

STORMWATER MANAGEMENT
ORDINANCE

ORDINANCE NO. 2002-5

BOROUGH OF NORTHUMBERLAND,
NORTHUMBERLAND COUNTY, PENNSYLVANIA

Adopted at a Public Meeting Held on
_____, 20__

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ARTICLE I- GENERAL PROVISIONS

Section 101. Statement of Findings

The governing body of the Municipality finds that:

- A. Inadequate management of accelerated stormwater runoff resulting from development throughout a watershed increases flood flows and velocities, contributes to erosion and sedimentation, overtaxes the carrying capacity of existing streams and storm sewers, greatly increases the cost of public facilities to convey and manage stormwater, undermines floodplain management and flood reduction efforts in upstream and downstream communities, reduces groundwater recharge, and threatens public health and safety.
- B. A comprehensive program of stormwater management, including reasonable regulation of development and activities causing accelerated erosion, is fundamental to the public health, safety, welfare, and the protection of the people of the Municipality and all the people of the Commonwealth, their resources, and the environment.

Section 102. Purpose

The purpose of this Ordinance is to promote health, safety, and welfare within the Municipality by minimizing the damages described in Section 101.A of this Ordinance through provisions designed to:

- A. Manage accelerated runoff and erosion and sedimentation problems at their source by regulating activities that cause these problems.
- B. Utilize and preserve the existing natural drainage systems.
- C. Encourage recharge of groundwater where appropriate and prevent degradation of groundwater quality.
- D. Maintain existing flows and quality of streams and watercourses in the municipality and the Commonwealth.
- E. Preserve and restore the flood-carrying capacity of streams.
- F. Provide proper maintenance of all permanent stormwater management facilities that are constructed in the Municipality.
- G. Provide performance standards and design criteria for watershed-wide stormwater management and planning.

Section 103. Statutory Authority

The Municipality 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 by Act 170 of December 21, 1988 and Act 131 of December 14, 1992, [and the applicable Municipal Code].

Section 104. Applicability

This Ordinance shall apply to those areas of the Municipality that are located within the Municipality.

This Ordinance shall only apply to permanent stormwater management facilities constructed as part of any of the Regulated Activities listed in this Section. Stormwater management and erosion and sedimentation control during construction activities are specifically not regulated by this Ordinance, but shall continue to be regulated under existing laws and ordinances.

Local stormwater management design criteria (e.g. inlet spacing, inlet type, collection system design and details, outlet structure design, etc.) shall continue to be regulated by the applicable Municipal Ordinances or at the municipal engineer's discretion.

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

- A. Land development.
- B. Subdivision.
- C. Construction of new or additional impervious or semi-pervious surfaces (driveways, parking lots, etc.).
- D. Construction of new buildings or additions to existing buildings.
- E. Diversion or piping of any natural or man-made stream channel.
- F. Installation of stormwater management facilities or appurtenances thereto.

Section 105. Repealer

Any ordinance or ordinance provision of the Municipality inconsistent with any of the provisions of this Ordinance is hereby repealed to the extent of the inconsistency only.

Section 106. 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 any of the remaining provisions of this Ordinance.

Section 107. Compatibility with Other Ordinance Requirements

Approvals issued pursuant to this Ordinance do not relieve the Applicant of the responsibility to comply with or to secure required permits or approvals for activities regulated by any other applicable code, rule, statutes, or ordinance.

Section 108. Landowner Responsibility

The granting of an exemption, permit, or approval by the municipality, does not relieve the applicant from assuring that stormwater runoff from the development site will not cause injury to other persons or property.

ARTICLE II-DEFINITIONS

For the purposes of this chapter, 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 word "person" includes an individual, firm, association, organization, partnership, trust, company, corporation, or any other similar entity.
- D. The words "shall" and "must" are mandatory; the words "may" and "should" are permissive.
- E. The words "used or occupied" include the words "intended, designed, maintained, or arranged to be used, occupied or maintained".

Accelerated Erosion - The removal of the surface of the land through the combined action of man's activity and the natural processes of a rate greater than would occur because of the natural process alone.

Agricultural Activities - The work of producing crops and raising livestock including tillage, plowing, disking, harrowing, pasturing and installation of conservation measures. Construction of new buildings or impervious area is not considered an agricultural activity.

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

Applicant - A landowner or developer who has filed an application for approval to engage in any Regulated Activities as defined in Section 104 of this Ordinance.

BMP (Best Management Practice) - Stormwater structures, facilities and techniques to maintain or improve the water quality of surface runoff.

Channel Erosion - The widening, deepening, and headward cutting of small channels and waterways, due to erosion caused by moderate to large floods.

Cistern - An underground reservoir or tank for storing rainwater.

Conservation District - The Northumberland County Conservation District.

Culvert - A structure with appurtenant works which carries a stream under or through an embankment or fill.

Dam - An artificial barrier, together with its appurtenant works, constructed for the purpose of impounding or storing water or another fluid or semifluid, or a refuse bank, fill or structure for highway, railroad or other purposes which does or may impound water or another fluid or semifluid.

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.

Designee - The agent of the Municipality involved with the administration, review or enforcement of any provisions of this ordinance by contract or memorandum of understanding.

Detention Basin - An impoundment structure designed to manage stormwater runoff by temporarily storing the runoff and releasing it at a predetermined rate.

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.

Development Site - The specific tract of land for which a Regulated Activity is proposed.

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

Drainage Conveyance Facility - A Stormwater Management Facility designed to transmit stormwater runoff and shall include streams, channels, swales, pipes, conduits, culverts, storm sewers, etc.

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

Drainage Permit - A permit issued by the municipality after the drainage plan has been approved. Said permit is issued prior to or with the final municipal approval.

Drainage Plan - The documentation of the stormwater management system, if any, to be used for a given development site, the contents of which are established in Section 403.

Earth Disturbance - Any activity including, but not limited to, construction, mining, timber harvesting and grubbing which alters, disturbs, and exposes the existing land surface.

Emergency Spillway - A depression in the embankment of a pond or basin which is used to pass peak discharges greater than the maximum design storm controlled by the Principal Spillway.

Erosion - The movement of soil particles by the action of water, wind, ice, or other natural forces.

Erosion and Sediment Pollution Control Plan - A plan, which is designed to minimize, accelerated erosion and sedimentation pursuant to 25 Pa. Code, Chapter 102.

Existing Conditions - The initial condition of a project site prior to the proposed construction. If the initial condition of the site is undeveloped land, the land use shall be considered as "meadow" unless the natural land cover is proven to generate lower curve numbers or Rational "C" value, such as forested lands. The lower curve number shall then be utilized.

Flood - A general but temporary condition of partial or complete inundation of normally dry land areas from the overflow of streams, rivers, and other waters of this Commonwealth.

Floodplain - Any land area susceptible to inundation by water from any natural source or delineated by applicable Department of Housing and Urban Development, Federal Insurance Administration Flood Hazard Boundary - Mapped as being a special flood hazard area. Also included are areas that comprise Group 13 Soils, as listed in Appendix A of the Pennsylvania Department of Environmental Protection (PADEP) 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 frequency 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 frequency 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.

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

Freeboard - A vertical distance between the elevation of the design high water and the top of a dam, levee, tank, basin, or diversion ridge. The space is required as a safety margin in a pond or basin.

Grade - A slope, usually of a road, channel or natural ground specified in percent and shown on plans as specified herein. (To) Grade - to finish the surface of a roadbed, top of embankment or bottom of excavation.

Grassed Waterway - A natural or constructed waterway, usually broad and shallow, covered with erosion-resistant grasses, used to conduct surface water from cropland.

Groundwater Recharge - Replenishment of existing natural underground water supplies.

Impervious Surface - A surface that prevents the infiltration of water into the ground.

Impoundment - A retention or detention basin designed to retain stormwater runoff and release it at a controlled rate.

Infiltration Structures - A structure designed to direct runoff into the ground (e.g. french drains, seepage pits, seepage trench).

Inlet - A surface connection to a closed drain. A structure at the diversion end of a conduit. The upstream end of any structure through which water may flow.

Land Development - (i) the improvement of one lot or two or more contiguous lots, tracts, or parcels of land for any purpose involving (a) a group of two or more buildings, or (b) the division or allocation of land or space between or among two or more existing or prospective occupants by means of, or for the purpose of streets, common areas, 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.

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

Main Stem (Main Channel) - Any stream segment or other runoff conveyance facility used as a reach in the stream.

Manning Equation or (Manning formula) – An empirical formula 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 - Borough of Northumberland, Northumberland County, Pennsylvania.

Non-point Source Pollution - Pollution that enters a water body from diffuse origins in the watershed and does not result from discernible, confined, or discrete conveyances or origin.

NRCS - Natural Resource Conservation Service (previously SCS).

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

Outfall - Point where water flows from a conduit, stream, or drain into a lake, stream or river.

Outlet - Points of water disposal from a pipe, swale, stream, river, lake, tidewater or artificial drain.

Parking Lot Storage - The use of impervious parking areas for temporary impoundment of stormwater with controlled release rates during rainstorms.

Peak Discharge - The maximum rate of stormwater runoff from a specific storm event whether real or synthetic.

Penn State Runoff Model - A computer-based hydrologic modeling technique.

Pipe - A culvert, closed conduit, or similar structure (including appurtenances) that conveys stormwater.

Planning Commission - The planning commission of Northumberland Borough.

PMF - Probable Maximum Flood - The flood that may be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in

any area. The PMF is derived from the probable maximum precipitation (PMP) as determined on the basis of data obtained from the National Oceanographic and Atmospheric Administration (NOAA).

