

Sacony Creek Stormwater Management Ordinance

ORDINANCE NO. 7 OF 2008

MAXATAWNY TOWNSHIP, BERKS COUNTY,
PENNSYLVANIA

SACONY CREEK
STORMWATER MANAGEMENT
ORDINANCE

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_____, 20__

TABLE OF CONTENTS

	<u>PAGE</u>
ARTICLE I - GENERAL PROVISIONS.....	1
Section 101. Short Title	1
Section 102. Statement of Findings	1
Section 103. Purpose	2
Section 104. Statutory Authority	3
Section 105. Applicability/Regulated Activities	4
Section 106. Repealer	4
Section 107. Severability	4
Section 108. Compatibility With Other Ordinance Requirements	4
Section 109. Duty of Persons Engaged in the Development of Land.....	4
ARTICLE II-DEFINITIONS.....	5
Section 201. Interpretation.....	5
Section 202 - Definitions	5
ARTICLE III - STORMWATER MANAGEMENT	16
Section 301. General Requirements	16
Section 302. Permit Requirements by Other Government Entities	17
Section 303. Erosion and Sediment Control During Regulated Earth Disturbance Activities.....	18
Section 304. Nonstructural Project Design (Sequencing to Minimize Stormwater Impacts)	18
Section 305. Ground Water Recharge (Infiltration/Recharge/Bioretenion).....	20
Section 306. Water Quality Requirements	26
Section 307. Streambank Erosion Requirements.....	27
Section 308. Stormwater Management Districts	28
Section 309. Calculation Methodology	30
Section 310. Design of Basins (Detention and Retention)	32
Section 311. Design of Storm Sewers.....	36
Section 312. Design of Culverts and Bridges.....	41
ARTICLE IV-DRAINAGE PLAN REQUIREMENTS.....	43
Section 401. General Requirements	43
Section 402. Exemptions	43
Section 403. Drainage Plan Contents	45
Section 404. Plan Submission.....	50
Section 405. Drainage Plan Review	51
Section 406. Modification of Plans	52
Section 407. Resubmission of Disapproved Drainage Plans.....	52
ARTICLE V-INSPECTIONS.....	53
Section 501. Schedule of Inspections	53
ARTICLE VI-FEES AND EXPENSES	53
Section 601. Maxatawny Townshipity Drainage Plan Review and Inspection Fee	53
Section 602. Expenses Covered by Fees	53
ARTICLE VII-MAINTENANCE RESPONSIBILITIES	54

Section 701. Performance Guarantee	54
Section 702. Blank.....	55
Section 703. Blank.....	55
Section 704. Adherence to Approved Stormwater Control and BMP Operations and Maintenance Plan.....	55
Section 705. Operations and Maintenance Agreement for Privately Owned Stormwater Controls and BMP's	55
Section 706. Stormwater Management Easements.....	55
Section 707. Maintenance Agreement for Privately Owned Stormwater Facilities.....	55
Section 708. Recording of Approved Stormwater Control and BMP Operations and Maintenance Plan and Related Agreements	56
Section 709. Maxatawny Township Stormwater Control and BMP Operation and Maintenance Fund	56
ARTICLE VIII- PROHIBITIONS	57
Section 801. Prohibited Discharges and Connections	57
Section 802. Roof drains.....	58
Section 803. Alteration of BMP's	58
ARTICLE IX-ENFORCEMENT AND PENALTIES	59
Section 901. Right-of-Entry.....	59
Section 902. Public Nuisance	59
Section 903. Enforcement Generally.....	59
Section 904. Liability Disclaimer Enforcement Generally.....	60
Section 905. Suspension and Revocation of Permits and Approvals	60
Section 906. Penalties	61
Section 907. Notification	61
Section 908. Enforcement.....	62
Section 909. Appeals	63
Section 910. Miscellaneous	63

