Drainage runoff from the surface of the land resulting from precipitation or snow or ice melt.

Stormwater Management Facility - Any structure, natural or man-made, that, due to its condition, design, or construction, conveys, stores, or otherwise affects stormwater runoff. Typical stormwater management facilities include, but are not limited to, detention and retention basins, open channels, storm sewers, pipes, and infiltration facilities.

Stream – A watercourse.

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

Stormwater Management Best Management Practices - Is abbreviated as **SWM BMPs** throughout this Ordinance.

Stormwater Management Site Plan - The plan prepared by the Developer or his representative indicating how storm water runoff will be managed at the development site in accordance with this Ordinance. **Stormwater Management Site Plan** will be designated as **SWM Site Plan** throughout this Ordinance.

Storm Sewer – A system of pipes or other conduits which carries intercepted surface runoff, street water and other wash waters, or drainage, but excludes domestic sewage and industrial wastes.

Subarea – The smallest unit of watershed breakdown for hydrologic modeling purposes for which the runoff control criteria have been established in the Storm Water Management Plan.

Subdivision - As defined in The Pennsylvania Municipalities Planning Code, Act of July 31, 1968, P.L. 805, No. 247.

USDA - United States Department of Agriculture.

Waters of this Commonwealth - Rivers, streams, creeks, rivulets, impoundments, ditches, watercourses, storm sewers, lakes, dammed water, wetlands, ponds, springs and 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.

Watershed - Region or area drained by a river, watercourse or other surface water of the Commonwealth.

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, fens, and similar areas.

ARTICLE III – STORMWATER MANAGEMENT REQUIREMENTS

SECTION 301. GENERAL REQUIREMENTS

RECOMMENDATION –

Replace with the following:

Section 301. General Requirements

- A. For all Regulated Activities, unless preparation of an SWM Site Plan is specifically exempted in Section 302:
 - 1. Preparation and implementation of an approved SWM Site Plan is required.
 - 2. No Regulated Activities shall commence until the municipality issues written approval of an SWM Site Plan, which demonstrates compliance with the requirements of this Ordinance.
- B. SWM Site Plans approved by the Municipality, in accordance with Section 406, shall be on site throughout the duration of the Regulated Activity.
- C. The Municipality may, after consultation with DEP, approve measures for meeting the State Water Quality Requirements other than those in this Ordinance, provided that they meet the minimum requirements of, and do not conflict with, State law including but not limited to the Clean Streams Law.
- D. For all Regulated Earth Disturbance Activities, erosion and sediment control BMPs shall be designed, implemented, operated, and maintained during the Regulated Earth Disturbance Activities (e.g., during construction) to meet the purposes and requirements of this Ordinance and to meet all requirements under the Pennsylvania Code Title 25 and the Clean Streams Law. Various BMPs and their design standards are listed in the *Erosion and Sediment Pollution Control Program Manual (E&S Manual)*², Commonwealth of Pennsylvania, Department of Environmental Protection, No. 363-2134-008, as amended and updated.
- E. For all Regulated Activities, implementation of the Volume Controls in Section 303 is required.
- F. Impervious Areas:
 - 1. The measurement of impervious areas shall include all of the impervious areas in the total proposed development even if development is to take place in stages.
 - 2. For development taking place in stages, the entire development plan must be used in determining conformance with this Ordinance.
 - 3. For projects that add impervious area to a parcel, the total impervious area on the parcel is subject to the requirements of this ordinance.
- G. Stormwater flows onto adjacent property shall not be created, increased, decreased, relocated, or otherwise altered without permission of the adjacent property owner(s). Such stormwater flows shall be subject to the requirements of this Ordinance.

- H. All regulated activities shall include such measures as necessary to:
1. Protect health, safety, and property;
 2. Meet State Water Quality Requirements as defined in Article II;
 3. Meet the water quality goals of this ordinance by implementing measures to:
 - a. Minimize disturbance to floodplains, wetlands, natural slopes over 8%, and existing native vegetation.
 - b. Preserve and maintain trees and woodlands. Maintain or extend riparian buffers and protect existing forested buffer. Provide trees and woodlands adjacent to impervious areas whenever feasible.
 - c. Establish and maintain non-erosive flow conditions in natural flow pathways.
 - d. Minimize soil disturbance and soil compaction. Cover disturbed areas and replace topsoil to a minimum depth equal to the original depth or 4 inches, whichever is greater. Use tracked equipment for grading when feasible.
 - e. Disconnect impervious surfaces by directing runoff to pervious areas, wherever possible.
 4. To the maximum extent practicable, incorporate the techniques for Low Impact Development Practices described in “The Pennsylvania Stormwater Best Management Practices Manual” (SWM Manual)¹.
- I. The design of all facilities over Karst shall include an evaluation of measures to minimize adverse effects.
- J. Infiltration BMPs should be spread out, made as shallow as practicable, and located to maximize use of natural on-site infiltration features while still meeting the other requirements of this Ordinance.
- K. Storage facilities should completely drain both the volume control and rate control capacities over a period of time not less than 24 and not more than 72 hours from the end of the design storm.
- L. For all Regulated Activities, SWM BMPs shall be designed, implemented, operated, and maintained to meet the purposes and requirements of this Ordinance and to meet all requirements under Pennsylvania Code Title 25, the Clean Streams Law, and the Storm Water Management Act.
- M. The design storm volumes to be used in the analysis of peak rates of discharge should be obtained from the Precipitation-Frequency Atlas of the United States, Atlas 14, Volume 2,

U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Weather Service, Hydrometeorological Design Studies Center, Silver Spring, Maryland, 20910. NOAA's Atlas 14⁵ can be accessed at Internet address: <http://hdsc.nws.noaa.gov/hdsc/pfds/>.

N. Various BMPs and their design standards are listed in the SWM Manual.¹

SECTION 303. STORMWATER MANAGEMENT DISTRICT IMPLEMENTATION PROVISIONS

RECOMMENDATION –

Replace with the following:

Section 303. Volume Controls

The low impact development practices provided in the SWM Manual¹ shall be utilized for all Regulated Activities to the maximum extent practicable.