Point of Interest (POI) – A downstream point within a watershed that is used for comparing existing condition versus after development condition discharges. A point of interest may be, but is not limited to, a property line, stormwater conveyance obstruction, drainageway junction, pond, lake, stream or river.

Principal Spillway – A pipe, weir or other appurtenant works designed to control the required detention storm.

Rational Formula - A rainfall-runoff relation used to estimate peak flow.

Regulated Activities - Actions or proposed actions that have an impact on stormwater runoff and that are specified in Section 104 of this Ordinance.

Retention Basin - An impoundment in which stormwater is stored and not released during the storm event. Stored water may be released from the basin at some time after the end of the storm.

Return Period - The average interval, in years, within which a storm event of a given magnitude can be expected to recur. For example, the 25-year return period rainfall would be expected to recur on the average once every twenty-five (25) years.

Riser - A vertical pipe extending from the bottom of a pond that is used to control the discharge rate from the pond for a specified list of one or more design storms.

Rooftop Detention - Temporary ponding and gradual release of stormwater falling directly onto flat roof surfaces by incorporating controlled-flow roof drains into building designs.

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

Sediment Basin - A barrier, dam, retention or detention basin designed to retain rock, sand, gravel, silt, or other material transported by water.

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

Sedimentation - The process by which mineral or organic matter is accumulated or deposited by the movement of water.

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

Sheet Flow - Runoff that flows over the ground surface as a relatively thin, and even layer of water, that is not concentrated in a rill, gully or channel.

Soil-Cover Complex Method - A method of runoff computation developed by the NRCS that is based on relating soil type and land use/cover to a runoff parameter called Curve Number (CN).

Soil Group, Hydrologic - A classification of soils by the NRCS, formerly the Soil Conservation Service, into four runoff categories. The groups range from A soils, which are very permeable and produce little runoff, to D soils, which are not very permeable and produce much more runoff.

Storage Indication Method - A reservoir routing procedure based on solution of the continuity equation (inflow minus outflow equals the change in storage) with outflow defined as a function of storage volume and depth.

Storm Frequency - The number of times that a given storm "event" occurs or is exceeded on the average in a stated period of years. See "Return Period".

Storm Sewer - A system of pipes and/or open channels that convey intercepted runoff and stormwater from other sources, but excludes domestic sewage and industrial wastes.

Stormwater – Runoff from a land surface that occurs when the rainfall rate exceeds the infiltration rate.

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 structures.

Stormwater Management Site Plan - The plan prepared by the Developer or his representative indicating how stormwater runoff will be managed at the particular site of interest in accordance with this Ordinance.

Stream Enclosure - A bridge, culvert or other structure which encloses a regulated water of this Commonwealth and has an upstream to downstream length greater than 100-feet.

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

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

Timber Operations - See Forest Management.

Time of Concentration (Tc) - The time for surface runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed. This time is the combined total of overland flow time and flow time in pipes or channels, if any.

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

Waters of the Commonwealth - Any and all rivers, streams, creeks, rivulets, ditches, watercourses, storm sewers, lakes, dammed water, wetlands, ponds, springs, and all other

bodies or channels of conveyance of surface and underground water, or parts thereof, whether natural or artificial, within or on the boundaries of this Commonwealth.

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

Section 301. Stormwater Management Exemption Criteria

Any Regulated Activity that meets the following exemption criteria is exempt from the provisions of this Ordinance requiring submission of a Stormwater Management Plan for Municipal review. Exemption shall not relieve the applicant from implementing such measures as are necessary to protect health, safety, and property. This exemption shall not relieve the applicant from meeting the requirements for water quality and groundwater recharge special requirements for high quality (HQ) and exceptional value (EV) watersheds, and of Sections 303E, 304 and 305 respectively.

- A. Impervious Area Exemption - Impervious cover shall include, but not be limited to, any roof, parking or driveway areas and any new streets and sidewalks. Any areas designed to initially be gravel or crushed stone shall be assumed to be impervious for the purposes of comparison to the waiver criteria. These criteria shall apply to the total development even if development is to take place in phases. The date of the Municipal Ordinance adoption shall be the starting point from which to consider tracts as "parent tracts" in which future subdivisions and respective impervious area computations shall be cumulatively considered. The date of the Municipal Ordinance adoption shall be the starting point from which to consider tracts as "parent tracts" in which future subdivisions and respective impervious area computations shall be cumulatively considered.

Impervious Area Exemption

<u>Total Parcel size</u>	<u>Exemption (sq. ft.)</u>
<.25 acre	1,000
0.25 -<0.5 acre	2,500
0.5 – 1 acre	5,000
> 1 -2 acres	10,000
> 2 – 5 acres	15,000
> 5 acres	20,000

- B. Use of land for gardening for home consumption.

C. Agriculture when operated in accordance with a conservation plan or erosion and sedimentation control plan found adequate by the Conservation District. The agricultural activities such as growing crops, rotating crops, tilling of soil, grazing animals and other such activities are specifically exempt from complying with the requirements of this Ordinance. Installation of new or expansion of existing farmsteads and production areas having impervious surfaces shall be subject to the provisions of this ordinance.

D. Forest Management operations which are following the Department of Environmental Protections' management practices contained in its publication "Soil Erosion and Sedimentation Control Guidelines for Forestry" and are operating under an erosion and sedimentation control plan.

No exemption shall be provided for Regulated Activities as defined in Section 104.E and 104.F of this Ordinance.

Section 302. General Requirements

- A. All regulated activities in the Municipality which do not fall under the exemption criteria shown in Section 301 shall submit a drainage plan consistent with this ordinance to the municipality for review. These criteria shall apply to the total proposed development even if development is to take place in stages. Impervious cover shall include, but not be limited to, any roof, parking or driveway areas and any new streets and sidewalks. Any areas designed to initially be gravel or crushed stone shall be assumed to be impervious for the purposes of comparison to the waiver criteria.
- B. Stormwater drainage systems shall be provided in order to permit unimpeded flow along natural watercourses, except as modified by stormwater management facilities or open channels consistent with this Ordinance.
- C. The existing points of concentrated drainage that discharge onto adjacent property shall not be altered without permission of the adjacent property owner(s) and shall be subject to any applicable discharge criteria specified in this Ordinance.
- D. Areas of existing diffused drainage discharge shall be subject to any applicable discharge criteria in the general direction of existing discharge, whether proposed to be concentrated or maintained as diffused drainage areas, except as otherwise provided by this ordinance. If diffused flow is proposed to be concentrated and discharged onto adjacent property, the Developer must document that adequate downstream conveyance facilities exist to safely transport the concentrated discharge, or otherwise prove that no erosion, sedimentation, flooding or other harm will result from the concentrated discharge.
- E. Where a development site is traversed by watercourses, drainage easements shall be provided conforming to the line of such watercourses. The terms of the easement shall prohibit excavation, the placing of fill or structures, and any alterations that may adversely affect the flow of stormwater within any portion of the easement. Also, maintenance, including mowing of vegetation within the easement shall be required, except as approved by the appropriate governing authority.
- F. When it can be shown that, due to topographic conditions, natural drainageways on the site cannot adequately provide for drainage, open channels may be constructed conforming substantially to the line and grade of such natural drainageways. Work within natural drainageways shall be subject to approval by PADEP through the Joint Permit Application process, or, where deemed appropriate by PADEP, through the General Permit process.
- G. Any stormwater management facilities regulated by this Ordinance that would be located in or adjacent to waters of the Commonwealth or wetlands shall be subject to approval by PA DEP through the Joint Permit Application process, or, where deemed appropriate by PA DEP, the General Permit process. When there is a question whether wetlands may be involved, it is the responsibility of the Developer or his agent to show that the land in question cannot be classified as wetlands, otherwise approval to work in the area must be obtained from PA DEP.

- H. Any stormwater management facilities regulated by this Ordinance that would be located on or drain toward State highway rights-of-way are subject to regulation under 67 PA Code § 441 and require a Highway Occupancy Permit from Pennsylvania Department of Transportation (PENNDOT).
- I. Roof drains must not be connected to streets, sanitary or storm sewers or roadside ditches. Roof drains shall be discharged to vegetated areas to promote overload flow and infiltration/percolation of stormwater where it is advantageous to do so. When it is more advantageous to connect directly to streets or storm sewers, then it shall be allowed on a case-by-case basis by the municipality.
- J. "Downstream Hydraulic Capacity Analysis" - Any downstream capacity hydraulic analysis conducted in accordance with this Ordinance shall use the following criteria for determining adequacy for accepting increased peak flow rates:
 - 1. Natural stream channels with undeveloped flood plains must be able to convey the increased runoff associated with a 2-year return period event within their lowest natural stream bank at velocities consistent with protection of the channels from erosion. Computations for the channels ability to withstand the erosive forces shall be based upon accepted procedures for determining channel stability equivalent to the U.S.D.A. Natural Resource Conservation Service (formerly the Soil Conservation Service) "Technical Release No. 25, Design of Open Channels" or an appropriate procedure cited in the Federal Interagency document "Stream Corridor Restoration, Principles, Processes, and Practices". The downstream flood depth elevation shall not be increased for the 2, 5, 10, 25, 50 or 100-year frequency storms. Proposed condition discharge flow elevations shall be compared to the existing condition discharge flow elevation using accepted engineering computation procedures.
 - 2. Man-made channels or swales must be able to convey their design storm frequency without an increase in channel bed or bank erosion. As a minimum they shall have capacity for the increased 25-year return period runoff without increasing any hazard to persons or property. Stability and capacity computations for man made channels or swales shall be from sources equivalent to either those contained in the above paragraph, the DEP "Erosion and Sediment Pollution Control Program Manual" or the Federal Highway Administration "Circular No. 15, Design of Stable Channels With Flexible Linings".
 - 3. Culverts, bridges, storm sewers or any other facilities which must pass or convey flows from the tributary area must be designed in accordance with DEP, Chapter 105 regulations (if applicable) and, at a minimum, pass the increased 25-year return period runoff.

