

Appendix C
Model Stormwater Ordinance Provisions

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

Article ____, Stormwater Management

Section 101 - General Provisions

A. Purpose

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

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

B. Applicability

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

C. Repealer

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

D. Severability

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

E. Liability Disclaimer

1. Neither the granting of any approval under the stormwater management provisions of this ordinance, nor the compliance with the provisions of this ordinance, or with any condition imposed by a municipal official hereunder, shall relieve any person from any responsibility for damage to persons or property resulting therefrom, or as otherwise imposed by law, nor impose any liability upon the municipality for damages to persons or property.
2. The granting of a permit which includes any stormwater management facilities shall not constitute a representation, guarantee or warranty of any kind by the municipality, or by an official or employee thereof, of the practicability or safety of any structure, use or other plan proposed, and shall create no liability upon or cause of action against such public body, official or employee for any damage that may result pursuant thereto.

Section 102 - Stormwater Management Performance Standards

A. Stormwater Management Performance Districts

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

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

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

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

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

B. General Standards

1. The following provisions shall be considered the overriding performance standards against which all proposed stormwater control measures shall be evaluated and shall apply throughout the municipality of _____:
 - a. Any landowner and any person engaged in the alteration or development of land which may affect stormwater runoff characteristics shall implement such measures as are reasonably

necessary to prevent injury to health, safety or other property. Such measures shall include such actions as are required:

- (1) To assure that the maximum rate of stormwater runoff is no greater after development than prior to development activities; or
 - (2) To manage the quantity, velocity and direction of resulting stormwater runoff in a manner which otherwise adequately protects health and property from possible injury.
2. The stormwater management plan for the development site must consider all the stormwater runoff flowing over the site.
 3. No discharge of toxic materials shall be permitted into any stormwater management system.

C. Watershed Standards: Designated Bull Run Stormwater Management Watershed

1. The stormwater performance standards contained in this section are intended to implement the standards and criteria contained in the Bull Run Stormwater Management Plan, adopted and approved in accordance with the Pennsylvania Storm Water Management Act. If there is any discrepancy between the provisions of this section and the standards and criteria of the plan, or if the watershed plan is subsequently amended, then the standards/criteria of the current watershed plan shall govern.
2. Storm Frequencies. Stormwater management facilities on all development sites shall control the peak stormwater discharge for the 2-, 10-, 25- and 100-year storm frequencies. The SCS 24-hour, Type II Rainfall Distribution shall be used for analyzing stormwater runoff for both pre- and post-development conditions. The 24-hour total rainfall for these storm frequencies in the watershed are:

<u>Storm Frequency</u>	<u>Rainfall Depth</u> <u>(inches)</u>
2-year	2.59
10-year	3.72
25-year	4.56
100-year	6.12

(For additional information or data on other storm return periods, consult the "Rainfall Duration Frequency Tables for Pennsylvania," produced by Pennsylvania Department of Environmental Resources (PA DER) Office of Resource Management, Bureau of Dams and

Waterways Management, Division of Stormwater Management, Harrisburg, February 1983.)

3. Calculation Methods

- a. Development Sites: For the purpose of computing peak flow rates and runoff hydrographs from development sites, calculations shall be performed using one of the following: SCS publications, Technical Release (TR) 55 or 20, HEC-1, Penn State Runoff Model (PSRM) or Modified Rational Method.
- b. Stormwater Collection/Conveyance Facilities: For the purposes of designing storm sewers, open swales and other stormwater runoff collection and conveyance facilities, the Rational Method shall be applied. Rainfall intensities for design should be obtained from the Pennsylvania Department of Transportation rainfall charts.
- c. Predevelopment Conditions: Predevelopment conditions shall be assumed to be those which exist on any site at the time of adoption of the Bull Run Stormwater Management Plan. Hydrologic conditions for all areas with pervious cover (i.e., fields, woods, lawn areas, pastures, cropland, etc.) shall be assumed to be in "good" condition, and the lowest recommended SCS runoff curve number (CN) shall be applied for all pervious land uses within the respective range for each land use and hydrologic soil group.
- d. Routing of hydrographs through detention / retention facilities for the purpose of designing those facilities shall be accomplished using the Modified-Puls Method or other recognized reservoir routing method subject to the approval of the municipality and county.