Water volume controls shall be implemented using the *Design Storm Method* in Subsection 1 or the *Simplified Method* in Subsection 2 below. For Regulated Activity areas equal or less than one (1) acre that do not require hydrologic routing to design the stormwater facilities, this Ordinance establishes no preference for either methodology; therefore, the applicant may select either methodology on the basis of economic considerations, the intrinsic limitations on applicability of the analytical procedures associated with each methodology, and other factors.

- I. *The Design Storm Method* (CG-1 in the SWM Manual¹) is applicable to any size of Regulated Activity. This method requires detailed modeling based on site conditions.
 - a. Do not increase the post-development total runoff volume for all storms equal to or less than the 2-year 24-hour duration precipitation.
 - b. For modeling purposes:
 - i. Existing (pre-development) non-forested pervious areas must be considered meadow or its equivalent.
 - ii. Twenty (20) percent of existing impervious area, when present, shall be considered meadow in the model for existing conditions.
2. *The Simplified Method* (CG-2 in the SWM Manual¹) provided below is independent of site conditions and should be used if the *Design Storm Method* is not followed. This method is not applicable to Regulated Activities greater than one (1) acre or for projects that require detailed design of stormwater storage facilities. For new impervious surfaces:

- a. Stormwater facilities shall capture at least the first two inches (2”) of runoff from all new impervious surfaces.
- b. At least the first one inch (1.0”) of runoff from new impervious surfaces shall be permanently removed from the runoff flow -- i.e. it shall not be released into the surface waters of this Commonwealth. Removal options include reuse, evaporation, transpiration, and infiltration.
- c. Wherever possible, infiltration facilities should be designed to accommodate infiltration of the entire permanently removed runoff; however, in all cases at least the first one-half inch (0.5”) of the permanently removed runoff should be infiltrated.
- d. This method is exempt from the requirements of Section 304, Rate Controls.

SECTION 304. CALCULATION METHODOLOGY

RECOMMENDATION –

Replace w/ the following:

Section 304. Calculation Methodology

Stormwater runoff from all development sites shall be calculated using either the rational method or a soil-cover-complex methodology.

- A. Any stormwater runoff calculations shall use generally accepted calculation technique that is based on the NRCS soil cover complex method. Table 304-I summarizes acceptable computation methods. It is assumed that all methods will be selected by the design professional based on the individual limitations and suitability of each method for a particular site.

The Municipality will allow the use of the Rational Method to estimate peak discharges from drainage areas that contain less than 200 acres. The Soil Complex Method is recommended for drainage areas greater than 200 acres.

**TABLE 304-I
Acceptable Computation Methodologies For
Stormwater Management Plans**

<u>METHOD</u>	<u>METHOD DEVELOPED BY</u>	<u>APPLICABILITY</u>
TR-20 (or commercial computer package based on TR-20)	USDA NRCS	Applicable where use of full hydrology computer model is desirable or necessary.
TR-55 (or commercial computer package	USDA NRCS	Applicable for land development plans within limitations described in TR-55.

based on TR-55)		
HEC-1 / HEC-HMS	US Army Corps of Engineers	Applicable where use of full hydrologic computer model is desirable or necessary.
PSRM	Penn State University	Applicable where use of a hydrologic computer model is desirable or necessary; simpler than TR-20 or HEC-1.
Rational Method or commercial computer package based on Rational Method)	Emil Kuichling(1889)	For sites less than 200 acres and with time of concentration less than 60 minutes (tc < 60 min), and with time of concentration less than 60 minutes (tc < 60 min.), or as approved by the Municipality.
Other Methods such as SWMM, HEC-HMD, WinTR20, and successors	Various	Other computation methodologies approved by the Municipality.

- B. All calculations consistent with this Ordinance using the soil cover complex method shall use the appropriate design rainfall depths for the various return period storms according to the region for which they are located as presented in the current PennDOT Drainage Manual. If a hydrologic computer model such as PSRM or HEC-1/ HEC-HMS is used for stormwater runoff calculations, then the duration of rainfall shall be 24 hours. The rainfall distribution should reference to NOAA Atlas 14.
- C. For the purposes of existing conditions flow rate determination, undeveloped land shall be considered as "meadow" in good condition, unless the natural ground cover generates a lower curve number or Rational 'C' value (i.e., forest), as listed in Table E-1 or E-2 in Appendix E of this document.
- D. All calculations using the Rational Method shall use rainfall intensities consistent with appropriate times-of-concentration for overland flow and return periods presented in the NOAA Atlas 14 or the PA Storm-Duration-Frequency charts from PennDOT Drainage Manual Chapter 7. Times-of-concentration for overland flow shall be calculated using the methodology presented in Chapter 3 of *Urban Hydrology for Small Watersheds*, NRCS, TR-55 (as amended or replaced from time to time by NRCS). Times-of-concentration for channel and pipe flow shall be computed using Manning's equation. Times-of-concentration in undeveloped areas using the NCRS lag equation divided by 0.6 is also acceptable.
- E. Runoff Curve Numbers (CN) for both existing and proposed conditions to be used in the soil cover complex method shall be obtained from Table E-1 in Appendix E of this Ordinance.
- F. Runoff coefficients (c) for both existing and proposed conditions for use in the Rational method shall be obtained from Table E-2 in Appendix E of this Ordinance.

- G. Where uniform flow is anticipated, the Manning equation shall be used for hydraulic computations, and to determine the capacity of open channels, pipes, and storm sewers. Values for Manning's roughness coefficient (n) shall be consistent with Table E-3 in Appendix E of this Ordinance.
- H. Outlet structures for stormwater management facilities shall be designed to meet the performance standards of this Ordinance using any generally accepted hydraulic analysis technique or method.
- I. The design of any stormwater detention facilities intended to meet the performance standards of this Ordinance shall be verified by routing the design storm hydrograph through these facilities using the Storage-Indication Method. For drainage areas greater than 200 acres in size, the design storm hydrograph shall be computed using a calculation method that produces a full hydrograph. The municipality may approve the use of any generally accepted full hydrograph approximation technique that shall use a total runoff volume that is consistent with the volume from a method that produces a full hydrograph.