Section 303. Stormwater Management Requirements

The following general standards shall be applied to all development within the Borough of Northumberland to control stormwater runoff.

- A. All site development in the municipality that does not meet the exemption criteria shall submit a drainage plan consistent with the provisions of this ordinance to the municipality for review and approval. This requirement shall apply to the total proposed development even if the development is to take place in stages. Impervious cover shall include, but not be limited to, any roof, parking or driveway area and any new street or sidewalk. Any area initially designated to be gravel or crushed stone shall be assumed to be impervious.
- B. To the maximum extent practical, techniques described in Appendix E of this Ordinance for the minimization of generating stormwater runoff, avoiding detrimental effects of stormwater runoff and the protection of environment (Low Impact Development Techniques) should be used.
- C. Runoff from the site shall not be concentrated or increased runoff discharged onto adjacent property without the written consent of the adjacent landowners in the form of a drainage easement.
- D. All developments which create impervious surface or change the existing topography shall provide capacity for and treatment of the "Water Quality Volume" and "Groundwater Recharge Volume", as described under sections 304, 305.
- E. Special requirements for areas falling within defined Exceptional Value and High Quality Sub-watersheds: The temperature and quality of water and streams that have been declared as exceptional value and high quality are to be maintained as defined in Chapter 93, Water Quality Standards, Title 25 of Pennsylvania Department of Environmental Protection Rules and Regulations. Temperature sensitive BMPs and stormwater conveyance systems are to be used and designed with storage pool areas, outflow channels and should be shaded with trees. This will require modification of berms for permanent ponds and the relaxation of restrictions on planting vegetation within the facilities, provided that capacity for volumes and rate control are maintained. At a minimum, the southern half of pond shorelines shall be planted with shade or canopy trees within ten (10) feet of the pond shoreline. In conjunction with this requirement, the maximum slope allowed on the berm area to be planted is 10 to 1. This will lessen the destabilization of berm soils due to root growth. A long term maintenance schedule and management plan for the thermal control BMPs is to be established and recorded for all development sites in HQ/EV watersheds.

Section 304. Water Quality Requirements

Developed areas will provide adequate storage and treatment facilities necessary to capture and treat stormwater runoff. The Recharge Volume computed under Section 305 may be a component of the Water Quality Volume. If the Recharge Volume is less than the Water Quality Volume, the remaining Water Quality Volume may be captured and treated by methods other than recharge/infiltration BMPs.

The Water Quality Volume (WQv) is the storage capacity needed to treat stormwater runoff produced by "P" inches of rainfall (90% Rule) from the developed areas of the site (For "P" Values, see Appendix D). The following calculation formula is used to determine the storage volume, WQv, in acre-feet of storage:

$$WQv=[(P)(Rv)(A)]/12$$

WQv = Water Quality Volume

P=Rainfall Amount (90% of events producing this rainfall (Appendix D))

A = Area in acres

Rv = $0.05 + 0.009(I)$ where "I" is the percent impervious surface ratio (i.e. if a 10-acre site will have 5 acres of impervious surface, then I=50)

WQv shall be designed as part of a stormwater management facility, which incorporates water quality BMPs as a primary benefit of using that facility, in accordance with design specifications contained in "Pennsylvania Handbook of Best Management Practices for Developing Areas". The following factors SHOULD be considered when evaluating the suitability of BMPs used to control water quality at a given development site:

- Peak discharge and required volume control.
- Stream bank erosion
- Efficiency of the BMPs to mitigate water quality problems.
- The volume of runoff that will be effectively treated.
- The nature of the pollutant being removed.
- Maintenance requirements.
- Creation/protection of aquatic and wildlife habitat.
- Recreational value.
- Enhancement of aesthetic and property value.

Section 305. Ground Water Recharge Requirements.

- a. The ability to retain and maximize the ground water recharge capacity of the area being developed is encouraged. Design of the infiltration/recharge stormwater management facilities shall give consideration to providing ground water recharge to compensate for the reduction in the percolation that occurs when the ground surface is paved and roofed over. These measures are encouraged, particularly in hydrologic soil groups A and B and should be utilized wherever feasible. Soils used for the construction of basins shall have low-erodibility factors ("K" factors).

- b. Infiltration BMPs shall meet the following minimum requirements:

Infiltration BMPs intended to receive runoff from developed areas shall be selected based on suitability of soils and site conditions and shall be constructed on soils that have the following characteristics:

- A minimum depth of 48 inches between the bottom of the facility and the seasonal high water table and/or bedrock (limiting zones).
- An infiltration and/or percolation rate sufficient to accept the additional stormwater load and drain completely as determined by field tests conducted by the Owner's qualified professional, where the professional will be either an Engineer, Geologist, Surveyor, Landscape Architect or Soil Scientist.

- Infiltration BMPs receiving only roof runoff may be placed in soils having a minimum depth of 24 inches between the bottom of the facility and the limiting zone.
- Infiltration BMPs shall be located a minimum of 10 feet away from the foundation wall of any building.

- c. The size of the recharge facility shall be based upon the following equation:

$$Re_v = [(S)(R_v)(A)(43,560)]/12$$

Where:

Re_v = Recharge Volume (cubic feet)
 S = Soil specific recharge factor (inches)
 R_v = Volumetric runoff coefficient
 A = Site area contributing to the recharge facility (acres)

$$R_v = 0.05 + 0.009 (I)$$

Where:

I = percent impervious area

And:

S shall be obtained based upon hydrologic soil group based upon the table below:

Hydrologic Soil Group Soil Specific Recharge Factor (S)

A	0.38
B	0.25
C	0.13
D	0.06

If more than one hydrologic soil group (HSG) is present at a site, a composite recharge volume shall be computed based upon the proportion of total site area within each HSG.

- d. The recharge volume provided at the site shall be directed to the most permeable HSG available.
- e. The recharge facility shall be capable of completely infiltrating the impounded water within 48 hours.
- f. A detailed soils evaluation of the project site shall be performed to determine the suitability of recharge facilities. The evaluation shall be performed by a qualified professional, and at a minimum, address soil permeability, depth to bedrock, depth to seasonal high water table, susceptibility to sinkhole formation, and subgrade stability. The general process for designing the infiltration BMP shall be:
- o Analyze hydrologic soil groups as well as natural and man-made features within watershed to determine general areas of suitability for infiltration practices.

- o Provide field test to determine appropriate percolation rate and/or hydraulic Conductivity.
 - o Determine seasonal high water table for infiltration site.
 - o Design infiltration structure for required storm volume based on field determined capacity at the level of the proposed infiltration surface.
- g. Extreme caution shall be exercised where infiltration is proposed in geologically susceptible areas such as strip mine or limestone areas. Extreme caution shall also be exercised where salt or chloride would be a pollutant since soils do little to filter this pollutant and it may contaminate the groundwater. It is also extremely important that the design professional evaluate the possibility of groundwater contamination from the proposed infiltration/recharge facility and recommend a hydrogeologic justification study be performed if necessary. Whenever a basin will be located in an area underlain by limestone, a geological evaluation of the proposed location shall be conducted to determine susceptibility to sinkhole formations. The design of all facilities over limestone formations shall include measures to prevent ground water contamination and, where necessary, sinkhole formation. The municipality may require the installation of an impermeable liner in detention basins. A detailed hydrogeologic investigation may be required by the municipality.
- h. The municipality may require the developer to provide safeguards against groundwater contamination for uses, which may cause groundwater contamination, should there be a mishap or spill. It shall be the developer's responsibility to verify if the site is underlain by limestone. The following note shall be attached to all drainage plans and signed and sealed by the developer's licensed or certified Engineer/Surveyor/Landscape Architect/Geologist/Soil Scientist:
- i. I, _____ certify that the proposed detention basin (circle one) is/is not underlain by limestone.
- j. Where pervious pavement is permitted for parking lots, recreational facilities, non-dedicated streets, or other areas, pavement construction specifications shall be noted on the plan.
- k. Recharge/infiltration facilities may be used in conjunction with other innovative or traditional BMPs, stormwater control facilities, and nonstructural stormwater management alternatives.

In selecting the appropriate BMPs or combinations thereof, the land developer SHALL consider the following:

- a) Permeability and infiltration rate of the site soils.
- b) Slope and depth to bedrock.
- c) Seasonal high water table.

- d) Proximity to building foundations and well heads.
- e) Erodibility of soils.
- f) Land availability and topography.
- g) Stormwater pollutant contamination.

The land developer shall submit original and innovative designs to the Municipal Engineer for review and approval. Such designs may achieve the water quality objectives through a combination of BMP (Best Management Practices).

Section 306. Stormwater Rate and Volume Controls:

If it is shown, by applications of water quality and ground water recharge requirements pursuant to sections 304 and, 305, that the post-development hydrographs are equal to the pre-development hydrographs to assure the rate and volume of runoff leaving the site is unchanged for 2-, 5-, 10-, 25-, 50-, and 100-year frequency storms, then the requirements of this section will be considered met. Otherwise, the developer shall control the rate and volume for the balance of uncontrolled runoff subsequent to the credits obtained by satisfying sections 304, 305. If an extended detention or a permanent pool type facility is selected for the treatment of water quality volume, the outlet shall be designed such that the one year 24-hour post-development runoff volume is released over a 24-hour period. This will also help channel protection. The release of water begins at the start of the storm (i.e., the invert of the water quality orifice is at the invert of the facility). The design of the facility shall consider and minimize the chances of clogging and sedimentation potential. Orifices smaller than 3 inches diameter are not recommended. However, if the Design Engineer can provide proof that the smaller orifices are protected from clogging by use of trash racks, etc., smaller orifices may be permitted.