4. Release Rate Percentage

- a. Definition. The release rate percentage defines the percentage of the pre-development peak rate of runoff that can be discharged from an outfall on the site after development. It applies uniformly to all land development or alterations within a subarea. Release rate percentage areas and a listing of the release rate percentage by subarea are displayed on the Bull Run Watershed Release Rate Percentage Map
- b. Procedure for Use
 - (1) Identify the specific subarea in which the development site is located from the watershed map and obtain the

subarea release rate percentage from Appendix A and the Bull Run Watershed Release Rate Percentage Map.

- (2) Compute the pre- and post-development runoff hydrographs for each stormwater outfall on the development site using an acceptable calculation method for the 2-, 10-, 25- and 100-year storms. Apply no on-site detention for stormwater management but include any techniques to minimize impervious surfaces and/or increase the time of concentration for stormwater runoff flowing from the development site. If the post-development peak runoff rate and the runoff volume are less than or equal to the predevelopment peak runoff rate and volume, then additional stormwater control shall not be required at that outfall. If the post-development peak runoff rate and volume are greater than the predevelopment peak runoff rate and volume, then stormwater detention will be required and the capacity of the detention facility must be calculated in the manner prescribed below.
- (3) Multiply the subarea release rate percentage by the predevelopment rate of runoff from the development site to determine the maximum allowable release rate from any detention facility for the four prescribed storm events.

5. No Harm Evaluation

- a. An applicant may seek to exceed the otherwise applicable subarea release rate percentage by performing the "No Harm Evaluation". This evaluation requires an independent engineering analysis to demonstrate that other reasonable options exist to prevent the occurrence of increased stormwater runoff discharge rates and/or velocities or that measures can be provided to prevent increased stormwater discharge rates and/or velocities from increasing flood elevations and accelerating erosion at all downstream points in the watershed.
- b. The analysis for the no-harm evaluation shall be submitted to the municipal engineer and Union County Planning Department for review and approval.
- c. A "No Harm Evaluation" will be considered only in instances where the discharge to a stream channel from the development site occurs directly to the West Branch of the Susquehanna River, an adequately sized storm or combined sewer which discharges directly into the West Branch of the Susquehanna

River, or through a properly sized and designed regional stormwater detention facility.

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

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

1. Develop the runoff hydrograph(s) for the design storms of the site and areas tributary to it using the PSRM for pre-development conditions using the land use characterizations contained in the Bull Run Watershed Stormwater Management Plan.
2. Develop the post-development discharge hydrograph from the proposed site using the PSRM. If no management or controls are proposed, this would be equivalent to the runoff hydrograph under the post-development conditions. If some management or controls are proposed, then the runoff hydrograph under post-development conditions should be modified to reflect their effects on the rate, volume and timing of discharges.
3. Subtract the runoff hydrograph ordinates under pre-development conditions (step 1) from the discharge hydrograph ordinates (step 2), maintaining the time scales of both hydrographs for one-to-one correspondence.
4. Obtain the PSRM for the existing conditions for the Bull Run Watershed from the County.
5. Locate the subbasin(s) in which the proposed development is located and into which the discharge hydrograph enters. If more than one subbasin receives this incremental flow, divide the flow accordingly.
6. Add the incremental increase computed in step 3 to the runoff hydrograph of the subbasin(s) identified in step 5.

7. Route the adjusted runoff hydrograph through the Bull Run Watershed PSM and note any increase in peak flows which would occur in downstream subbasins. If no increase is noted, then the "No-Harm" has been demonstrated. If no increase is noted, then the "No-Harm" has been demonstrated. If no increase is observed in peak flows, the increased potential for erosion and/or sedimentation in downstream channels resulting from any change in the flood hydrograph predicted by the model shall be evaluated. If no increased potential can be demonstrated by appropriated technical means, then the "No-Harm" exemption may be requested.
8. If an increase in peak flow is observed in any of the downstream subbasins or increased potential for erosion and/or sedimentation is indicated, the "No-Harm" exemption shall not be granted.

Section 103 - Design criteria for stormwater management controls

A. General criteria

1. Applicants may select runoff control techniques, or a combination of techniques, which are most suitable to control stormwater runoff from the development site. All controls must be subject to approval of the municipal engineer. The municipal engineer may request specific information on design and/or operating features of the proposed stormwater controls in order to determine their suitability and adequacy in terms of the standards of this ordinance.
2. The applicant should consider the effect of the proposed stormwater management techniques on any special soil conditions or geological hazards which may exist on the development site. In the event such conditions are identified on the site, the municipal engineer may require in-depth studies by a competent geotechnical engineer. Not all stormwater control methods may be advisable or allowable at a particular development site.
3. The stormwater management practices to be used in developing a stormwater management plan for a particular site shall be selected according to the following order of preference:
 - a. infiltration of runoff on-site
 - b. flow attenuation by use of open vegetated swales and natural depressions