ARTICLE IV – DRAINAGE PLAN REQUIREMENTS

RECOMMENDATION –

It is recommended all of Article IV be replaced with the current Stormwater Management Site Plan Requirements in the 2008 DEP Model Stormwater Ordinance:

**ARTICLE IV - STORMWATER MANAGEMENT (SWM) SITE PLAN
REQUIREMENTS**

Section 401. Plan Contents

The following items shall be included in the SWM Site Plan:

- A. Appropriate sections from the Municipal Subdivision and Land Development Ordinance, and other applicable local ordinances, shall be followed in preparing the SWM Site Plans. In instances where the Municipality lacks Subdivision and Land Development regulations, the content of SWM Site Plans shall follow the County's Subdivision and Land Development Ordinance.
- B. The Municipality shall not approve any SWM Site Plan that is deficient in meeting the requirements of this Ordinance. At its sole discretion and in accordance with this Article, when a SWM Site Plan is found to be deficient, the Municipality may either disapprove the submission and require a resubmission, or in the case of minor deficiencies the Municipality may accept submission of modifications.
- C. Provisions for permanent access or maintenance easements for all physical SWM BMPs, such as ponds and infiltration structures, as necessary to implement the operation and maintenance plan discussed in item E.9 below.

D. The following signature block for the Municipality:

“(Municipal Official or designee), on this date (date of signature), has reviewed and hereby certifies that the SWM Site Plan meets all design standards and criteria of the Municipal Ordinance No. (Number assigned to the Ordinance).”

E. The SWM Site Plan shall provide the following information:

1. The overall stormwater management concept for the project.
2. A determination of Site Conditions in accordance with the SWM Manual¹. A detailed site evaluation shall be completed for projects proposed in areas of carbonate geology or karst topography, and other environmentally sensitive areas such as brownfields.
3. Stormwater runoff design computations, and documentation as specified in this Ordinance, or as otherwise necessary to demonstrate that the maximum practicable measures have been taken to meet the requirements of this Ordinance, including the recommendations and general requirements in Section 301.
4. Expected project time schedule.
5. A soil erosion and sediment control plan, where applicable, as prepared for and approved by the approval authority.
6. The effect of the project (in terms of runoff volumes, water quality, and peak flows) on surrounding properties and aquatic features and on any existing stormwater conveyance system that may be affected by the project.
7. Plan and profile drawings of all SWM BMPs including open channel structures, pipes, open channels, and swales.
8. SWM Site Plan shall show the locations of existing and proposed on-lot wastewater facilities and water supply wells.
9. The SWM Site Plan shall include an operation and maintenance (O&M) plan for all existing and proposed physical stormwater management facilities. This plan shall address long-term ownership and responsibilities for operation and maintenance as well as schedules and costs for O&M activities.

Section 402. Plan Submission

A. _____ (Typically Five (5)) copies of the SWM Site Plan shall be submitted as follows:

1. _____ (Typically Two (2)) copies to the Municipality.
2. _____ (Typically One (1)) copy to the Municipal Engineer (when applicable).

3. ____ (Typically One (1)) copy to the County Conservation District.
 4. ____ (Typically One (1)) copy to the County Planning Commission/Office.
- B. Additional copies shall be submitted as requested by the Municipality or DEP.

Section 403. Plan Review

- A. The SWM Site Plan shall be reviewed by a Qualified Professional for the Municipality for consistency with the provisions of this ordinance. After review, the Qualified Professional shall provide a written recommendation for the municipality to approve or disapprove the SWM Site Plan. If it is recommended to disapprove the SWM Site Plan, the Qualified Professional shall state the reasons for the disapproval in writing. The Qualified Professional also may recommend approval of the SWM Site Plan with conditions and, if so, shall provide the acceptable conditions for approval in writing. The SWM Site Plan review and recommendations shall be completed within the time allowed by the Municipalities Planning Code for reviewing subdivision plans.
- B. The Municipality shall notify the applicant in writing within 45 calendar days whether the SWM Site Plan is approved or disapproved. If the SWM Plan involves a Subdivision and Land Development Plan, the notification period is 90 days. If a longer notification period is provided by other statute, regulation, or ordinance, the applicant will be so notified by the Municipality. If the Municipality disapproves the SWM Plan, the Municipality shall cite the reasons for disapproval in writing.

Section 404. Modification of Plans

A modification to a submitted SWM Site Plan that involves a change in SWM BMPs or techniques, or that involves the relocation or redesign of SWM BMPs, or that is necessary because soil or other conditions are not as stated on the SWM Site Plan as determined by the Municipality, shall require a resubmission of the modified SWM Site Plan in accordance with this Article.

Section 405. Resubmission of Disapproved Storm Water Management Site Plans

A disapproved SWM Site Plan may be resubmitted, with the revisions addressing the Municipality's concerns, to the Municipality in accordance with this Article. The applicable review fee must accompany a resubmission of a disapproved SWM Site Plan.

Section 406. Authorization to Construct and Term of Validity

The Municipality's approval of an SWM Site Plan authorizes the Regulated Activities contained in the SWM Site Plan for a maximum term of validity of five years following the date of approval. The Municipality may specify a term of validity shorter than five years in the approval for any specific SWM Site Plan. Terms of validity shall commence on the date the Municipality signs the approval

for an SWM Site Plan. If an approved SWM Site Plan is not completed according to Section 407 within the term of validity, then the Municipality may consider the SWM Site Plan disapproved and may revoke any and all permits. SWM Site Plans that are considered disapproved by the Municipality shall be resubmitted in accordance with Section 405 of this Ordinance.