APPENDICES

ORDINANCE APPENDIX A	-	STORMWATER CONTROLS AND BEST MANAGEMENT PRACTICES OPERATION AND MAINTENANCE AGREEMENT
ORDINANCE APPENDIX B	-	STORMWATER MANAGEMENT DESIGN CRITERIA
ORDINANCE APPENDIX C-1	-	DRAINAGE PLAN APPLICATION AND PROPOSED SCHEDULE OF FEES
ORDINANCE APPENDIX C-2	-	DRAINAGE PLAN CHECKLIST
ORDINANCE APPENDIX D	-	STORMWATER MANAGEMENT DISTRICT WATERSHED MAP*
ORDINANCE APPENDIX E	-	LOW IMPACT DEVELOPMENT PRACTICES
ORDINANCE APPENDIX F	-	REFERENCES
ORDINANCE APPENDIX G	-	WEST NILE VIRUS GUIDANCE
ORDINANCE APPENDIX H	-	IMPLEMENTATION FLOW CHART
ORDINANCE APPENDIX I	-	STORMWATER MANAGEMENT PRACTICES FOR PROJECTS WHICH ARE EXEMPT UNDER SECTION 402 OF THIS ORDINANCE

**SACONY CREEK WATERSHED
ACT 167 STORM WATER MANAGEMENT ORDINANCE**

BE IT ENACTED and ORDAINED by the Township of Maxatawny, Berks County, Pennsylvania, and it is hereby enacted and ordained by the authority of the same as follows:

ARTICLE I - GENERAL PROVISIONS

Section 101. Short Title and Statement of Findings

This Ordinance shall be known and may be cited as the "Maxatawny Township Sacony Creek Watershed Stormwater Management Ordinance".

Section 102. Statement of Findings

As mandated by the Pennsylvania Department of Environmental Protection, Maxatawny Township must regulate activities by the Authority of the Act of October 4, 1978, P.L. 864 (Act 167), 32 P.S. Section 680.1, et seq., as amended. Maxatawny Township agrees that:

- A. Inadequate management of accelerated stormwater runoff resulting from past 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 burden on 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. Inadequate planning and management of stormwater runoff resulting from land development and redevelopment throughout a watershed can also harm surface water resources by changing the natural hydrologic patterns, accelerating stream flows (which increase scour and erosion of stream-beds and stream-banks thereby elevating sedimentation), destroying aquatic habitat and elevating aquatic pollutant concentrations and loadings, such as sediments, nutrients, heavy metals and pathogens. Groundwater resources are also impacted through loss of recharge.
- C. A comprehensive program of stormwater management (SWM), including minimization of impacts of development, redevelopment and activities causing accelerated erosion, is fundamental to the public health, safety, welfare, and the protection of the people of Maxatawny Township and all the people of the Commonwealth, their resources, and the environment.
- D. Inadequate management of accelerated stormwater runoff resulting from past development throughout a watershed poses a threat to surface and groundwater quality.

- E. Stormwater can be an important water resource by providing groundwater recharge for water supplies and base flow of streams, which also protects and maintains surface water quality.
- F. Through project design, impacts from stormwater runoff can be minimized to maintain the natural hydrologic regime, and sustain high water quality, groundwater recharge, stream baseflow and aquatic ecosystems. The most cost effective and environmentally advantageous way to manage storm water runoff is through nonstructural project design, minimizing impervious surfaces and sprawl, avoiding sensitive areas (i.e. stream buffers, floodplains, steep slopes), and designing to topography and soils to maintain the natural hydrologic regime.
- G. Public education on the control of pollution from stormwater is an essential component in successfully addressing stormwater.
- H. Federal and state regulations mandate Maxatawny Township to implement a program of stormwater controls. Maxatawny Township may be required to obtain a permit for stormwater discharges from their separate storm sewer systems under the National Pollutant Discharge Elimination System (NPDES).
- I. Non-stormwater discharges to Maxatawny Township separate storm sewer systems can contribute to pollution of waters of the Commonwealth.

Section 103. Purpose

The purpose of this Ordinance is to promote the public health, safety, and welfare within the Sacony Creek Watershed by maintaining the natural hydrologic regime by minimizing the impacts described in Section 102 of this Ordinance through provisions designed to:

- A. Promote alternative project designs and layout that minimizes impacts to surface and ground water.
- B. Promote nonstructural BMP's.
- C. Minimize increases in stormwater volume.
- D. Minimize impervious surfaces.
- E. Manage accelerated runoff and erosion and sedimentation problems at their source by regulating activities that cause these problems.
- F. Utilize and preserve the existing natural drainage systems.
- G. Manage stormwater impacts close to the runoff source, which requires a minimum of structures and relies on natural processes.
- H. Focus on infiltration of stormwater, to maintain groundwater recharge, to prevent degradation of surface and groundwater quality and to otherwise protect water resources.
- I. Strive to maintain existing base flows and quality of streams and watercourses.