- c. stormwater detention/retention structures
4. Infiltration practices shall be used to the extent practicable to reduce volume increases and promote groundwater recharge. A combination of successive practices may be used to achieve the applicable minimum control requirements. Justification shall be provided by the applicant for rejecting each of the preferred practices based on actual site conditions.
 5. Sinkholes shall be protected as follows:
 - a. Stormwater from roadways, parking lots, storm sewers, roof drains or other concentrated runoff paths shall not be discharged directly into sinkholes.
 - b. Sinkholes with sufficient capacity to receive appreciable amounts of stormwater, as determined by the municipal engineer, shall be designated as such by posting on-site notices clearly visible at the sinkhole prohibiting any disposal of refuse, rubbish, hazardous wastes, organic matter, or soil into the sinkhole. Rock fill may be permitted in the sinkhole for the purpose of preventing dumping of said materials. The discharge of stormwater runoff to the subsurface using sinkholes shall be considered as potential pollution and prohibited unless the disposal method is designed so that contaminants in the runoff will be absorbed/adsorbed in the soil mantle and be acted upon by the bacteria naturally present in the mantle before reaching the groundwater. Systems intended to meet this requirement shall be designed by a hydrogeologist.
 - c. If increased or concentrated runoff is to be discharged into a sinkhole, including filtered discharge, a geologic assessment of the effects of such runoff on increased land subsidence and groundwater quality shall be prepared and the results submitted with the stormwater plan. Such discharge shall be prohibited if the municipal engineer determines that the discharge poses a hazard to life, property, or groundwater resources.

B. Criteria for infiltration systems

1. Infiltration systems shall be sized and designed based upon local soil and ground water conditions.
2. Infiltration systems greater than three (3) feet deep shall be located at least ten (10) feet from basement walls.
3. Infiltration systems shall not be used to handle runoff from commercial or industrial working or parking areas. This prohibition does not

extend to roof areas which are demonstrated to be suitably protected from the effects of the commercial/industrial activities.

4. Infiltration systems may not receive runoff until the entire drainage area to the system has received final stabilization.
5. The stormwater infiltration facility design shall provide an overflow system with measures to provide a non-erosive velocity of flow along its length and at the outfall.

C. Criteria for flow attenuation facilities

1. If flow attenuation facilities are employed to assist in the control of peak rates of discharge, their effects must be quantified using the SCS Technical Release (TR) 55 Urban Hydrology for Small Watersheds. The effects of the flow attenuation facilities on travel time should be reflected in the TR-55 calculations as outlined in the TR-55 manuals.
2. Flow attenuation facilities such as swales and natural depressions should be properly graded to insure positive drainage and avoid prolonged ponding of water.
3. Swales shall be properly vegetatively stabilized or otherwise lined to prevent erosion.
4. The design of swales shall be in accordance with the recommendations contained in the Commonwealth of Pennsylvania Erosion and Sediment Pollution Control Program Manual.

D. Criteria for stormwater detention facilities

1. If detention facilities are utilized for the development site, the facility(ies) shall be designed such that post-development peak runoff rates from the developed site are controlled to those rates defined by the subarea release rate percentage for the 2-, 10-, 25, and 100-year storm frequencies.
2. All detention facilities and equipped with outlet structures to provide discharge control for the four (4) designated storm frequencies. Provisions shall also be made to safely pass the post-development 100-year storm runoff without damage (i.e., impairing the continued function of the facilities). Should any stormwater management facilities require a permit under PA DER Chapter 105, the facility shall be designed in accordance with Chapter 105 and meet the regulations of Chapter 105 concerning dam safety.
3. Shared-storage facilities, which provide detention of runoff for more than one development site within a single subarea may be considered and are encouraged. Such facilities shall meet the criteria contained in

this section. In addition, runoff from the development sites involved shall be conveyed to the facility in a manner that avoids adverse impacts (such as flooding or erosion) to channels and properties located between the development site and the shared-storage facilities.