Section 407. As-Built Plans, Completion Certificate and Final Inspection

- A. The Developer shall be responsible for providing as-built plans of all SWM BMPs included in the approved SWM Site Plan. The as-built plans and an explanation of any discrepancies with the construction plans shall be submitted to the Municipality.
- B. The as-built submission shall include a certification of completion signed by a Qualified Professional verifying that all permanent SWM BMPs have been constructed according to the approved plans and specifications. If any licensed Qualified Professionals contributed to the construction plans, then a licensed Qualified Professional must sign the completion certificate.
- C. After receipt of the completion certification by the Municipality, the Municipality may conduct a final inspection.

APPENDICES

RECOMMENDATION –

The following Appendices are recommended to be added as Appendices to the Stormwater Ordinance:

ORDINANCE APPENDIX A

**STORMWATER CONTROLS AND BEST MANAGEMENT PRACTICES
OPERATIONS AND MAINTENANCE AGREEMENT**

THIS AGREEMENT, made and entered into this _____ day of _____, 200__, by and between _____, (hereinafter the “Landowner”), and _____, _____ County, Pennsylvania, (hereinafter “Municipality”);

WITNESSETH

WHEREAS, the Landowner is the owner of certain real property as recorded by deed in the land records of _____ County, Pennsylvania, Deed Book _____ at Page _____, (hereinafter “Property”).

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

WHEREAS, the Stormwater Controls and BMP Operations and Maintenance 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 (BMPs); 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 Practice;” 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 Municipal 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.

Infiltration Trench – A BMP surface structure designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or groundwater aquifer,

Seepage Pit – An underground BMP structure designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or groundwater aquifer,

Rain Garden – A BMP overlain with appropriate mulch and suitable vegetation designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or underground aquifer, and

WHEREAS, the Municipality requires, through the implementation of the Plan, that stormwater management BMPs as required by said Plan and the Municipal 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 representatives 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 _____ 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 _____, 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 _____, 200_.

NOTARY PUBLIC

(SEAL)

ORDINANCE APPENDIX B-I

SAMPLE DRAINAGE PLAN APPLICATION AND FEE SCHEDULE

(To be attached to the "land subdivision plan or development plan review application or "minor land subdivision plan review application")

Application is hereby made for review of the Stormwater Management and Erosion and Sedimentation Control Plan and related data as submitted herewith in accordance with the _____
_____ Township Stormwater Management and Earth Disturbance Ordinance.

_____ Final Plan _____ Preliminary Plan _____ Sketch Plan

Date of Submission _____ Submission No. _____

1. Name of subdivision or development _____

2. Name of applicant _____ Telephone No. _____

(if corporation, list the corporation's name and the names of two officers of the corporation)

_____ Officer 1

_____ Officer 2

Address _____

Zip _____

Applicants interest in subdivision or development

(if other than property owner give owners name and address)

3. Name of property owner _____ Telephone No. _____

Address _____

Zip _____

4. Name of engineer or surveyor _____ Telephone No. _____

Address _____

Zip _____

5. Type of subdivision or development proposed:

____ Single-Family Lots ____ Townhouses ____ Commercial (Multi-Lot)
____ Two Family Lots ____ Garden Apartments ____ Commercial (One-Lot)
____ Multi-Family Lots ____ Mobile-Home Park ____ Industrial (Multi-Lot)
____ Cluster Type Lots ____ Campground ____ Industrial (One-Lot)
____ Planned Residential ____ Other (_____
Development

6. Lineal feet of new road proposed? _____ L.F.

7. Area of proposed and existing impervious area on entire tract.

a. Existing (to remain) _____ S.F. _____ % of Property
b. Proposed _____ S.F. _____ % of Property

8. Stormwater

a. Does the peak rate of runoff from proposed conditions exceed that flow which occurred for existing conditions for the designated design storm? _____

b. Design storm utilized (on-site conveyance systems) (24 hr.) _____

No. of Subarea _____

Watershed Name _____

Explain: _____

c. Does the submission and/or district meet the release rate criteria for the applicable subarea? _____

d. Number of subarea(s) from Ordinance Appendix D of the Stonycreek River Watershed Stormwater Management Plan Update. _____

e. Type of proposed runoff control _____

f. Does the proposed stormwater control criteria meet the requirement/guidelines of the Stormwater Ordinances? _____

If not, what variances/waivers are requested? _____

Reasons _____

g. Does the plan meet the requirements of Article iii of the Stormwater Ordinances? _____

If not, what variances/waivers are requested? _____

Reasons Why _____

h. Was TR-55, June 1986 utilized in determining the time of concentration? _____

i. What hydrologic method was used in the stormwater computations? _____

j. Is a hydraulic routing through the stormwater control structure submitted? _____

k. Is a construction schedule or staging attached? _____

l. Is a recommended maintenance program attached? _____

9. Erosion and Sediment Pollution Control (E&S):

a. Has the stormwater management and E&S plan, supporting documentation and narrative been submitted to the [County Name] _____ County Conservation District? _____

b. Total area of earth disturbance _____ S.F.

10. Wetlands

a. Have the wetlands been delineated by someone trained in wetland delineation? _____

b. Have the wetland lines been verified by a state or federal permitting authority? _____

c. Have the wetland lines been surveyed? _____

d. Total acreage of wetland within the property _____

e. Total acreage of wetland disturbed _____

f. Supporting documentation _____

11. Filing

a. Has the required fee been submitted? _____
Amount _____

- b. Has the proposed schedule of construction inspection to be performed by the applicant's engineer been submitted? _____
- c. Name of individual who will be making the inspections _____
- d. General comments about stormwater management at development _____

CERTIFICATE OF OWNERSHIP AND ACKNOWLEDGMENT OF APPLICATION:

COMMONWEALTH OF PENNSYLVANIA

COUNTY OF [County Name] .

On this the _____ day of _____, 20____, before me, the undersigned officer, personally appeared _____ who being duly sworn, according to law, deposes and says that owners of the property described in this application and that the application was made with knowledge and/or direction and does hereby agree with the said application and to the submission of the same.