- J. Meet legal water quality requirements under state law, including regulations at 25 Pa. Code Chapter 93.4a to protect and maintain “existing uses” and maintain the level of water quality to support those uses in all streams, and to protect and maintain water quality in “special protection” streams.
- K. Address the quality and quantity of stormwater discharges from the development site.
- L. Provide a mechanism to identify controls necessary to meet the NPDES permit requirements.
- M. Implement an illegal discharge detection and elimination program to address non-stormwater discharges into Maxatawny Township’s separate storm sewer system(s).
- N. Preserve and restore the flood-carrying capacity of streams.
- O. Prevent scour and erosion of streambanks and streambeds.
- P. Provide proper maintenance of all permanent stormwater management facilities and BMP’s that are implemented in Maxatawny Township.
- Q. Provide performance standards and design criteria for watershed-wide stormwater management and planning.
- R. Federal regulations approved October 1999 that require operators of small municipal separate storm sewer systems (MS4s) to obtain NPDES Phase II permits from DEP by March 2003. (NPDES II is an acronym for the National Pollutant Discharge Elimination System Phase II Stormwater Permitting Regulations.) This program affects all municipalities in “urbanized areas” of the state. This definition applies to all Schuylkill River watershed municipalities identified in Table III-1 of the Schuylkill River Stormwater Management Plan Volume II as NPDES Phase II municipalities. Therefore, these identified municipalities will be subject to the NPDES Phase II requirements mandated by the Federal Clean Water Act as administered by DEP.

Section 104. Statutory Authority

Primary Authority:

Maxatawny Township is empowered to regulate these activities by the Authority of the Act of October 4, 1978, P.L. 864 (Act 167), 32 P.S. Section 680.1, et seq., as amended, known as the “Pennsylvania Storm Water Management Act” and the Maxatawny Township Subdivision and Land Development Regulations.

Secondary Authority

Maxatawny Township also is empowered to regulate land use activities that affect runoff by the Authority of the Act of July 31, 1968, P.L. 805, No. 247, known as The Pennsylvania Municipalities Planning Code, as amended (“MPC”).

Section 105. Applicability/Regulated Activities

- A. All Regulated Activities and all activities that may affect stormwater runoff, including Land Development and Earth Disturbance Activity, are subject to regulation by this Ordinance unless exempted in Section 402.
- B. This Ordinance shall only apply to those areas of Maxatawny Township that are located within the Sacony Creek Watershed, as delineated in Appendix D.
- C. This Ordinance shall only apply to permanent storm water management facilities constructed as part of any of the Regulated Activities.
- D. This Ordinance contains only the storm water management performance standards and design criteria that are necessary or desirable from a watershed-wide perspective and shall be regulated, enforced and interpreted at the discretion of Maxatawny Township and the Maxatawny Township Engineer.
- E. Local storm water management design criteria (e.g. inlet spacing, inlet type, collection system design and details, outlet structure design, etc.) shall continue to be regulated by this ordinance and the Maxatawny Township Subdivision and Land Development Regulations and at the Maxatawny Township Engineer's discretion.

Section 106. Repealer

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

Section 107. 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 108. Compatibility With Other Ordinance Requirements

Approvals issued and actions taken under this Ordinance do not relieve the Applicant of the responsibility to secure required permits or approvals for activities by any other code, law, regulation or ordinance.

Section 109. Duty of Persons Engaged in the Development of Land.

Notwithstanding any provisions of this Ordinance, including exemption and waiver provisions, any landowner and any person engaged in the alteration or development of land which may affect stormwater runoff characteristics shall implement such measures as are reasonably necessary to prevent injury to health, safety or other property. Such measures shall include such actions as are required to manage the rate, volume, direction and quality of resulting stormwater runoff in a manner which otherwise adequately protects health and property from possible injury.

ARTICLE II-DEFINITIONS

Section 201. Interpretation

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

- A. Words used in the present tense include the future tense; the singular number includes the plural, and the plural number includes the singular; words of masculine gender include feminine gender; and words of feminine gender include masculine gender.
- B. The word "includes" or "including" shall not limit the term to the specific example, but is intended to extend its meaning to all other instances of like kind and character.
- C. The word "person" includes an individual, firm, association, organization, partnership, trust, company, corporation, unit of government, 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."

Section 202 - Definitions

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. For purposes of regulation by this Ordinance 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.