4. Where detention facilities will be utilized, multiple use facilities, such as wetlands, lakes, ballfields or similar recreational/open space uses are encouraged wherever feasible, subject to the approval of the municipality and Pennsylvania Department of Environmental Resources' Chapter 105 regulations.
5. Other considerations which should be incorporated into the design of the detention facilities include:
 - a. Inflow and outflow structures shall be designed and installed to prevent erosion and bottoms of impoundment type structures should be protected from soil erosion.
 - b. Control and removal of debris both in the storage structure and in all inlet or outlet devices shall be a design consideration.
 - c. Inflow and outflow structures, pumping stations, and other structures shall be designed and protected to minimize safety hazards.
 - d. The water depth at the perimeter of a storage pond should be limited to that which is safe for children. This is especially necessary if bank slopes are steep or if ponds are full and recirculating in dry periods. Restriction of access (fence, walls, etc.) may be necessary depending on the location of the facility.
 - e. Side slope of storage ponds shall not exceed a ration of two-and-one-half to one (2.5:1) horizontal to vertical dimension.
 - f. Landscaping shall be provided for the facility which harmonizes with the surrounding area.
 - g. Facility shall be located to facilitate maintenance, considering the frequency and type of equipment that will be required.

E. Criteria for collection/conveyance facilities

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

1. All stormwater runoff collection or conveyance facilities, whether storm sewers or other open or closed channels, shall be designed in accordance with the following basic standards:
 - a. All sites shall be graded to provide drainage away from and around the structure in order to prevent any potential flooding damage.
 - b. Lots located on the high side of streets shall extend roof and french drains to the curb line storm sewer (if applicable). Low side lots shall extend roof and french drains to a stormwater collection/conveyance/control system or natural watercourse in accordance with the approved stormwater management plan for the development site.
 - c. Collection/conveyance facilities should not be installed parallel and close to the top or bottom of a major embankment to avoid the possibility of failing or causing the embankment to fail.
 - d. All collection/conveyance facilities shall be designed to convey the 25-year storm peak flow rate from the contributing drainage area and to carry it to the nearest suitable outlet such as a stormwater control facility, curbed street, storm sewer or natural watercourse.
 - e. Where drainage swales or open channels are used, they shall be suitably lined to prevent erosion and designed to avoid excessive velocities.
2. Wherever storm sewers are proposed to be utilized, they shall comply with the following criteria:
 - a. Where practical, designed to traverse under seeded and planted areas. If constructed within ten (10) feet of road paving, walks or other surfaced areas, drains shall have a narrow trench and maximum compaction of backfill to prevent settlement of the superimposed surface or development.
 - b. Preferably installed after excavating and filling in the area to be traversed is completed, unless the drain is installed in the original ground with a minimum of three (3) feet cover and/or adequate protection during the fill construction.
 - c. Designed: (1) with cradle when traversing fill areas of indeterminate stability, (2) with anchors when gradient exceeds twenty (20) percent, and (3) with encasement or special backfill requirements when traversing under a paved area.

- d. Designed to adequately handle the anticipated stormwater flow and be economical to construct and maintain. The minimum pipe size shall be fifteen (15) inches in diameter.
- e. Drain pipe, trenching, bedding and backfilling requirements shall conform to the requirements of the municipality and/or applicable PENNDOT Specifications, Form 408.
- f. All corrugated metal pipe shall be polymer coated, and with asbestos bonding and paved inverts where prone to erode. Pipe within a municipal right-of-way shall be reinforced concrete pipe with a minimum diameter of 15 inches.
- g. Storm inlets and structures shall be designed to be adequate, safe, self-cleaning and unobtrusive and consistent with municipal standards.
- h. Appropriate grates shall be designed for all catch basins, stormwater inlets and other entrance appurtenances.
- i. Manholes shall be designed so that the top shall be at finished grade and sloped to conform to the slope of the finished grade. Top castings of structures located in roads or parking areas shall be machined or installed to preclude "rattling."
- j. Where proposed sewer connects with an existing storm sewer system, the applicant shall demonstrate that sufficient capacity exists in the downstream system to handle the additional flow.
- k. Storm sewer outfalls shall be equipped with energy dissipation devices to prevent erosion and conform with applicable requirements of the Pennsylvania DER for stream encroachments (Chapter 105 of Pennsylvania DER Rules and Regulations).