_____ Property Owner

My Commission Expires _____ 20_____

Notary Public _____

THE UNDERSIGNED HEREBY CERTIFIES THAT TO THE BEST OF HIS KNOWLEDGE AND BELIEF THE INFORMATION AND STATEMENTS GIVEN ABOVE ARE TRUE AND CORRECT.

SIGNATURE OF APPLICANT _____



(Information Below This Line To Be Completed By The Municipality)

_____ Township official submission receipt:

Date complete application received _____ Plan Number _____

Fees _____ date fees paid _____ received by _____

Official submission receipt date _____

Received by _____

Township

Drainage Plan
Proposed Schedule Of Fees

Subdivision name _____ Submittal No. _____

Owner _____ Date _____

Engineer _____

- 1. Filing fee \$ _____

- 2. Land use
 - 2a. Subdivision, campgrounds, mobile home parks, and multi-family dwelling where the units are located in the same local watershed. \$ _____
 - 2b. Multi-family dwelling where the designated open space is located in a different local watershed from the proposed units. \$ _____
 - 2c. Commercial/industrial. \$ _____

- 3. Relative amount of earth disturbance
 - 3a. Residential
 - road <500 l.f. \$ _____
 - road 500-2,640 l.f. \$ _____
 - road >2,640 l.f. \$ _____
 - 3b. Commercial/industrial and other
 - impervious area <3,500 s.f. \$ _____
 - impervious area 3,500-43,460 s.f. \$ _____
 - impervious area >43,560 s.f. \$ _____

- 4. Relative size of project
 - 4a. Total tract area <1 ac \$ _____

1-5 ac	\$ _____
5-25 ac	
25-100 ac	\$ _____
100-200 ac	\$ _____
>200 ac	\$ _____

5. Stormwater control measures

5a. Detention basins & other controls which require a review of hydraulic routings (\$ per control). \$ _____

5b. Other control facilities which require storage volume calculations but no hydraulic routings. (\$ per control) \$ _____

6. Site inspection (\$ per inspection) \$ _____

Total \$ _____

All subsequent reviews shall be 1/4 the amount of the initial review fee unless a new application is required as per Section 406 of the stormwater ordinance. A new fee shall be submitted with each revision in accordance with this schedule.

ORDINANCE APPENDIX B – 2

DRAINAGE PLAN CHECKLIST



Address:

-
-

Phone:

Fax:

Project: _____

Municipality: _____

Engineer: _____

Submittal No: _____

Date: _____

Project ID: _____ (for County use ONLY)

ARTICLE I: GENERAL PROVISIONS

- 1. Is the Proposed Project within the Lackawanna River Watershed? Yes No
- 2. Does the Proposed Project meet the definition of a "Regulated Activity"? Yes No

STOP – If you have checked NO for either of the above questions, you are not required to submit a Stormwater Management Plan under the Lackawanna River Watershed Stormwater Management Ordinance.

ARTICLE I: GENERAL PROVISIONS

Note: Parent Tract refers to the total parcel configuration on (DATE) and includes any subdivision of lands which may have occurred after than date.

Parent Tract Area: _____ acres

Total Existing Impervious Area (DATE) : _____ acres

Total New Impervious Area (all Phases): _____ acres

Parcel IS Exempt

Parcel IS NOT Exempt

ARTICLE III: STORMWATER MANAGMENT

1. Are any of the following Environmentally Sensitive areas identified on site?

- | | | | | | | |
|-------------------------------|--------------------------|-----|--------------------------|----|--------------------------|---------|
| Steep Slopes | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unknown |
| Ponds / Lakes / Vernal Pools | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unknown |
| Streams | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unknown |
| Wetlands | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unknown |
| Hydric Soils | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unknown |
| Flood plains | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unknown |
| Stream Buffer Zones | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unknown |
| Hydrologic Soil Groups A or B | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unknown |
| Recharge Areas | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unknown |
| Others: _____ | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No | <input type="checkbox"/> | Unknown |

2. Does the site layout plan avoid Environmentally Sensitive Areas identified on site?

- Yes No, Explain _____

3. Has a stream buffer been established?

- Yes No, Explain _____

ARTICLE III: STORMWATER MANAGEMENT

1. Is the proposed activity considered a "Stormwater Hotspot"? Yes No

2. Have provisions been installed to promote groundwater recharge on site?

- Yes No, Explain _____

3. Total Recharge Volume Required: _____ cubic feet

4. How is the Required Recharge Volume being addressed?

- | | | | |
|--------------------------|---------------------|--------------------------|--------------|
| <input type="checkbox"/> | Infiltration Trench | <input type="checkbox"/> | Dry Swales |
| <input type="checkbox"/> | Infiltration Basin | <input type="checkbox"/> | Other: _____ |
| <input type="checkbox"/> | Bioretention | | |

ARTICLE III: STORMWATER MANAGEMENT

1. Have provisions been installed to address stormwater runoff water quality on site?

Yes No, Explain _____

2. Total Water Quality Volume Required: _____ acre feet

3. Is the site in a Special Protection watershed which includes Exceptional Value (EV) of High Quality (HQ) waters? Yes No

4. How is the Required Water Quality Volume being addressed?

<input type="checkbox"/> Wet Detention Basin	<input type="checkbox"/> Sand Filter
<input type="checkbox"/> Extended Dry Detention Basin	<input type="checkbox"/> Constructed Wetlands
<input type="checkbox"/> Bioretention	<input type="checkbox"/> Other: _____

ARTICLE III: STORMWATER MANAGEMENT

1. Has the 2-year proposed conditions flow been reduced to the 1-year existing conditions flow?

Yes No, Explain _____

2. Does the proposed conditions 1-year storm drain over a minimum 24-hour period?

Yes No, Explain _____

ARTICLE III: STORMWATER MANAGEMENT

1. In which of the following Stormwater Management District(s) is the site located?

A C
 B

2. Does the Proposed Conditions Runoff meet the Criteria established for the Management District?

Yes No, if you answered Yes proceed next page.