As-built drawings - Those drawings maintained by the Contractor or Applicant or Developer as he/she constructs the project and upon which he documents the actual locations of the building or components and any changes to the original contract documents. These, electronic or mylar of same, are turned over to the Engineer at the completion of the project

Applicant - A person who has filed an application for approval to engage in any Regulated Activities as defined in Section 105 of this Ordinance.

Bankfull - The channel at the top-of-bank or point where water begins to overflow onto a floodplain.

Base Flow – Portion of stream discharge derived from groundwater; the sustained discharge that does not result from direct runoff or from water diversions, reservoir releases, piped discharges, or other human activities.

Bioretention – A stormwater retention area which utilizes woody and herbaceous plants and soils to remove pollutants before infiltration occurs.

BMP (Best Management Practice) – Methods, measures or practices to prevent or reduce surface runoff and/or water pollution, including but not limited to, structural and non-structural stormwater management practices and operation and maintenance procedures. See also Non-structured Best Management Practice (BMP).

Buffer – The area of land immediately adjacent to any stream, measured perpendicular to and horizontally from the top-of-bank on both sides of a stream.

Carbonate Bedrock (Areas) - Rock consisting chiefly of carbonate minerals, such as limestone and dolomite; specifically a sedimentary rock composed of more than 50% by weight of carbonate minerals that underlies soil or other unconsolidated, superficial material.

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 drainage ways, swales, streams, ditches, canals, and pipes flowing partly full.

Channel Erosion - The widening, deepening, and headward cutting of small channels and waterways, caused by stormwater runoff or bankfull flows.

Cistern - An underground reservoir or tank for storing rainwater.

Conservation District – The Berks County Conservation District.

Culvert - A structure with appurtenant works, which carries water 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.

Department or “DEP” – The Pennsylvania Department of Environmental Protection.

Designee - The agent of the Berks County Planning Commission, Berks County Conservation District and/or agent of Maxatawny Township involved with the administration, review or enforcement of any provisions of this ordinance by contract or memorandum of understanding.

Design Professional (Qualified) – Any person licensed by the Pennsylvania Department of State or otherwise qualified by law to perform the work required by the Ordinance

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.

Designated Watershed (ACT 167) – A Watershed which is listed under the Pennsylvania Department of Environmental Protection’s “Index of Designated Watersheds (Stormwater Management)” pursuant to the Stormwater Management Act P.L. 864, No. 167, October 4, 1978, and published in the Pennsylvania Bulletin on May 31, 1980 and August 9, 1980, as amended on November 19, 1991, April 21, 1992, June 21, 1994, April 16, 1996, April 15, 1997 and December 16, 1997).

Detention Basin - An impoundment designed to collect and retard stormwater runoff by temporarily storing the runoff and releasing it at a predetermined rate. Detention basins are designed to drain completely shortly after any given rainfall event and are dry until the next rainfall event.

Detention District - Those subareas in which some type of detention is required to meet the plan requirements and the goals of Act 167.

Developer – A person that seeks to undertake any Regulated Earth Disturbance activities at a project site in Maxatawny Township.

Development - See “Earth Disturbance Activity.” The term includes redevelopment.

Development Site - The specific tract of land where any Earth Disturbance activities in Maxatawny Township are planned, conducted or maintained.

Diffused Drainage Discharge – Drainage discharge not confined to a single point location or channel, such as sheet flow or shallow concentrated flow.

Discharge – To release water from a project, site, aquifer, drainage basin or other point of interest (verb); The rate and volume of flow of water such as in a stream, generally expressed in cubic feet per second (volume per unit of time) (noun). See also Peak Discharge.

Discharge Point – The point where stormwater flow into.

Disturbed Areas – Unstabilized land area where an earth disturbance activity is occurring or has occurred.

Ditch – An artificial waterway for irrigation or stormwater conveyance.

Downslope Property Line - That portion of the property line of the lot, tract, or parcels of land being developed located such that 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 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 Maxatawny Township Board of Supervisors after the drainage plan has been approved.

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 Activity – A construction or other human activity which disturbs the surface of land, including, but not limited to, clearing and grubbing, grading, excavations, embankments, land development, agricultural plowing or tilling, timber operations activities, mineral extraction, and the moving, depositing, stockpiling, or storing of soil, rock or earth materials.

Emergency Spillway – A conveyance area that is used to pass peak discharge greater than the maximum design storm controlled by the stormwater facility.

Encroachment – A structure or activity that changes, expands or diminishes the course, current or cross section of a watercourse, floodway or body of water.