Section 104 - Erosion and sedimentation controls

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

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

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

Section 105 - Maintenance of stormwater management controls

A. Maintenance responsibilities

1. The stormwater management plan for the development site shall contain a operation and maintenance plan prepared by the developer and approved by the municipal engineer. The operation and maintenance plan shall outline required routine maintenance actions and schedules necessary to insure proper operation of the facility(ies).
2. The stormwater management plan for the development site shall establish responsibilities for the continuing operation and maintenance of all proposed stormwater control facilities, consistent with the following principals:
 - a. If a development consists of structures or lots which are to be separately owned and in which streets, sewers and other public improvements are to be dedicated to the municipality, stormwater control facilities should also be dedicated to and maintained by the municipality.
 - b. If a development site is to be maintained in single ownership or if sewers and other public improvements are to be privately owned and maintained, then the ownership and maintenance of stormwater control facilities should be the responsibility of the owner or private management entity.
2. The governing body, upon recommendation of the municipal engineer, shall make the final determination on the continuing maintenance responsibilities prior to final approval of the stormwater management plan. The governing body reserves the right to accept the ownership and operating responsibility for any or all of the stormwater management controls.

B. Maintenance agreement for privately owned stormwater facilities

1. Prior to final approval of the site's stormwater management plan the property owner shall sing and record a maintenance agreement covering all stormwater control facilities which are to be privately owned. The agreement shall stipulate that:
 - a. The owner shall maintain all facilities in accordance with the approved maintenance schedule and shall keep all facilities in a safe and attractive manner.
 - b. The owner shall convey to the municipality easements and or rights-of-way to assure access for periodic inspections by the municipality and maintenance if required.

- c. The owner shall keep on file with the municipality the name, address and telephone number of the person or company responsible for maintenance activities; in the event of a change, new information will be submitted to the municipality within ten (10) days of the change.
 - d. If the owner fails to maintain the stormwater control facilities following due notice by the municipality to correct the problem(s), the municipality may perform the necessary maintenance work or corrective work and the owner shall reimburse the municipality for all costs.
2. Other items may be included in the agreement where determined necessary to guarantee the satisfactory maintenance of all facilities. The maintenance agreement shall be subject to the review and approval of the municipal solicitor and governing body.

C. Municipal stormwater maintenance fund

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

1. Persons installing stormwater storage facilities shall be required to pay a specified amount to the Municipal Stormwater Maintenance Fund to help defray costs of periodic inspections and maintenance expenses. The amount of the deposit shall be determined as follows:
 - a. If the storage facility is to be privately owned and maintained, the deposit shall cover the cost of periodic inspections performed by the municipality for a period of ten (10) years, as estimated by the municipal engineer. After that period of time, inspections will be performed at the expense of the municipality.
 - b. If the storage facility is to be owned and maintained by the municipality, the deposit shall cover the estimated costs for maintenance and inspections for ten (10) years. The municipal engineer will establish the estimated costs utilizing information submitted by the applicant.
 - c. The amount of the deposit to the fund shall be converted to present worth of the annual series values. The municipal engineer shall determine the present worth equivalents which shall be subject to the approval of the governing body.

2. If a storage facility is proposed that also serves as a recreation facility (e.g., ballfield, lake), the municipality may reduce or waive the amount of the maintenance fund deposit based upon the value of the land for public recreation purposes.
3. If at some future time a storage facility (whether publicly or privately owned) is eliminated due to the installation of storm sewers or other storage facility, the unused portion of the maintenance fund deposit will be applied to the cost of abandoning the facility and connecting to the storm sewer system or other facility. Any amount of the deposit remaining after the costs of abandonment are paid will be returned to the depositor.

Section 106 - Stormwater plan requirements

A. General requirements

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

B. Exemptions for small developments

1. At the time of application, the municipality shall determine if the subdivision/land development qualifies as a "small development" and, therefore, is eligible for a simplified stormwater plan submission. For the purposes of this ordinance, a small development is any subdivision or land development which results in (or will result when fully constructed) the creation of 5,000 or less square feet of impervious surface area. This criteria shall apply to the total development even if development is to take place in phases. This exemption shall not relieve the applicant from providing adequate stormwater management to meet the purpose of this Article..
2. Applications for small developments shall include a plan which describes the type and location of proposed on-site stormwater management techniques or the proposed connection to an existing storm sewer system. The plan should show accurately site boundaries, five-foot interval contours, locations of watershed and/or subarea boundaries on the site (if applicable) and any watercourses, floodplains, or existing drainage facilities or structures located on the site. The municipality reserves the right to require that the plan be prepared by a registered professional engineer, surveyor or landscape architect.