The developer may, subject to approval of the municipal engineer, use the stormwater credits, described in the following table, in computing post-development hydrograph:

Stormwater Credit	Description
Natural Area Conservation	Conservation of natural areas such as forest, wetlands, or other sensitive areas in a protected easement thereby retaining their pre-development hydrologic and water quality characteristics. Using this credit, a designer may subtract conservation areas from total site area when computing the required water quality volume. Additionally, the post-development curve number (CN) for these areas may be assumed to be forest in good condition.

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

Section 307. Design Criteria for Stormwater Management Facilities

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 shall 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 Section.
 - a. 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 licensed Geotechnical Engineer. Not all stormwater control methods may be advisable or allowable at a particular development site.
 - (a) In developing stormwater management plans for a particular site; stormwater controls shall be selected according to the following order of preference:
 - (i) Infiltration of runoff on-site
 - (ii) Flow attenuation by use of open vegetated swales and natural depressions
 - (iii) Stormwater detention/retention structures
 - (b) 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.
 - (c) Open detention/retention facilities shall not be permitted within residential areas as part of an in-fill project.
 - (i) The applicant may request a waiver from this requirement. All such requests for waiver shall be submitted in writing.
 - (ii) It shall be the responsibility of the applicant for a waiver of this part to show that the modification will not create a safety risk and that the modification is consistent with the Best Management Practices and current engineering design standards

- B. Any stormwater management facility (i.e. detention basin) designed to store runoff and requiring a berm or earthen embankment required or regulated by this ordinance shall be designed to provide an emergency spillway to handle flow up to and including the 100-year post- development conditions. The height of embankment must be set as to provide a minimum 1.0 foot of freeboard above the maximum pool elevation computed when the facility functions for the 100-year post-development inflow. Should any stormwater management facility require a dam safety permit under PADEP Chapter 105, the facility shall be designed in accordance with Chapter 105 and meet the regulations of Chapter 105 concerning dam safety which may be required to pass storms larger than 100-year event.
- C. Any facilities that constitute water obstructions (e.g., culverts, bridges, outfalls, or stream enclosures), and any work involving wetlands as directed in PADEP Chapter 105 regulations (as amended or replaced from time to time by PADEP), shall be designed in accordance with Chapter 105 and will require a permit from PADEP. Any other drainage conveyance facility that doesn't fall under Chapter 105 regulations must be able to convey, without damage to the drainage structure or roadway, runoff from the 25-year design storm. Roadway crossings located within designated floodplain areas must be able to convey runoff from a 100-year design storm. Any facility that constitutes a dam as defined in PADEP Chapter 105 regulations may require a permit under dam safety regulations. Any facility located within a PENNDOT right of way must meet PENNDOT minimum design standards and permit submission requirements.
- D. Any drainage conveyance facility and/or channel that doesn't fall under Chapter 105 Regulations, must be able to convey, without damage to the drainage structure or roadway, runoff from the 10-year design storm. Conveyance facilities to or exiting from stormwater management facilities (i.e. detention basins) shall be designed to convey the design flow to or from that structure. Roadway crossings located within designated floodplain areas must be able to convey runoff from a 100-year design storm. Any facility located within a PENNDOT right-of-way must meet the requirements of 67 PA Code § 441.
- E. Storm sewers must be able to convey post-development runoff from a 10-year design storm without surcharging inlets, where appropriate higher frequency design storms may be required.
- F. Adequate erosion protection shall be provided along all open channels, and at all points of discharge.
- G. The design of all stormwater management facilities shall incorporate sound engineering principles and practices. The Municipality shall reserve the right to disapprove any design that would result in the occurrence or continuation of an adverse hydrologic or hydraulic condition within the watershed.
- H. "No Harm" Option - For any proposed development site the developer has the option of using a less restrictive runoff control (including no detention) if the developer can prove that "no harm" would be caused by discharging at a higher runoff rate than that specified by the Plan. The "no harm" Option is used when a developer can prove that the post-development hydrographs can match pre-development hydrographs, or if it can be proved that the post-development conditions will not cause increases in peaks at all downstream points of interest.

- I. Downstream. Proof of "no harm" would have to be shown based upon the following "Downstream Impact Evaluation" which shall include a "downstream hydraulic capacity analysis" consistent with Section 307.H to determine if adequate hydraulic capacity exists. The land developer shall submit to the municipality this evaluation of the impacts due to increased downstream stormwater flows in the watershed.
 1. The "Downstream Impact Evaluation" shall include hydrologic and hydraulic calculations necessary to determine the impact of hydrograph timing modifications due to the proposed development upon a dam, highway, structure, natural point of restricted stream flow or any stream channel section, established with the concurrence of the municipality.
 2. The evaluation shall continue downstream until the increase in flow diminishes due to additional flow from tributaries and/or stream attenuation.
 3. Developer-proposed runoff controls which would generate increased peak flow rates at storm drainage problem areas would, by definition, be precluded from successful attempts to prove "no-harm", except in conjunction with proposed capacity improvements for the problem areas consistent with Section 307.H.
 4. A financial distress shall not constitute grounds for granting a no-harm exemption.
 5. Downstream capacity improvements may be proposed, as necessary to implement the "no harm" option. Proposed downstream improvements by the Developer would have to be approved by the Municipality and be concurred on by the property owner where improvements would occur.
 6. Any "no harm" justifications shall be submitted by the developer as part of the Drainage Plan submission per Article IV.

Section 308. 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 involving stormwater detention or retention shall use generally accepted calculation technique that is based on the NRCS soil cover complex method. Table VIII-1 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 Municipal Engineer may approve the use of the Rational Method to estimate peak discharges where detention or retention is not required, from drainage areas that contain less than 200 acres.

- 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 presented in Table A-1 in Appendix A of this Ordinance. The duration of rainfall shall be 24 hours. The NRCS

Type II 'S' curve shown in Figure A-1, Appendix A of this Ordinance shall be used for the rainfall distribution.

- C. For the purposes of predevelopment flow rate determination, undeveloped land shall be considered as "meadow" good condition, unless the natural ground cover generates a lower curve number or Rational 'C' value (i.e. forest).
- D. All calculations using the Rational Method shall use rainfall intensities consistent with appropriate times of concentration for overland flow and return periods from the Design Storm Curves from PA Department of Transportation Design Rainfall Curves (1986) (Appendix A, Figure A-2). 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. For undeveloped existing condition watershed analysis, the time of concentration may be computed using the NRCS Lag procedure.
- 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 A-2 in Appendix A of this Ordinance.
- F. Runoff coefficient (c) for both existing and proposed conditions for use in the Rational Method shall be obtained from Table A-3 in Appendix A 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 A-4 in Appendix A of the 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 20 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, which shall use a total runoff volume that is consistent with the volume from a method that produces a full hydrograph.
- J. The Municipality has the authority to require that computed existing runoff rates be reconciled with field observations and conditions. If the designer can substantiate through actual physical calibration that more appropriate runoff and time-of-concentration values should be utilized at a particular site, then appropriate variations may be made upon review and recommendations of the Municipal Engineer. Calibration shall require detailed gauge and rainfall data for the particular site in question.

TABLE VIII-1

ACCEPTABLE COMPUTATION METHODOLOGIES FOR STORMWATER
MANAGEMENT PLANS

METHOD	METHOD DEVELOPED BY	APPLICABILITY
TR-20 or commercial Package Based on TR-20	USDA - NRCS	When use of full model is desirable or necessary
Tr-55 OR Commercial Package Based on TR-55	USDA - NRCS	Applicable for plans within the models limitations
HEC - 1	U.S. Army Corps of Engineers	When full model is desirable or necessary
PSRM	Penn State University	When full model is desirable or necessary
VT/PSUHM	Virginia Tech	When full model is desirable or necessary
Rational Method or commercial package based on Rational Method	Emil Kuiching (1889)	For sites less than 200 acres
Other Methods	Various	As approved by the municipal Engineer

Section 309. Erosion and Sedimentation Requirements

- A. Whenever the vegetation and topography are to be disturbed, such activity must be in conformance with Chapter 102, Title 25, Rules and Regulations, Part I, Commonwealth of Pennsylvania, Department of Environmental Protection, Subpart C, protection of Natural Resources, Article II, Water Resources, Chapter 102, "Erosion Control," and in accordance with the Northumberland County Conservation District and the standards and specifications of the appropriate municipal government.
- B. Additional erosion and sedimentation control design standards and criteria that must be or are recommended to be applied where infiltration BMPs are proposed and include the following:
 - 1. Areas proposed for infiltration BMPs shall be protected from sedimentation and compaction during the construction phase, so as to maintain their maximum infiltration capacity.
 - 2. Infiltration BMPs shall not be constructed nor receive runoff until the entire contributory drainage area to the infiltration BMP has received final stabilization.

ARTICLE IV-DRAINAGE PLAN REQUIREMENTS

Section 401. General Requirements

For any of the activities regulated by this Ordinance, the final approval of subdivision and/or land development plans, the issuance of any building or occupancy permit, or the commencement of any land disturbance activity may not proceed until the Property Owner or Developer or his/her agent has received written approval of a Drainage Plan from the Municipality.

The Property Owner is encouraged to schedule and conduct a pre-application meeting with the Codes Enforcement Officer and/or Municipal Engineer.