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

Erosion and Sediment Control Plan - A plan for a project site which identifies BMP's to minimize accelerated erosion and sedimentation.

Exceptional Value Waters – Surface waters of high quality which satisfy Pennsylvania Code Title 25 Environmental Protection, Chapter 93, Water Quality Standards, § 93.4b(b) (relating to anti-degradation).

Existing Conditions - The initial condition of a project site prior to the proposed alteration. 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.

Flood - A temporary condition of partial or complete inundation of 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.

Floodway - The channel of the watercourse and those portions of the adjoining floodplains, which 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-bank.

Fluvial Geomorphology - The study of landforms associated with river channels and the processes that form them.

Forest Management/Timber Operations - Planning and activities necessary for the management of forest land with no change of land use proposed. These include timber inventory and preparation of forest management plans, silvicultural treatment, cutting budgets, logging road design and construction, timber harvesting and reforestation.

Freeboard - A vertical distance between the elevation of the design high-water and the top of a dam, levee, tank, basin, swale, or diversion berm. 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 convey surface water.

Groundwater - Water beneath the earth's surface, often between saturated soil and rock that supplies wells and springs.

Groundwater Recharge - Replenishment of existing natural underground water supplies without degrading groundwater quality.

HEC-HMS - The U.S. Army Corps of Engineers, Hydrologic Engineering Center (HEC) - Hydrologic Modeling System (HMS).

High Quality Waters - Surface waters having quality which exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water by satisfying Pennsylvania Code Title 25 Environmental Protection, Chapter 93 Water Quality Standards, § 93.4b(a).

Hotspots - Areas where land use or activities generate highly contaminated runoff, with concentrations of pollutants in excess of those typically found in stormwater.

Hydrograph - A graph of discharge versus time for a selected point in the drainage system.

Hydrologic Regime (natural) - The hydrologic cycle or balance that sustains quality and quantity of stormwater, baseflow, storage, and groundwater supplies under natural conditions.

Hydrologic Soil Group - A classification of soils by the Natural Resources Conservation Service, formerly the Soil Conservation Service, into four runoff potential groups. 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.

Impervious Surface - A surface that prevents the infiltration of water into the ground. Impervious surface includes, but is not limited to, any roof, parking or driveway areas, and any new streets and sidewalks. Any existing or proposed surface areas designed to be gravel or crushed stone shall be assumed to be impervious surfaces. See Appendix B for impervious road material cross-sections.

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

Infill - Development that occurs on smaller parcels that remain undeveloped but are within or very close proximity to urban areas. The development relies on existing infrastructure and does not require an extension of water, sewer or other public utilities.

Infiltration – Movement of surface water into the soil, where it is absorbed by plant roots, evaporated into the atmosphere, or percolates downward to recharge groundwater.

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

Inlet - The upstream end of any structure through which water may flow.

Intermittent Stream - A stream that flows only part of the time. Flow generally occurs for several weeks or months in response to seasonal precipitation, due to groundwater discharge.

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 residential or nonresidential buildings, whether proposed initially or cumulatively, or a single residential or nonresidential building on a lot or lots regardless of the number of occupants or tenure or (b) the division or allocation of land or space, whether initially or cumulatively, between or among two or more existing or prospective occupants by means of, or for the purpose of streets, common areas, leaseholds, condominiums, building groups, or other features; (ii) A subdivision of land; (iii) development in accordance with Section 503(1.1) of the PA Municipalities Planning Code.

Limiting zone—A soil horizon or condition in the soil profile or underlying strata which includes one of the following:

- (i) A seasonal high water table, whether perched or regional, determined by direct observation of the water table or indicated by soil mottling.
- (ii) A rock with open joints, fracture or solution channels, or masses of loose rock fragments, including gravel, with insufficient fine soil to fill the voids between the fragments.
- (iii) A rock formation, other stratum or soil condition which is so slowly permeable that it effectively limits downward passage of effluent.

Lot – A part of a subdivision or a parcel of land used as a building site or intended to be used for building purposes, whether immediate or future.

Maintenance – See Road Maintenance.

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

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

Maxatawny Township Engineer – A professional engineer licensed as such in the Commonwealth of Pennsylvania, duly appointed as the engineer for Maxatawny Township, planning agency or planning commission.

Maxatawny Township – Maxatawny Township, Berks County, Pennsylvania.