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

C. Stormwater plan contents

1. General Format: The stormwater plan shall be drawn to a scale of not less than 1 inch = 200 feet. All sheets shall contain a title block with; Name and address of applicant and engineer, scale, north arrow, legend and date of preparation.
2. Existing and Proposed Features: The plan shall show the following:
 - a. Watershed location - Provide a key map showing the location of the development site within the watershed(s) and watershed subarea(s). On all site drawings, show the boundaries of the watershed(s) and subarea(s) as they are located on the development site and identify watershed names(s) and subarea number(s).
 - b. Floodplain boundaries - Identify 100-year floodplains on the development site (as appropriate) based on the municipal Flood Insurance Study maps.
 - c. Natural features - Show all bodies of water (natural or artificial), watercourses (permanent and intermittent), swales, wetlands and other natural drainage courses on the development site, or which will be affected by runoff from the development.
 - e. Soils - Provide an overlay showing soil types and boundaries within the development site (consult county, SCS and U.S. Geological Survey for information).
 - f. Contours - Show existing and final contours at intervals of two (2) feet; in areas with slopes greater than fifteen (15) percent, five (5) foot contour intervals may be used.
 - g. Land cover - Show existing and final land cover classifications as necessary to support and illustrate the runoff calculations performed.
 - h. Drainage area delineations - Show the boundaries of the drainage areas employed in the runoff calculations performed.
 - i. Stormwater management controls - Show any existing stormwater management or drainage controls and/or structures, such as sanitary and storm sewers, swales, culverts, etc. which are located on the development site, or which are located off-site but will be affected by runoff from the development.

3. Professional certification: The stormwater management plan (including all calculations) must be prepared and sealed by a registered professional engineer, surveyor or landscape architect with training and expertise in hydrology and hydraulics. Documentation of qualifications may be required by the municipality.
4. Runoff calculations: Calculations for determining pre- and post-development discharge rates and for designing proposed stormwater control facilities must be submitted with the stormwater management plan. All calculations shall be prepared using the methods and data prescribed by Section 102 of this ordinance.
5. Stormwater controls: All proposed stormwater runoff control measures must be shown on the plan including methods for collecting, conveying and storing stormwater runoff on-site, which are to be used both during and after construction. Erosion and sedimentation controls shall be shown in accordance with applicable municipal and County Conservation District requirements. The plan shall provide information on the exact type, location, sizing, design and construction of all proposed facilities and relationship to the existing watershed drainage system.
 - a. If the development is to be constructed in stages, the applicant must demonstrate that stormwater facilities will be installed to manage stormwater runoff safely during each stage of development.
 - b. A schedule for the installation of all temporary and permanent stormwater control measures and devices shall be submitted.
 - c. If appropriate, a justification should be submitted as to why any preferred stormwater management techniques, as listed in Section 103, are not proposed for use.
6. Easements, rights-of-way, deed restrictions: All existing and proposed easements and rights-of-way for drainage and/or access to stormwater control facilities shall be shown and the proposed owner identified. Show any areas subject to special deed restrictions relative to or affecting stormwater management on the development site.
7. Other permits/approvals: A list of any approvals/permits relative to stormwater management that will be required from other governmental agencies (Pennsylvania DER Chapter 105 and 106 permits) and anticipated dates of submission/receipt should be included with the stormwater plan submission. Copies of permit applications may be requested by the municipality where they may be helpful for the plan review.

8. Maintenance program: The application shall contain a proposed maintenance plan for all stormwater control facilities in accordance with the following:
 - a. Identify the proposed ownership entity (e.g., municipality, property owner, private corporation, homeowner's association, or other entity).
 - b. Include a maintenance program for all facilities, outlining the type of maintenance activities, probable frequencies, personnel and equipment requirements and estimated annual maintenance costs.
 - c. Identify method of financing continuing operation and maintenance if the facility is to be owned by other than the municipality or governmental agency.
 - d. Submit any legal agreements required to implement the maintenance program and copies of the maintenance agreement as required by this ordinance.
9. Financial guarantees: Submit financial guarantees in accordance with the provisions of this ordinance.

Section 107 - Plan review procedures

A. Pre-application phase

1. Before submitting the stormwater plan, applicants are urged to consult with the municipality, County Planning Department and County Conservation District on the requirements for safely managing from the development site in a manner consistent with the municipal ordinances and applicable watershed stormwater management plan. These agencies may also be helpful in providing necessary data for the stormwater management plan.
2. Applicants are encouraged to submit a sketch plan with a narrative description of the proposed stormwater management controls for general guidance and discussion with the municipality and other agencies.
3. The pre-application phase is not mandatory; any review comments provided by the municipality or other agencies are advisory only and do not constitute any legally binding action on the part of the municipality or any county agency.