The following items shall be included in the Drainage Plan:

- A. General
 1. General description of project.
 2. General description of permanent stormwater management techniques, including construction specifications for the materials to be used for stormwater management facilities.
 3. Complete hydrologic, hydraulic, and structural computations for all stormwater management facilities.
- B. Plan Drawing(s) of the project area shall be submitted on sheets consistent with the Borough of Northumberland Land Development Ordinance and shall be prepared in a form that meets the requirements for recording the offices of the Recorder of Deeds of Northumberland County. The contents of the map(s) shall include, but not be limited to:
 1. The location of the project relative to highways, municipalities or other identifiable landmarks.
 2. Existing contours at intervals adequate to define the site topography and drainage pattern but not less than two feet. In areas of steep slopes (greater than 15 percent), five-foot contour intervals may be used.
 3. Existing streams, lakes, ponds, or other bodies of water within the project area.
 4. Other physical features including flood hazard boundaries, sinkholes, streams, existing drainage courses, areas of natural vegetation to be preserved, and the total extent of the upstream area draining through the site.
 5. The locations of all existing and proposed utilities, sanitary sewers, and water lines within the site and within 50 feet of the site's property lines.
 6. An overlay showing soil names and boundaries.

7. Proposed changes to the land surface and vegetative cover, including the type and amount of impervious area that would be added.
8. Proposed structures, roads, paved areas, and buildings.
9. Final contours at intervals adequate to define the site grading but not less than two feet. In areas of steep slopes (greater than 15 percent), five-foot contour intervals may be used.
10. The name of the development, the name and address of the owner of the property, and the name of the individual or firm preparing the plan.
11. The date of submission.
12. A graphic and written scale of one (1) inch equals no more than fifty (50) feet; for tracts of twenty (20) acres or more, the scale shall be one (1) inch equals no more than one hundred (100) feet.
13. A North arrow.
14. The total tract boundary and size with distances marked to the nearest foot and bearings to the nearest degree.
15. Existing and proposed land use(s).
16. A key map showing all existing man-made features beyond the property boundary that would be affected by the project.
17. Horizontal and vertical profiles of all open channels, including hydraulic capacity.
18. Typical cross-sections for existing and proposed channels for each channel reach.
19. Overland drainage paths for time of concentration and travel time computations.
20. A fifteen-foot wide access easement around all stormwater management facilities that would provide ingress to and egress from a public right-of-way.
21. A note on the plan indicating the location and responsibility for maintenance of stormwater management facilities that would be located off-site. All off-site facilities shall meet the performance standards and design criteria specified in this Ordinance.
22. A construction detail of any improvements made to sinkholes and the location of all notes to be posted, as specified in this Ordinance.
23. A statement, signed by the landowner, acknowledging the stormwater management system to be a permanent fixture that can be altered or removed only after approval of a revised plan by the municipality.

24. The following signature block for the developer's Professional Engineer or Professional Land Surveyor:

I, _____, on this date _____, hereby certify that the Stormwater Management Plan meets all design standards and criteria of the Northumberland Borough Stormwater Management Ordinance."

25. The location of all erosion and sedimentation control facilities.

C. Supplemental Information

1. A written description of the following information shall be submitted.
 - a) The overall stormwater management concept for the project.
 - b) Stormwater runoff computations as specified in this Ordinance.
 - c) Stormwater management techniques to be applied both during and after development.
 - d) Expected project time schedule.
 - e) Hydrologic and Hydraulic summary that compares "pre" and "post" development.
2. A soil erosion and sedimentation control plan, where applicable, including all reviews and approvals, as required by PADEP.
3. A geologic assessment of the effects of runoff on sinkholes as specified in this Ordinance.
4. The effect of the project (in terms of runoff volumes and peak flows) on adjacent properties and on any existing municipal stormwater collection system that may receive runoff from the project site.
5. A Highway Occupancy Permit from the PENNDOT District Office when utilization of a PENNDOT storm drainage system is proposed.

D. Stormwater Management Facilities

1. All stormwater management facilities must be located on a plan and described in detail.
2. When groundwater recharge methods such as seepage pits, beds or trenches are used, the locations of existing and proposed septic tank infiltration areas and wells must be shown.
3. All calculations, assumptions, and criteria used in the design of the stormwater management facilities must be shown within 200-feet of the infiltration system.

Section 402. Drainage Plan Contents

The Drainage Plan shall consist of all applicable calculations, maps, and plans. A note on the maps shall refer to the associated computations and erosion and sedimentation control plan by title and date. The cover sheet of the computations and erosion and sedimentation control plan shall refer to the associated maps by title and date. All Drainage Plan materials shall be submitted to the municipality in a format that is clear, concise, legible, neat, and well organized; otherwise, the Drainage Plan shall be disapproved and returned to the Applicant.

Section 403. Plan Submission

For all activities regulated by this Ordinance, the steps below shall be followed for submission. For any activities that require a PADEP Joint Permit Application and regulated under Chapter 105 (Dam Safety and Waterway Management) or Chapter 106 (Floodplain Management) of PADEP's Rules and Regulations, require a PENNDOT Highway Occupancy Permit, or require any other permit under applicable state or federal regulations, the permit(s) shall be part of the plan.

- A. The Drainage Plan shall be submitted by the Developer as part of the Preliminary Plan submission for the Regulated Activity.
- B. Four (4) copies of the Drainage Plan shall be submitted.
- C. Distribution of the Drainage Plan will be as follows:
 - 1. Two (2) copies to the Municipality accompanied by the requisite Municipal Review Fee, as specified in this Ordinance.
 - 2. One (1) copy to the Municipal Engineer.
 - 3. One (1) copy to the County Planning Commission/Department

Section 404. Drainage Plan Review

- A. The Municipal Engineer shall review the Drainage Plan for consistency with this Ordinance. The Municipality shall require receipt of a complete plan, as specified in this Ordinance.
- B. The Municipal Engineer shall review the Drainage Plan for any submission or land development against the municipal subdivision and land development ordinance provisions not superseded by this Ordinance.
- C. For activities regulated by this Ordinance, the Municipal Engineer shall notify the Municipality in writing, within 30 calendar days, whether the Drainage Plan is consistent with this Ordinance. Should the Drainage Plan be determined to be consistent with this Ordinance, the Municipal Engineer will forward an approval letter to the Developer with a copy to the Municipal Secretary.

- D. Should the Drainage Plan be determined to be inconsistent with this Ordinance, the Municipal Engineer will forward a disapproval letter to the Developer with a copy to the Municipal Secretary citing the reason(s) for the disapproval. Any disapproved Drainage Plans may be revised by the Developer and resubmitted consistent with this Ordinance.
- E. For Regulated Activities specified in Sections 104.A through 104.D of this Ordinance, the Municipal Engineer shall notify the Municipal Building Permit Officer in writing, within a time frame consistent with the Municipal Building Code and/or Municipal Subdivision Ordinance, whether the Drainage Plan is consistent with this Ordinance and forward a copy of the approval/disapproval letter to the Developer. Any disapproved drainage plan may be revised by the Developer and resubmitted consistent with this Ordinance.
- F. For Regulated Activities requiring a PADEP Joint Permit Application, the Municipal Engineer shall notify PADEP whether the Drainage Plan is consistent with this Ordinance and forward a copy of the review letter to the Municipality and the Developer. PADEP may consider the Municipal Engineer's review comments in determining whether to issue a permit.
- G. The Municipality shall not approve any subdivision or land development for Regulated Activities specified in Sections 104.A and 104.B of this Ordinance if the Drainage Plan has been found to be inconsistent with this Ordinance, as determined by the Municipal Engineer. All required permits from PADEP must be obtained prior to approval.
- H. The Municipal Building Permit Office shall not issue a building permit for any Regulated Activity specified in Section 104 of this Ordinance if the Drainage Plan has been found to be inconsistent with this Ordinance, as determined by the Municipal Engineer, or without considering the comments of the Municipal Engineer. All required permits from PADEP must be obtained prior to issuance of a building permit.
- I. The Developer shall be responsible for completing an "As-Built Survey" of all stormwater management facilities included in the approved Drainage Plan. The As-Built Survey and an explanation of any discrepancies with the design plans shall be submitted to the Municipal Engineer for final approval. In no case shall the Municipality approve the As-Built Survey until the Municipality receives a copy of an approved Highway Occupancy Permit from the PENNDOT District Office, and any applicable permits from PADEP.
- J. The Municipality's approval of a Drainage Plan shall be valid for a period not to exceed 5 years. This 5-year time period shall commence on the date that the Municipality signs the approved Drainage Plan. If stormwater management facilities included in the approved Drainage plan have not been constructed, or if an As-Built Survey of these facilities has not been approved within this 5-year time period, then the Municipality may consider the Drainage plan disapproved and may revoke any and all permits. Drainage Plans that are considered disapproved by the Municipality shall be resubmitted in accordance with Section 407 of this Ordinance.

Section 405. Modification of Plans

A modification to a submitted Drainage Plan for a development site that involves a change in stormwater management facilities or techniques, or that involves the relocation or re-design of stormwater management facilities, or that is necessary because soil or other conditions are not

as stated on the Drainage Plan as determined by the Municipal Engineer, shall require a resubmission of the modified Drainage Plan consistent with Section 404 of this Ordinance and be subject to review as specified in Section 405 of this Ordinance.

A modification to an already approved or disapproved Drainage Plan shall be submitted to the Municipality, accompanied by the applicable review fee, as indicated in the Borough's Current Schedule of Fees Resolution. A modification to a Drainage Plan for which the Municipality has not taken a formal action shall also be submitted to the Municipality, accompanied by the applicable Municipality Review Fee, as indicated in the Borough's Current Schedule of Fees Resolution.