ARTICLE III: STORMWATER MANAGEMENT

1. Which method(s) are utilized in the site stormwater management plan for computing stormwater runoff rates and volumes?

- | | |
|--|--|
| <input type="checkbox"/> TR-20 | <input type="checkbox"/> PSRM |
| <input type="checkbox"/> TR-55 | <input type="checkbox"/> Rational Method |
| <input type="checkbox"/> HEC-1 / HEC-HMS | <input type="checkbox"/> Other: _____ |

2. Was NOAA Atlas 14 utilized in rainfall determination?

Yes No, Explain _____

3. Was Table E-2 (Runoff Curve Numbers) or Table E-3 in the Appendix E (Rational Runoff Coefficients) utilized in calculations for runoff?

Yes No, Explain _____

4. For any proposed stormwater detention facility, were the appropriate design storms routed through the facility using the Storage-Indication Method?

Yes No, Explain _____

ARTICLE III: STORMWATER MANAGEMENT

1. Is this project subject to PENNDOT approval?

Yes No

a. If "YES" have these plans been forwarded to PENNDOT for review?

Yes No, Explain _____

2. Are any proposed stormwater facilities subject to PADEP Chapter 105 permitting?

Yes No

a. If "YES" have these plans been forwarded to PADEP for review?

Yes No, Explain _____

ARTICLE VII: MAINTENANCE RESPONSIBILITIES

1. Has a Stormwater Control and BMP Operations and Maintenance Plan been approved by the Municipality?

Yes No, Explain _____

2. Who shall assume responsibility for implementing the Stormwater Control and BMP Operations and Maintenance Plan?

Municipality Homeowner Association
 Private Owner Other _____

ORDINANCE APPENDIX C

STORMWATER MANAGEMENT DISTRICT WATERSHED MAP

The Stormwater Management District Watershed Map developed for the 1994 Lackawanna River Stormwater Management Plan may remain as-is for use in the recommended update to the Plan. It is recommended that this map now be moved to Appendix C.

ORDINANCE APPENDIX D

LOW IMPACT DEVELOPMENT (LID) PRACTICES

ALTERNATIVE APPROACH FOR MANAGING STORMWATER RUNOFF

Natural hydrologic conditions may be altered radically by poorly planned development practices, such as introducing unneeded impervious surfaces, destroying existing drainage swales, constructing unnecessary storm sewers, and changing local topography. A traditional drainage approach of development has been to remove runoff from a site as quickly as possible and capture it in a detention basin. This approach leads ultimately to the degradation of water quality as well as expenditure of additional resources for detaining and managing concentrated runoff at some downstream location.

The recommended alternative approach is to promote practices that will minimize post-development runoff rates and volumes, which will minimize needs for artificial conveyance and storage facilities. To simulate pre-development hydrologic conditions, forced infiltration is often necessary to offset the loss of infiltration by creation of impervious surfaces. The ability of the ground to infiltrate depends upon the soil types and its conditions.

Preserving natural hydrologic conditions requires careful alternative site design considerations. Site design practices include preserving natural drainage features, minimizing impervious surface area, reducing the hydraulic connectivity of impervious surfaces, and protecting natural depression storage. A well-designed site will contain a mix of all those features. The following describes various techniques to achieve the alternative approach:

Preserving Natural Drainage Features. Protecting natural drainage features, particularly vegetated drainage swales and channels, is desirable because of their ability to infiltrate and attenuate flows and to filter pollutants. However, this objective is often not accomplished in land development. In fact, commonly held drainage philosophy encourages just the opposite pattern -- streets and adjacent storm sewers typically are located in the natural headwater valleys and swales, thereby replacing natural drainage functions with a completely impervious system. As a result, runoff and pollutants generated from impervious surfaces flow directly into storm sewers with no opportunity for attenuation, infiltration, or filtration. Developments designed to fit site topography also minimizes the amount of grading on site.

Protecting Natural Depression Storage Areas. Depressional storage areas have no surface outlet, or drain very slowly following a storm event. They can be commonly seen as ponded areas in farm fields during the wet season or after large runoff events. Traditional development practices eliminate these depressions by filling or draining, thereby obliterating their ability to reduce surface

runoff volumes and trap pollutants. The volume and release-rate characteristics of depressions should be protected in the design of the development site. The depressions can be protected by simply avoiding the depression or by incorporating its storage as additional capacity in required detention facilities.

Avoiding introduction of impervious areas. Careful site planning should consider reducing impervious coverage to the maximum extent possible. Building footprints, sidewalks, driveways and other features producing impervious surfaces should be evaluated to minimize impacts on runoff.

Reducing the Hydraulic Connectivity of Impervious Surfaces. Impervious surfaces are significantly less of a problem if they are not directly connected to an impervious conveyance system (such as storm sewer). Two basic ways to reduce hydraulic connectivity are routing of roof runoff over lawns and reducing the use of storm sewers. Site grading should promote increasing travel time of stormwater runoff, and should help reduce concentration of runoff to a single point in the development.

Routing Roof Runoff Over Lawns. Roof runoff can be easily routed over lawns in most site designs. The practice discourages direct connections of downspouts to storm sewers or parking lots. The practice also discourages sloping driveways and parking lots to the street. By routing roof drains and crowning the driveway to run off to the lawn, the lawn is essentially used as a filter strip.

Reducing the Use of Storm Sewers. By reducing use of storm sewers for draining streets, parking lots, and back yards, the potential for accelerating runoff from the development can be greatly reduced. The practice requires greater use of swales and may not be practical for some development sites, especially if there are concerns for areas that do not drain in a “reasonable” time. The practice requires educating local citizens and public works officials, who expect runoff to disappear shortly after a rainfall event.