(Notes: 1) If the municipal Planning Commission has the final authority for approving plans, then this section should be changed as appropriate. 2) It is important that the applicant's engineer concur with the requested modifications because he/she is certifying the development's stormwater management system.)

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

Section 108 - Status of the stormwater plan after final approval

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

Section 109 - Stormwater plan modifications

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

B. Stormwater plan reviews

1. Submission of plans: Stormwater plan applications shall be submitted with the preliminary and final subdivision/land development applications.
2. Notification of affected municipalities: The municipality shall notify municipalities upstream and downstream of the development site, which may be affected by the stormwater runoff and proposed controls for the site. Copies of the plans will be made available to the municipalities upon request. Comments received from any affected municipality will be considered by the municipal engineer and county agencies in their reviews.
3. County planning review:
 - a. A copy of the stormwater plan, along with all runoff calculations, shall be forwarded to the Union County Planning Department. A report of the findings will be returned to the municipality within 30 days.
 - b. If the Planning Department review identifies that the plan fails to comply with the watershed standards and criteria or that a possibility exists for harmful downstream impacts from the development site, the applicant will be advised so that the necessary modifications can be made to the stormwater management controls for the development site. The municipal engineer shall not approve the development site's stormwater management plan until modifications are made and the plan receives a positive review from the County Planning Department.
4. Municipal engineer's review: The municipal engineer shall approve or disapprove the stormwater management plan based on the requirements of the municipal ordinances, the standards and criteria of the watershed plan and good engineering practice. The engineer shall submit a written report, along with supporting documentation, stating their reasons for approval or disapproval.
5. Status of the engineer's determination: The approval/disapproval of the site's stormwater management plan by the municipal engineer shall be considered final. The governing body shall not reverse the engineer's determination by approving or disapproving the site's stormwater management plan or any specific control measure in contradiction to the engineer's action. The governing body may request modifications or alternative approaches to the stormwater management controls, provided these are agreed to by the municipal engineer and the applicant's engineer.

Section 110 - Inspections of stormwater management controls

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

- A. The municipal engineer or a designated representative shall inspect the construction of the temporary and permanent stormwater management system for the development site. The permittee shall notify the engineer 48 hours in advance of the completion of the following key development phases:
1. At the completion of preliminary site preparation including stripping of vegetation, stockpiling of topsoil and construction of temporary stormwater management and erosion control facilities.
 2. At the completion of rough grading but prior to placing topsoil, permanent drainage or other site development improvements and ground covers.
 3. During construction of the permanent stormwater facilities at such times as specified by the municipal engineer.
 4. Completion of permanent stormwater management facilities including established ground covers and plantings.
 5. Completion of final grading, vegetative control measures or other site restoration work done in accordance with the approved plan and permit.
- B. No work shall commence on any subsequent phase until the preceding one has been inspected and approved. If there are deficiencies in any phase, the municipal engineer shall issue a written description of the required corrections and stipulate the time by which they must be made.
- C. If during construction, the contractor or permittee identifies and site condition, such as subsurface soil conditions, alterations in surface or subsurface drainage which could affect the feasibility of the approved stormwater facilities, he/she shall notify the municipal engineer within 24 hours of the discovery of such condition and request a field inspection. The municipal engineer shall determine if the condition requires a stormwater plan modification.
- D. In cases where stormwater facilities are to be installed in areas of landslide-prone soils or other special site conditions exist, the municipality may require special precautions such as soil tests and core borings, full-time inspectors and/or similar measures. All costs of any such measures shall be borne by the permittee.