Natural Hydrologic Regime (see Hydrologic Regime)

Natural Recharge Area – Undisturbed surface area or depression where stormwater collects, and a portion of which infiltrates and replenishes the underground and groundwater.

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.

Non Stormwater Discharges - Water flowing in stormwater collection facilities, such as pipes or swales, which is not the result of a rainfall event or snowmelt.

Nonstructural Best Management Practice (BMP's) – Methods of controlling stormwater runoff quantity and quality, such as innovative site planning, impervious area and grading reduction, protection of natural depression areas, temporary ponding on site and other techniques.

NPDES - National Pollutant Discharge Elimination System, the federal government's system for issuance of permits under the Clean Water Act, which is delegated to DEP in Pennsylvania.

NRCS - Natural Resource Conservation Service (previously SCS).

Outfall - "Point source" as described in 40 CFR § 122.2 at the point where a storm sewer system discharges to surface waters of the Commonwealth.

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

PaDot – Pennsylvania Department of Transportation

Parent Tract – The parcel of land from which a land development or subdivision originates, determined from the date of the original 1998 Maxatawny Township adoption of this Ordinance.

Parking Lot Storage - Involves the use of parking areas as temporary impoundments with controlled release rates during rainstorms.

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

Penn State Runoff Model - The computer-based hydrologic model developed at the Pennsylvania State University.

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

Planning Commission - The planning commission of Maxatawny Township.

Point Source - any discernible, confined and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, or conduit from which stormwater is or may be discharged, as defined in State regulations at 25 Pa. Code § 92.1.

Post Construction – Period after construction where disturbed areas are stabilized, stormwater controls are in place and functioning and all proposed improvements in the approved land development plan are completed.

Predevelopment – Undeveloped/Existing Condition.

Pretreatment – Techniques employed in stormwater BMP's to provide storage or filtering to trap coarse materials and other pollutants before they enter the system, but not necessarily meet the water quality volume requirements of Section 306.

Project Site - The specific area of land where any Regulated Earth Disturbance activities in Maxatawny Township are planned, conducted or maintained.

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

Recharge – The replenishment of groundwater through the infiltration of rainfall, other surface waters, or land application of water or treated wastewater.

Record Drawings - Original documents revised to suit the as-built conditions and subsequently provided by the Applicant to the Township Engineer. The Township Engineer takes the Applicant's, Developers or Contractor's as-builts, reviews them in detail with his/her own records for completeness, then either turns these over to the Township or transfers the information to a set of reproducible, for the Township's permanent records.

Redevelopment – The demolition, construction, reconstruction, alteration, or improvement exceeding 2,500 square feet of land disturbance performed on sites where an existing land use is commercial, industrial, institutional, or multifamily residential. Maintenance activities such as road repair, milling and re-paving are not considered to be redevelopment. Interior remodeling projects and tenant improvements are also not considered to be redevelopment. Utility trenches in streets are not considered redevelopment.

Regulated Activities - Any actions or proposed actions that involve the alteration or development of land in a manner that may affect stormwater runoff.

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

Release Rate - The percentage of existing conditions peak rate of runoff from a site or subarea to which the post development peak rate of runoff must be reduced to protect downstream areas.

Retention Basin - A structure in which stormwater is stored and not released during the storm event. Retention basins do not have an outlet other than recharge and must infiltrate stored water.

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 of once every twenty-five 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 design storm.

Road Maintenance - earth disturbance activities within the existing road cross-section, such as grading, repairing, repaving, etc. existing paved or unpaved road surfaces, cutting road banks, cleaning or clearing drainage ditches and other similar activities.

Roof Drains - A drainage conduit or pipe that collects water runoff from a roof and leads it away from the structure.

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.

SALDO - Maxatawny Township Subdivision and Land Development Regulations, as amended.

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

Sediment Pollution - The placement, discharge or any other 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 or air.

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 underground water.

Separate Storm Sewer System - A conveyance or system of conveyances (including roads with drainage systems, streets, catch basins, curbs, gutters, ditches, man-made channels or storm drains) primarily used for collecting and conveying stormwater runoff.

Shallow Concentrated Flow - Stormwater runoff flowing in shallow, defined ruts prior to entering a defined channel or waterway.

Sheet Flow - A flow process associated with broad, shallow water movement on sloping ground surfaces that is not channelized or concentrated.

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).

Source Water Protection Areas (SWPA) - The zone through which contaminants, if present, are likely to migrate and reach a drinking water well or surface water intake.