Section 406. Resubmission of Disapproved Drainage Plans

A disapproved Drainage Plan may be resubmitted, with the revisions addressing the Municipal Engineer's concerns documented in writing, to the Municipal Engineer in accordance with Section 404 of this Ordinance and be subject to review as specified in Section 405 of this Ordinance. The applicable Municipality Review Fee, as indicated in the Borough's Current Schedule of Fees Resolution, must accompany a resubmission of a disapproved Drainage Plan.

ARTICLE V-INSPECTIONS

Section 501. Schedule of Inspections

- A. The Municipal Engineer or the municipal assignee shall inspect all critical phases of the installation of the permanent stormwater management facilities. The critical phases for inspection shall be determined by the reviewing engineer at the time the stormwater plan is reviewed. They shall be listed in the Municipal Engineer's approval letter.
- B. During any stage of the work, if the Municipal Engineer determines that the permanent stormwater management facilities are not being installed in accordance with this Ordinance, the Municipality shall suspend or revoke, at the Engineer's direction, any existing permits until a revised Drainage Plan is submitted and approved, as specified in this Ordinance.

ARTICLE VI-FEES AND EXPENSES

Section 601. General

The fees required by this Ordinance are shown in the Borough's Current Schedule of Fees Resolution. The Municipal Review fee shall be established by the Municipality to defray review costs incurred by the Municipality and the Municipal Engineer. The Applicant shall pay all fees.

Section 602. Municipality Drainage Plan Review Fee

The Municipality shall establish a Review Fee Schedule by resolution of the municipal governing body based on the Municipality's costs for reviewing Drainage Plans. The Municipality shall periodically update the Review Fee Schedule to ensure that review costs are adequately reimbursed.

Section 603. Expenses Covered by Fees

The fees required by this Ordinance shall, at a minimum, cover:

- A. Administrative/clerical Costs.
- B. The review of the Drainage Plan by the Municipality and the Municipal Engineer. This includes all subsequent reviews required until the plan is conformance.
- C. The site inspections including, but not limited to, pre-construction meetings, inspections during construction of stormwater facilities and appurtenances, and final inspection upon completion of the stormwater facilities and drainage improvements.
- D. Any additional work required to enforce any permit provisions regulated by this Ordinance, correct violations, and assure proper completion of stipulated remedial actions.

ARTICLE VII-MAINTENANCE RESPONSIBILITIES

Section 701. Performance Guarantee

The applicant shall provide a financial guarantee to the Municipality for the timely installation and proper construction of all stormwater management controls as required by this Ordinance equal to the full construction cost of the required controls.

Section 702. Maintenance Responsibilities

- A. The Drainage Plan for the development site shall contain an operation and maintenance plan prepared by the developer and approved by the municipal engineer. The operation and maintenance plan shall outline required routine maintenance actions and schedules necessary to ensure proper operation of the facility(ies).
- B. The Drainage Plan for the development site shall establish responsibilities for the continuing operating and maintenance of all proposed stormwater control facilities, consistent with the following principals:
 - 1. 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 may also be dedicated to and maintained by the municipality. The acceptance of maintenance responsibility for stormwater ponds infiltration areas and water quality BMPs will be at the discretion of the Borough officials.
 - 2. If a development site is to be maintained in a 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 shall be the responsibility of the owner or private management entity.
- C. 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 Drainage Plan. The governing body reserves the right to accept or reject the ownership and operating responsibility for any or all of the stormwater management controls.

Section 703. Maintenance Agreement for Privately Owned Stormwater Facilities

- A. Prior to final approval of the site's stormwater management plan, the property owner shall sign and record a maintenance agreement covering all stormwater control facilities that are to be privately owned. Said agreement, designated as Appendix C, is attached and made part hereto.

- B. 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.

Section 704. Municipal Stormwater Maintenance Fund

If stormwater facilities are accepted by the municipality for dedication, 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:

- 1. 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, using independent engineering judgment, will establish the estimated costs utilizing information submitted by the applicant.
 - 2. 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 municipal governing body.
- B. If a storage facility is proposed that also serves as a recreation facility (e.g. ballfield, lake, etc.), the municipality may reduce or waive the amount of the maintenance fund deposit based upon the value of the land for public recreation purpose. This decision shall be made by the municipality after consultation with the Municipal Engineer and other appropriate municipal staff.
 - C. 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 705. Post-Construction Maintenance Inspections

- A. Basins should be inspected by the land owner/developer or responsible entity (including the municipal engineer for dedicated facilities) on the following basis:
 - 1. Annually for the first 5 years.
 - 2. Once every 3 years thereafter,
 - 3. During or immediately after the cessation of a 2.9-inches per 24-hour or greater storm event.
- B. The entity conducting the inspection should be required to submit a written report to the municipality regarding the condition of the facility and recommending necessary repairs, if needed.

ARTICLE VIII-ENFORCEMENT AND PENALTIES

Section 801. Right-of-Entry

Upon presentation of proper credentials, duly authorized representatives of the municipality may enter at reasonable times upon any property within the municipality to inspect the condition of the stormwater structures and facilities in regard to any aspect regulated by this Ordinance.

Section 802. Notification

In the event that a person fails to comply with the requirements of this Ordinance, or fails to conform to the requirements of any permit issued hereunder, the municipality shall provide written notification of the violation. Such notification shall set forth the nature of the violation(s) and establish a time limit for correction of these violation(s). Failure to comply within the time specified shall subject such person to the penalty provision of this Ordinance. All such penalties shall be deemed cumulative and shall not prevent the municipality from pursuing any and all other remedies. It shall be the responsibility of the owner of the real property on which any Regulated Activity is proposed to occur, is occurring, or has occurred, to comply with the terms and conditions of this Ordinance.

Section 803. Enforcement

The municipal governing body is hereby authorized and directed to enforce all of the provisions of this ordinance. All inspections regarding compliance with the drainage plan shall be the responsibility of the municipal engineer or other qualified persons designated by the municipality.

A. A set of design plans approved by the municipality shall be on file at the site throughout the duration of the construction activity. Periodic inspections may be made by the municipality or designee during construction.

B. Adherence to Approved Plan

It shall be unlawful for any person, firm or corporation to undertake any regulated activity under Section 104 on any property except as provided for in the approved drainage plan and pursuant to the requirements of this ordinance. It shall be unlawful to alter or remove any control structure required by the drainage plan pursuant to this ordinance or to allow the property to remain in a condition, which does not conform to the approved drainage plan.

C. At the completion of the project, and as a prerequisite for the release of the performance guarantee, the owner or his representatives shall:

1. Provide a certification of completion from an engineer or other person qualified by law verifying that all permanent facilities have been constructed according to the plans and specifications and approved revisions thereto.

- 2. Provide a set of as built drawings.
- D. After receipt of the certification by the municipality, a final inspection shall be conducted by the governing body or its designee to certify compliance with this ordinance.
- E. Prior to revocation or suspension of a permit, the governing body will schedule a hearing to discuss the non-compliance if there is no immediate danger to life, public health or property.
- F. Suspension and revocation of Permits
 - 1. Any permit issued under this ordinance may be suspended or revoked by the governing body for:
 - a) Non-compliance with or failure to implement any provision of the permit.
 - b) A violation of any provision of this ordinance or any other applicable law, ordinance, rule or regulation relating to the project.
 - c) The creation of any condition or the commission of any act during construction or development which constitutes or creates a hazard or nuisance, pollution or which endangers the life or property of others.
 - 2. A suspended permit shall be reinstated by the governing body when:
 - a) The municipal engineer or his designee has inspected and approved the corrections to the stormwater management and erosion and sediment pollution control measure(s), or the elimination of the hazard or nuisance, and/or;
 - b) The governing body is satisfied that the violation of the ordinance, law, or rule and regulation has been corrected.
 - c) A permit, which has been revoked by the governing body, cannot be reinstated. The applicant may apply for a new permit under the procedures outlined in this Ordinance.

Comment: ????

G. Occupancy Permit

An occupancy permit shall not be issued unless the certification of compliance has been secured. An occupancy permit shall be required for each lot owner and/or developer for all subdivisions and land development in the municipality.



Section 804. Public Nuisance

- A. The violation of any provision of this ordinance is hereby deemed a Public Nuisance.
- B. Each day that a violation continues shall constitute a separate violation.

Section 805. Penalties

- A. Anyone violating the provisions of this ordinance shall be guilty of a misdemeanor, and upon conviction shall be subject to a fine and/or punishment as indicated in the Borough's Current Schedule of Fees Resolution, for each violation, recoverable with costs. Each day that the violation continues shall be a separate offense.
- B. In addition, the municipality, through its solicitor, may institute injunctive, mandamus or any other appropriate action or proceeding at law or in equity for the enforcement of this Ordinance. Any court of competent jurisdiction shall have the right to issue restraining orders, temporary or permanent injunctions, mandamus or other appropriate forms of remedy or relief.

Section 806. Appeals

- A. Any person aggrieved by any action of the Municipality or its designee, relevant to the provisions of this ordinance may appeal to the Municipal Zoning Hearing Board within thirty (30) days of that action.
- B. Any person aggrieved by any decision of the Zoning Hearing Board, relevant to the provisions of this ordinance, may appeal to the County Court of Common Pleas in the county where the activity has taken place within thirty (30) days of the Zoning Hearing Board's decision.

ENACTED and ORDAINED at a regular meeting of the _____
_____ on the _____ of _____, 20____. This
Ordinance shall take effect immediately.

_____	_____
[Name]	[Title]
_____	_____
[Name]	[Title]
_____	_____
[Name]	[Title]
_____	_____
[Name]	[Title]
_____	_____
[Name]	[Title]

ATTEST:

Secretary

I hereby certify that the foregoing Ordinance was advertised in the _____ on _____, 20____, a newspaper of general circulation in the municipality and was duly enacted and approved as set forth at a regular meeting of the municipality's governing body held on _____, 20____.