Section 111 - Financial guarantees and dedication of public improvements

- A. Guarantee of completion: A completion guarantee in the form of a bond, cash deposit, certified check or other negotiable securities acceptable to the municipality, shall be filed. The guarantee shall cover all streets, sanitary sewers, stormwater management facilities, water systems, fire hydrants, sidewalks and other required improvements; it shall be in the amount and form prescribed by the Municipal Planning Code (Section 509).
- B. Release of completion guarantee: The completion guarantee shall be returned or released upon written certification by the municipal engineer or a designated agent that improvements and facilities have been installed and completed in accordance with the approved plan and specifications. The procedures for requesting and obtaining a release of the completion guarantee shall be in a manner prescribed by the Municipalities Planning Code (Section 510).
- C. Default of completion guarantee: If improvements are not installed in accordance with the approved final plan, the governing body may enforce any corporate bond or other security by appropriate legal and equitable remedies. If proceeds of such bond or other security are insufficient to pay the cost of installing or making repairs or corrections to all the improvements covered by said security, the governing body may at its option install part of such improvements in all or part of the development and may institute appropriate legal or equitable action to recover the monies necessary to complete the remainder of the improvements. All proceeds, whether resulting from the security or from the security or from any legal or equitable action brought against the developer, or both, shall be used solely for the installation of the improvements covered by such security and not for any other municipal purpose.
- D. Dedication of public improvements:
1. When streets, sanitary sewers, stormwater management facilities, water lines or other required improvements in the development have been completed in accordance with the final approved plan, such improvements shall be deemed private until such time as they have been offered for dedication to the municipality and accepted by separate ordinance or resolution or until they have been condemned for use as a public facility.
 2. Prior to acceptance of any improvements or facilities, the municipal engineer shall inspect it to ensure that it is constructed in accordance with the approved plan and is functioning properly. In the case of any stormwater control facility, it must be free of sediment and debris.
 3. The owner shall submit as-built plans for all facilities proposed for dedication.

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

Section 112 - Fee Schedule

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

Section 113 - Enforcement procedures and remedies

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

- A. Right of entry: Upon presentation of proper credentials, duly authorized representatives of the municipality may enter at reasonable times upon any property to investigate or ascertain the condition of the subject property in regard to an aspect regulated by this ordinance.
- B. Notification: In the event that the applicant, developer, owner or his/her agent fails to comply with the requirements of this ordinance or fails to conform to the requirements of any permit, a written notice of violation shall be issued. Such notification shall set forth the nature of the violation(s) and establish a time limit for correction of the violation(s). Upon failure to comply within the time specified, unless otherwise extended by the municipality, the applicant, developer, owner or his/her agent shall be subject to the enforcement remedies of this ordinance.
- C. Preventive remedies:
1. In addition to other remedies, the municipality may institute and maintain appropriate actions by law or in equity to restrain, correct or abate a violation, to prevent unlawful construction, to recover damages and to prevent illegal occupancy of a building or premises.
 2. In accordance with the Planning Code (Sec. 515.1), the municipality may refuse to issue any permit or grant approval to further improve or

develop any property which has been developed in violation of this chapter.

D. Enforcement remedies

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

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

Section 114 - Definitions

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

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

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

Conservation District: The Union County Conservation District.

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

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

Design storm: (see storm frequency)

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

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

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

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

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

Drainage: (1) In general, the removal of surface water from a given area. Commonly applied to surface water and ground water.

Drainage Area: (1) The area of a drainage basin or watershed, expressed in acres, square miles, or other unit of area. Also called catchment area,

watershed, river basin. (2) The area served by a sewer system receiving storm and surface water, or by a watercourse.

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

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

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

Ground Cover: Materials covering the ground surface,

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

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

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

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

Land Development: Any of the following activities:

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

(2) a subdivision of land.

(3) development in accordance with Section 503, subsection 1.1 of the Pennsylvania Municipalities Planning Code (as amended or replaced from time to time);

(4) any lot improvements regulated under the Municipal Zoning Regulations.

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

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

Municipality: (name of municipality)

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

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

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

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

Peak Flow: Maximum flow.

Pennsylvania DER: Pennsylvania Department of Environmental Resources.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

MODEL STORMWATER MANAGEMENT PROVISIONS FOR THE MUNICIPAL ZONING ORDINANCE

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

Section _____, Stormwater Management

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

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

- B. Agricultural activities, nurseries and forestry management operations, where permitted by this ordinance, shall be required to provide for the safe management of stormwater runoff in accordance with the requirements of the subdivision/land development ordinance. However, the submission and approval of a stormwater management plan shall be waived when:
1. agricultural activities are operated in accordance with a conservation plan or erosion and sedimentation control plan approved by the Union County Conservation District;
 2. forestry management operations are following Pennsylvania DER management practices contained in its publication Soil Erosion and Sedimentation Control Guidelines for Forestry and are operating under an erosion and sedimentation control plan.
- C. Strip mining where permitted by this ordinance shall have a plan for control of erosion and sedimentation and stormwater runoff which is approved by the Pennsylvania DER. If the strip mining operation is located within a watershed(s) for which a stormwater management plan has been approved in accordance with the requirements of the Storm Water Management Act, then the erosion/sedimentation plan and any permanent stormwater runoff controls shall be consistent with the standards and criteria of the watershed stormwater management plan. A copy of the state-approved erosion/sedimentation plan shall be filed with the municipality prior to commencing mining operations.