Reducing Street Widths. Street widths can be reduced by either eliminating on-street parking or by reducing roadway widths. Municipal planners and traffic designers should encourage narrower neighborhood streets which ultimately could lower maintenance.

Limiting Sidewalks to One Side of the Street. A sidewalk on one side of the street may suffice in low-traffic neighborhoods. The lost sidewalk could be replaced with bicycle/recreational trails that follow back-of-lot lines. Where appropriate, backyard trails should be constructed using pervious materials.

Using Permeable Paving Materials. These materials include permeable interlocking concrete paving blocks or porous bituminous concrete. Such materials should be considered as alternatives to conventional

pavement surfaces, especially for low use surfaces such as driveways, overflow parking lots, and emergency access roads.

Reducing Building Setbacks. Reducing building setbacks reduces driveway and entry walks and is most readily accomplished along low-traffic streets where traffic noise is not a problem.

Constructing Cluster Developments. Cluster developments can also reduce the amount of impervious area for a given number of lots. The biggest savings is in street length, which also will reduce costs of the development. Cluster development clusters the construction activity onto less-sensitive areas without substantially affecting the gross density of development.

In summary, a careful consideration of the existing topography and implementation of a combination of the above mentioned techniques may avoid construction of costly stormwater control measures. Other benefits include reduced potential of downstream flooding, water quality degradation of receiving streams/water bodies and enhancement of aesthetics and reduction of development costs. Beneficial results include more stable baseflows in receiving streams, improved groundwater recharge, reduced flood flows, reduced pollutant loads, and reduced costs for conveyance and storage.

ORDINANCE APPENDIX E

STORMWATER MANAGEMENT DESIGN CRITERIA

TABLE E-1

RUNOFF CURVE NUMBERS

Source: NRCS (SCS) TR-55

TABLE E-2

RATIONAL RUNOFF COEFFICIENTS

TABLE E-3

MANNING ROUGHNESS COEFFICIENTS

TABLE E-4

NONSTRUCTURAL STORMWATER MANAGEMENT MEASURES

TABLE E-1
Runoff Curve Numbers
(From NRCS (SCS) TR-55)

LAND USE DESCRIPTION		HYDROLOGIC SOIL GROUP			
		A	B	C	D
Open Space		44	65	77	82
Meadow / Orchard		30	58	71	78
Agricultural		59	71	79	83
Forest		36	60	73	79
Commercial	(85% Impervious)	89	92	94	95
Industrial	(72% Impervious)	81	88	91	93
Institutional (50% Impervious)		71	82	88	90
Residential					
Average Lot Size	% impervious				
1/8 acre or less*	65	77	85	90	92

1/8 - 1/3 acre	34	59	74	82	87
1/3 - 1 acre	23	53	69	80	85
1 - 4 acres	12	46	66	78	82
Farmstead		59	74	82	86
Smooth Surfaces (Concrete, Asphalt, Gravel or Bare Compacted Soil)		98	98	98	98
Water		98	98	98	98
Mining/Newly Graded Areas (Pervious Areas Only)		77	86	91	94

* Includes Multi-Family Housing unless justified lower density can be provided.

Note: Existing site conditions of bare earth or fallow ground shall be considered as meadow when choosing a CN value.

TABLE E-2

RATIONAL RUNOFF COEFFICIENTS

By Hydrologic Soils Group and Overland Slope (%)

Land Use	A			B			C			D		
	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+	0-2%	2-6%	6%+
Cultivated Land	0.08 ^a	0.13	0.16	0.11	0.15	0.21	0.14	0.19	0.26	0.18	0.23	0.31
	0.14 ^b	0.18	0.22	0.16	0.21	0.28	0.20	0.25	0.34	0.24	0.29	0.41
Pasture	0.12	0.20	0.30	0.18	0.28	0.37	0.24	0.34	0.44	0.30	0.40	0.50
	0.15	0.25	0.37	0.23	0.34	0.45	0.30	0.42	0.52	0.37	0.50	0.62
Meadow	0.10	0.16	0.25	0.14	0.22	0.30	0.20	0.28	0.36	0.24	0.30	0.40
	0.14	0.22	0.30	0.20	0.28	0.37	0.26	0.35	0.44	0.30	0.40	0.50
Forest	0.05	0.08	0.11	0.08	0.11	0.14	0.10	0.13	0.16	0.12	0.16	0.20
	0.08	0.11	0.14	0.10	0.14	0.18	0.12	0.16	0.20	0.15	0.20	0.25
Residential												
Lot Size 1/8 Acre	0.25	0.28	0.31	0.27	0.30	0.25	0.30	0.33	0.38	0.33	0.36	0.42
	0.33	0.37	0.40	0.35	0.39	0.44	0.38	0.42	0.49	0.41	0.45	0.54
Lot Size 1/4 Acre	0.22	0.26	0.29	0.24	0.29	0.33	0.27	0.31	0.36	0.30	0.34	0.40
	0.30	0.34	0.37	0.33	0.37	0.42	0.36	0.40	0.47	0.38	0.42	0.52
Lot Size 1/3 Acre	0.19	0.23	0.26	0.22	0.26	0.30	0.25	0.29	0.34	0.28	0.32	0.39
	0.28	0.32	0.35	0.30	0.35	0.39	0.33	0.38	0.45	0.36	0.40	0.50
Lot Size 1/2 Acre	0.16	0.20	0.24	0.19	0.23	0.28	0.22	0.27	0.32	0.26	0.30	0.37
	0.25	0.29	0.32	0.28	0.32	0.36	0.31	0.35	0.42	0.34	0.38	0.48
Lot Size 1 Acre	0.14	0.19	0.22	0.17	0.21	0.26	0.20	0.25	0.31	0.24	0.29	0.35
	0.22	0.26	0.29	0.24	0.28	0.34	0.28	0.32	0.40	0.31	0.35	0.46
Industrial	0.67	0.68	0.68	0.68	0.68	0.69	0.68	0.69	0.69	0.69	0.69	0.70
	0.85	0.85	0.86	0.85	0.86	0.86	0.86	0.86	0.87	0.86	0.86	0.88
Commercial	0.71	0.71	0.72	0.71	0.72	0.72	0.72	0.72	0.72	0.72	0.72	0.72
	0.88	0.88	0.89	0.89	0.89	0.89	0.89	0.89	0.90	0.89	0.89	0.90
Streets	0.70	0.71	0.71	0.71	0.72	0.74	0.72	0.73	0.76	0.73	0.75	0.78
	0.76	0.77	0.79	0.80	0.82	0.84	0.84	0.85	0.89	0.89	0.91	0.95
Open Space	0.05	0.10	0.14	0.08	0.13	0.19	0.12	0.17	0.24	0.16	0.21	0.28
	0.11	0.16	0.20	0.14	0.19	0.26	0.18	0.23	0.32	0.22	0.27	0.39
Parking	0.85	0.86	0.87	0.85	0.86	0.87	0.85	0.86	0.87	0.85	0.86	0.87
	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97	0.95	0.96	0.97