Secretary

APPENDIX A

STORMWATER MANAGEMENT DESIGN CRITERIA

TABLE A-1

DESIGN STORM RAINFALL AMOUNT (INCHES)

FIGURE A-1

NRCS (SCS) TYPE II RAINFALL DISTRIBUTION

FIGURE A-2

**PENNDOT STORM INTENSITY-DURATION-FREQUENCY CURVE
REGION 3**

TABLE A-2

**RUNOFF CURVE NUMBERS
(FROM NRCS (SCS) TR-55)**

TABLE A-3

RATIONAL RUNOFF COEFFICIENTS

TABLE A-4

MANNING ROUGHNESS COEFFICIENTS

TABLE A-1

DESIGN STORM RAINFALL AMOUNT (INCHES)

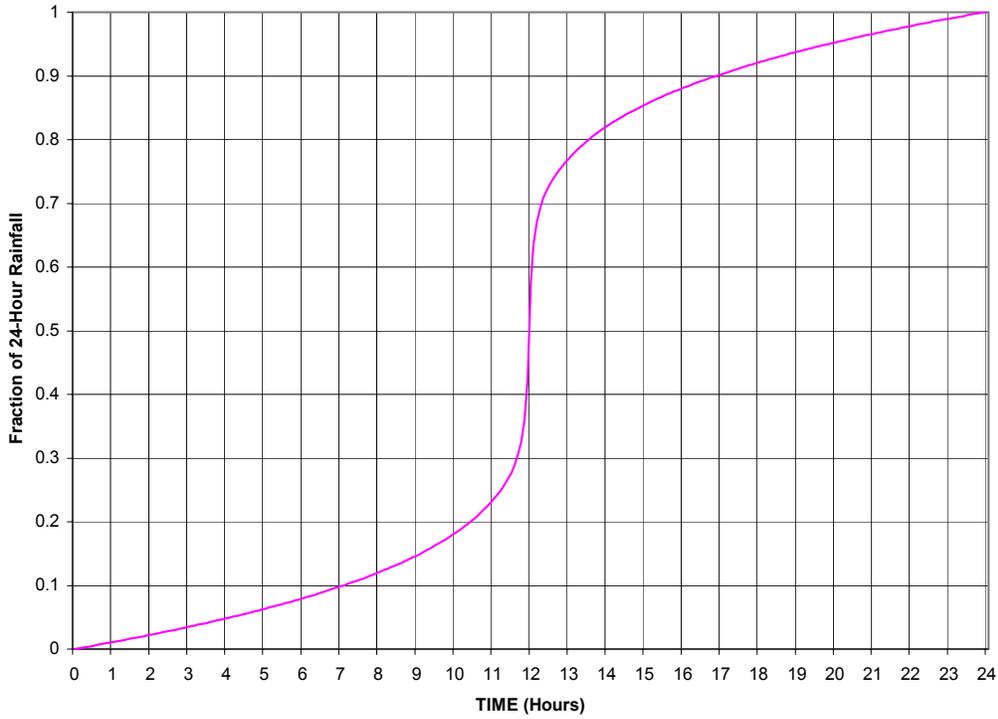
RETURN PERIOD	PRECIPITATION AMOUNT 24-HOUR STORM
1	2.4
2	2.9
5	3.8
10	4.6
25	5.0
50	5.7
100	6.3

Source: Commonwealth of Pennsylvania Department of Environmental Protection
Office of Water Management "Erosion and Sediment Pollution Control Program
Manual" March 2000.

FIGURE A-1

**Natural Resource Conservation Service
Precipitation Distribution**

SCS 24-HOUR TYPE II RAINFALL DISTRIBUTION



HOURS	MIN	FRACT.	HOURS	MIN	FRACT.	HOURS	MIN	FRACT.
1	00	0.0107	9	40	0.1659	15	00	0.852
2	00	0.0222	10	00	0.1781	15	20	0.8616
3	00	0.0345	10	20	0.1918	15	40	0.8705
4	00	0.0479	10	40	0.2077	16	00	0.8788
5	00	0.0626	11	00	0.2266	16	20	0.8866
6	00	0.079	11	20	0.2506	16	40	0.894
6	20	0.0849	11	40	0.2843	17	00	0.9009
6	40	0.091	12	00	0.3773	17	20	0.9075
7	00	0.0975	12	20	0.6925	17	40	0.9138
7	20	0.1043	12	40	0.7361	18	00	0.9199
7	40	0.1114	13	00	0.7639	19	00	0.9365
8	00	0.119	13	20	0.785	20	00	0.9515
8	20	0.127	13	40	0.8023	21	00	0.9651
8	40	0.1356	14	00	0.817	22	00	0.9776
9	00	0.1449	14	20	0.8299	23	00	0.9892
9	20	0.1549	14	40	0.8415	24	00	1

TABLE A-2

**RUNOFF CURVE NUMBERS
(FROM NRCS (SCS) TR-55)**

LAND USE DESCRIPTION		HYDROLOGIC SOIL GROUP			
		A	B	C	D
Meadow ***		30	58	71	77
Low Density Residential	(>1 Acre)	46	65	77	82
Medium density residential	(1/2 – 1 Acre)	58	73	82	86
High Density Residential	(> 1/8 – 1/2 Acre)*	77	85	90	92
Mobile Home Park		77	85	90	92
Commercial		89	92	94	95
Industrial		81	88	91	93
Mixed Urban		81	88	91	93
Transportation**		98	98	98	98
Campgrounds		77	85	90	92
Fairgrounds		77	85	90	92
Private Parks***		39	61	74	80
Public Parks***		39	61	74	80
Cemetery***		39	61	74	80
Cropland		65	75	82	86
Pasture		49	69	79	84
Permanent Hay		55	69	78	83
Orchards, Groves, Vineyards, Nurseries, Scrub brush		43	65	76	82
Other Agricultural Land & Open Space***		35	56	70	77
Mixed Forest Land***		36	60	73	77
Lakes/Ponds		98	98	98	98
Rivers/Streams		98	98	98	98
Wetlands		98	98	98	98
Strip Mines, Quarries, & Gravel Pits		66	68	72	77
Gravel Driveways & Parking Areas		84	91	92	93

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

**Transportation includes paved area only.

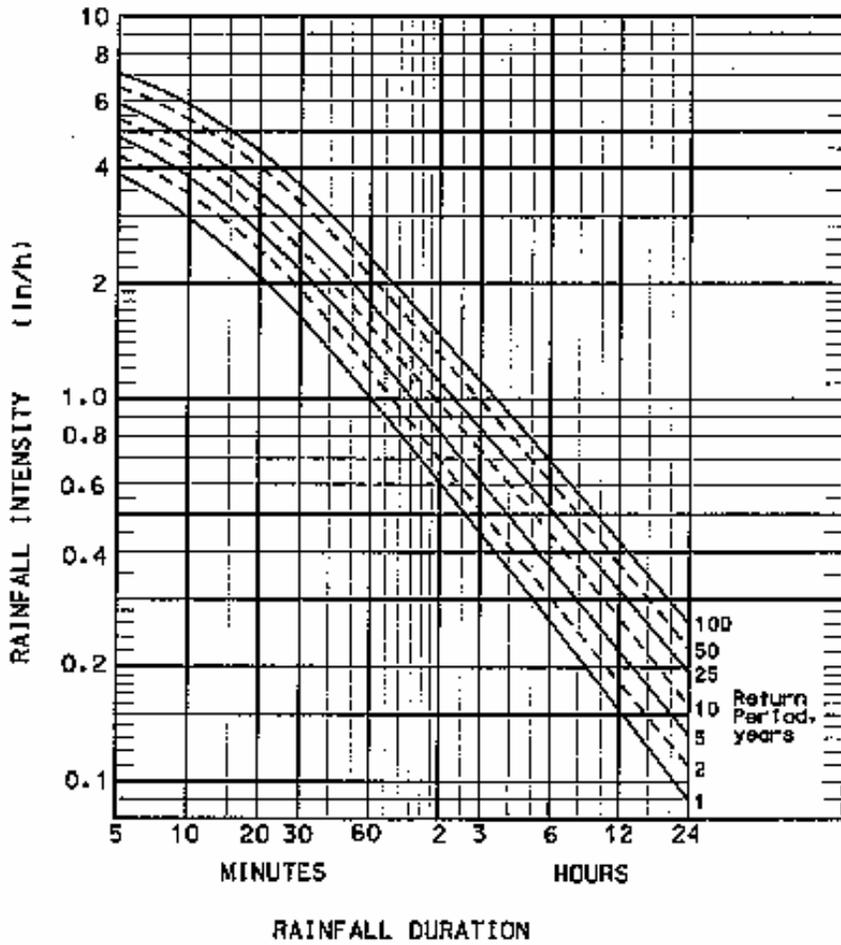
***Caution – CN values under 40 may produce erroneous modeling results.