^a Runoff coefficients for storm recurrence intervals less than 25 years.

^b Runoff coefficients for storm recurrence intervals of 25 years or more.

Source : Rawls, W.J., S.L. Wong and R.H. McCuen, 1981, "Comparison of Urban Flood Frequency Procedures", Preliminary Draft, U.S. Department of Agriculture, Soil Conservation Service, Baltimore, MD.

TABLE E-3

**Roughness Coefficients (Manning's "n") For Overland Flow
(U.S. Army Corps Of Engineers, HEC-1 Users Manual)**

Surface Description	n	
_____	-	
Dense Growth	0.4	- 0.5
Pasture	0.3	- 0.4
Lawns	0.2	- 0.3
Bluegrass Sod	0.2	- 0.5
Short Grass Prairie	0.1	- 0.2
Sparse Vegetation	0.05	- 0.13
Bare Clay-Loam Soil (eroded)	0.01	- 0.03
Concrete/Asphalt		
very shallow depths		
(less than 1/4 inch)	0.10	- 0.15
small depths		
(1/4 inch to several inches)	0.05	- 0.10

Roughness Coefficients (Manning's "n") For Channel Flow

Reach Description**n**

Natural stream, clean, straight, no rifts or pools	0.03
Natural stream, clean, winding, some pools or shoals	0.04
Natural stream, winding, pools, shoals, stony with some weeds	0.05
Natural stream, sluggish deep pools and weeds	0.07
Natural stream or swale, very weedy or with timber underbrush	0.10
Concrete pipe, culvert or channel	0.012
Corrugated metal pipe	0.012-0.027 ⁽¹⁾
High Density Polyethylene (HDPE) Pipe	
Corrugated	0.021-0.029 ⁽²⁾
Smooth Lined	0.012-0.020 ⁽²⁾

(1) Depending upon type, coating and diameter

(2) Values recommended by the American Concrete Pipe Association, check Manufacturer's recommended value.

TABLE E-4

NONSTRUCTURAL STORMWATER MANAGEMENT MEASURES

Nonstructural Stormwater Measure	Description
Natural Area Conservation	Conservation of natural areas such as forest, wetlands, or other sensitive areas in a protected easement, thereby retaining their existing hydrologic and water quality characteristics.
Disconnection of Rooftop Runoff	Rooftop runoff is disconnected and then directed over a pervious area where it may either infiltrate into the soil or filter over it. This is typically obtained by grading the site to promote overland flow or by providing bioretention on single-family residential lots.
Disconnection of Nonrooftop Runoff	Disconnect surface impervious cover by directing it to pervious areas where it is either infiltrated or filtered through the soil.
Buffers	Buffers effectively treat 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 grassy or forested area.
Grass Channel (Open Section Roads)	Open grass channels are used to reduce the volume of runoff and pollutants during smaller storms.
Environmentally Sensitive Rural Development	Environmental site design techniques are applied to low-density or rural residential development.

Source: Maryland Department of the Environment, "Maryland Stormwater Design Manual," Baltimore, MD, 2000

ORDINANCE APPENDIX G

BMP MANUAL REFERENCES

California

California Stormwater BMP Handbook: New Development and Redevelopment (January 2003) – separate file available at <http://www.cabmphandbooks.org/Development.asp>

Georgia

Georgia Stormwater Management Manual Volume 2: Technical Handbook (August 2001) separate file (<http://www.georgiastormwater.com/>)

Maryland

2000 Maryland Stormwater Design Manual –
http://www.mde.state.md.us/Programs/Waterprograms/SedimentandStormwater/stormwater_design/index.asp

Massachusetts

Stormwater Management, Volume Two: Stormwater Technical Handbook (Massachusetts, 1997) – separate file available at <http://www.state.ma.us/dep/brp/stormwtr/stormpub.htm>

Minnesota

Minnesota Urban Small Sites BMP Manual: Stormwater Best Management Practices for Cold Climates (July 2001) – <http://www.metrocouncil.org/environment/Watershed/BMP/manual.htm>

New Jersey

Revised Manual for New Jersey: Best Management Practices for Control of Non-point Source Pollution from Stormwater (Fifth Draft May 2000) –
<http://www.state.nj.us/dep/watershedmgt/bmpmanual.htm>

New York

New York State Stormwater Management Design Manual (2001) –
<http://www.dec.state.ny.us/website/dow/swmanual/swmanual.html>

Pennsylvania

PA DEP Stormwater Best Management Practices Manual, December, 2006.

<http://164.156.71.80/WXOD.aspx?fs=2087d8407c0e00008000071900000719&ft=1>

Washington

Stormwater Management Manual for Western Washington (August 2001) –

<http://www.ecy.wa.gov/programs/wq/stormwater/manual.html>

Federal

Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring (FHWA) –

<http://www.fhwa.dot.gov/environment/ultraurb/3fs1.htm>

USEPA Infiltration Trench Fact Sheet (September 1999) –

<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/post.cfm>