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

FIGURE A-2

PENNDOT STORM INTENSITY - DURATION - FREQUENCY CURVE
REGION 3

REGION 3



**TABLE A-3
Runoff Coefficients
Rational Method "C" Values**

LAND USE DESCRIPTION	HYDROLOGIC SOIL GROUP			
	A	B	C	D
Meadow	0.04 (a) 0.07 (b)	0.17 0.23	0.26 0.33	0.31 0.38
Low Density Residential	(>1 Acre)	0.11 0.16	0.23 0.30	0.33 0.40
Medium density residential	(1/2 – 1 Acre)	0.19 0.25	0.30 0.38	0.38 0.46
High Density Residential	(< 1/2 Acre)*	0.41 0.50	0.50 0.60	0.57 0.67
Mobile Home Park		0.41 0.50	0.50 0.60	0.57 0.67
Commercial		0.60 0.71	0.64 0.75	0.67 0.78
Industrial		0.47 0.57	0.56 0.66	0.60 0.70
Mixed Urban and Transportation**		0.90 0.95	0.90 0.95	0.90 0.95
Campgrounds and Fairgrounds		0.41 0.50	0.50 0.60	0.57 0.67
Private Parks, Public Parks and Cemetery		0.07 0.11	0.18 0.24	0.27 0.34
Cropland		0.20 0.26	0.27 0.34	0.33 0.40
Pasture		0.14 0.19	0.23 0.29	0.30 0.36
Permanent Hay		0.11 0.16	0.23 0.29	0.30 0.37
Orchards, Groves Vineyards, Nurseries		0.08 0.12	0.20 0.26	0.28 0.35
Scrub Brush, Other Agricultural Land & Open Space		0.06 0.09	0.15 0.20	0.24 0.30
Mixed Forest Land		0.06 0.09	0.17 0.23	0.26 0.32
Lakes/Ponds Rivers / Streams / Wetlands		0.95 0.98	0.95 0.98	0.95 0.98
Strip Mines, Quarries, & Gravel Pits		0.22 0.29	0.24 0.30	0.27 0.34
Gravel Driveways & Parking Areas		0.52 0.62	0.62 0.73	0.62 0.73

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

**Transportation includes paved area only.

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

- (a) Runoff Co-efficient for storm recurrence intervals less than 25 years.
- (b) Runoff Co-efficient for storm recurrence intervals up to 25 years or more.

TABLE A-4

Recommended “n” Values to be used with Manning’s Equation

Surface	Min.	Design	Max.
Asphalt Lining		0.015	
Brick in cement mortar, brick sewers	0.012	0.015	0.017
Concrete-lined channel	0.012	0.015	0.018
Cement-rubble surface	0.017		0.030
Neat cement surface	0.010	0.012	0.013
Plastic-lined channel	0.012		0.014
Shotcrete	0.016		0.017
Asbestos Cement Pipe		0.009	
Concrete Pipe	0.012	0.015	0.016
Vitrified Clay Pipe	0.010	0.013	0.017
Common-clay drainage tile	0.011	0.012	0.017
Semi-circular metal flumes, smooth	0.011		0.015
Corrugated	0.023	0.025	0.030
Channels and ditches			
Earth, straight and uniform	0.017	0.023	0.025
Rock cuts, smooth and uniform	0.025	0.030	0.035
jagged and irregular	0.035	0.040	
Dredged earth channels	0.025	0.028	0.033
Earth bottom, rubble sides	0.028	0.030	0.035
Natural Streams			
1. Clean, straight bank, full stage no rifts or deep pools	0.025		0.033
2. Same as 1, but some weeds and stones	0.030		0.040
3. Winding, some pools and shoals, clean	0.033		0.045
4. Same as 3, lower stages, more ineffective slope and sections	0.040		0.055
5. Same as 3, same weeds and stone	0.035		0.050
6. Same as 4, stony sections	0.045		0.060
7. Sluggish river reaches, rather weedy or with very deep pools	0.050		0.080
8. Very weedy reaches	0.075		0.150

APPENDIX B

DRAINAGE PLAN APPLICATION

DRAINAGE PLAN 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 Borough of Northumberland stormwater management and earth disturbance Ordinance.

Check type of Plan submittal:
_____ 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)

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 | _____ 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 predevelopment conditions for the designated design storm?

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

- No. Of subarea _____
 - Watershed name _____
 - Other _____
- Explain:

c. Type of proposed runoff control _____

d. Does the proposed stormwater control criteria meet the requirement/guidelines of the stormwater ordinances? _____

- If not, what variances/waivers are requested? _____
 - Reasons _____
- _____

e. Does the plan meet the requirements of Article III of the stormwater ordinance? _____

- If not, what variances/waivers are requested _____
 - Reasons why _____
- _____

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

g. What hydrologic method was used in the stormwater computations?

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

i. Is a construction schedule or staging attached? _____

j. 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 Northumberland 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. Is supporting documentation attached

11. Filing

a. The applicant understands and accepts responsibility for all fees as indicated in the Borough's Current Schedule of Fees Resolution _____

b. Has the proposed schedule of construction inspection to be performed by the applicant's engineer been submitted? _____

c. Name of individual whom will be making the inspections _____

d. General comments about stormwater management at development

**CERTIFICATE OF OWNERSHIP
AND ACKNOWLEDGMENT OF APPLICATION**

**COUNTY OF NORTHUMBERLAND, COMMONWEALTH
OF PENNSYLVANIA**

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 PRIOR knowledge and/or direction and does hereby agree with the said application and to the submission of the same.

Property Owner(s)

My Commission Expires _____, 20____ Notary Public or Officer

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 _____

Appendix C

STANDARD BEST MANAGEMENT PRACTICES MAINTENANCE AND

MONITORING AGREEMENT

THIS AGREEMENT, made and entered into this _____ day of _____, 20____, by and between _____, (hereinafter the “Landowner”), and Borough of Northumberland, Northumberland County; Pennsylvania, (hereinafter “Municipality”);

WITNESSETH

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

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

WHEREAS, the Subdivision/Land Management Plan (hereinafter “Plan”) for the property identified herein, which is expressly made a part hereof, as approved or to be 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 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.

- 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
- Stormwater Structures and Facilities shall include, but not be limited to, detention and retention basins, and BMPs.

WHEREAS, the Municipality requires, through the implementation of the _____ Subdivision and Land Development Plan, that stormwater management BMPs as required by said Plan and the Municipal Ordinance be constructed and adequately maintained by the Landowner, his successors and assigns. The Plan shall include, but not be limited to, the BMP site location, plan view and cross sectional drawings as appropriate, design calculations, material specifications, and any maintenance requirements imposed by the Municipality or its Designated Representatives, and

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

1. The onsite BMP facility shall be constructed by the Landowner in accordance with the plans and specifications identified in the Plan.
2. The Landowner shall 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 which is attached hereto as Appendix A and made part hereof.
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 maintain the BMP(s) as shown on the Plan in good working order acceptable to the Municipality, the Municipality 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 incurred within 10 days of receipt of invoice from the Municipality.
6. The intent and purpose of this Agreement is to insure 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 nonpoint source pollution runoff.
7. The Landowner, its executors, administrators, assigns, and other successors in interests, shall indemnify the Municipality's employees and designated representatives against 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 among the land records of Northumberland 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

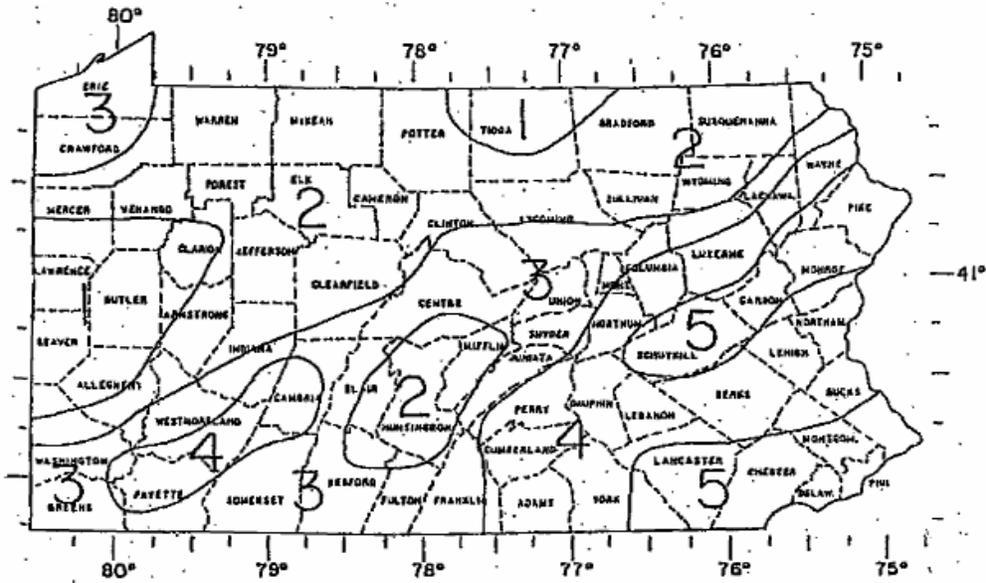
I, _____, a Notary Public in and for the County and State aforesaid, whose commission expires on the _____ day of _____, 20__, do hereby certify that _____ whose name(s) is/are signed to the foregoing Agreement bearing date of the _____ day of _____, 20____, has acknowledged the same before me in my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

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

NOTARY PUBLIC

(SEAL)

Appendix D



Hydrologic Regions With Uniform Rainfall (PENNDOT Field Manual, May 1986)

“P” Values for Water Quality Requirements 24-Hour Storm Values Representing 90 % of Annual Rainfall

Rainfall Region	Inches
1	1.13
2	1.48
3	1.60
4	1.95
5	2.04

**APPENDIX E
LOW IMPACT DEVELOPMENT PRACTICES**

**ALTERNATIVE APPROACH FOR
MANAGING STORMWATER RUNOFF**

Natural hydrologic conditions may be altered radically by poorly planned development practices. Deleterious activities include 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 in a detention basin in accordance with the local regulations. This approach leads ultimately to the 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 depend 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 for 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 modern developments. 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. 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 Depressional 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.** A 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 yard, 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 a low-traffic neighborhood. 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 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,

Note: This information has been developed from various sections presented in "Pennsylvania Handbook of BMPs for Developing Areas" prepared by CH2M HILL under a contract with PACD.