Special Geologic Features - Carbonate bedrock features, including but not limited to closed depressions, existing sinkholes, fracture traces, lineaments, joints, faults, caves and pinnacles, which may exist and must be identified on a site when stormwater management BMP's are being considered.

Special Protection Subwatersheds - Watersheds for which the receiving waters are exceptional value (EV) or high quality (HQ) waters.

Spillway – A conveyance that is used to pass the peak discharge of the maximum design storm controlled by the stormwater facility.

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

Storage Indication Method - A reservoir routing procedure based on solution of the continuity equation (inflow minus outflow equals the change in storage) 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 stormwater runoff and stormwater from other sources, but excludes domestic sewage and industrial wastes.

Stormwater - The surface runoff generated by precipitation reaching the ground surface.

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

Stormwater Management Plan - The plan for managing those land use activities that will influence stormwater runoff quality and quantity and that would impact the Sacony Creek Watershed adopted by Berks County and Lehigh County as required by the Act of October 4, 1978, P.L. 864, (Act 167), and known as the "Sacony Creek Watershed Act 167 Stormwater Management Plan".

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

Stream – A natural watercourse.

Stream Buffer – The land area adjacent to each side of a stream, essential to maintaining water quality. (See Buffer)

Stream Enclosure - A bridge, culvert or other structure in excess of 100 feet in length upstream to downstream which encloses a regulated water of this Commonwealth.

Subarea (Subwatershed)- The smallest drainage unit of a watershed for which stormwater management criteria have been established in the Stormwater Management Plan.

Subdivision - The division or redivision 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, partition by the court for distribution to heirs or devisees, 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 dwelling, shall be exempted. Also see definition in the Subdivision and Land Development Ordinance.

Surface 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, or parts thereof, whether natural or artificial, within or on the boundaries of this Commonwealth.

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.

Top-of-Bank – Highest point of elevation in a stream channel cross section at which a rising water level just begins to flow out of the channel and over the floodplain.

Un-Developed – Existing natural condition. See Existing Condition.

Vernal Pond – Seasonal depression wetlands that are covered by shallow water for variable periods from winter to spring, but may be completely dry for most of the summer and fall.

Watercourse - A channel or conveyance of surface water having defined bed and banks, whether natural or artificial, with perennial or intermittent flow.

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.

Watershed - Region or area drained by a river, watercourse or other body of water, whether natural or artificial.

Wellhead – 1. a structure built over a well, 2. the source of water for a well.

Wellhead Protection Area - The surface and subsurface area surrounding a water supply well, well field, spring or infiltration gallery supplying a public water system, through which contaminants are reasonably likely to move toward and reach the water source.

Wet Basin - Pond for urban runoff management that is designed to detain urban runoff and always contains water.

Wetland - Those areas that are inundated or saturated by surface or groundwater 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. General Requirements

- A. All Site Development and Applicants proposing Regulated Activities in Sacony Creek Watershed which do not fall under the exemption criteria shown in Section 402 shall submit a drainage plan consistent with the Sacony Creek Watershed Stormwater Management Plan to Maxatawny Township for review. These criteria shall apply to the total proposed development even if development is to take place in stages.
- B. The Applicant is required to evaluate practicable alternatives to the surface discharge of stormwater, the creation of impervious surfaces and the degradation of waters of the Commonwealth, and must maintain as much as possible the natural hydrologic regime.
- C. The Drainage Plan must be designed consistent with the sequencing provisions of Section 304 to ensure maintenance of the natural hydrologic regime and to promote groundwater recharge and protect groundwater and surface water quality and quantity. The Drainage Plan designer must proceed sequentially in accordance with Article III of this Ordinance.
- D. The existing points of concentrated drainage that discharge onto adjacent property shall not be altered in any manner which could cause property damage without permission of the affected property owner(s) and shall be subject to any applicable discharge criteria specified in this Ordinance. Storm water runoff from a Development Site shall flow directly into a natural drainageway, watercourse, or into an existing storm sewer system, or onto adjacent properties in a manner similar to the runoff characteristics of the pre-development flow. Maximum use shall be made of the existing on-site natural and man-made storm water management facilities.
- E. 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 Drainage Discharge is proposed to be concentrated and discharged onto adjacent property, the Applicant must document that adequate downstream conveyance facilities exist to safely transport the concentrated discharge, or otherwise prove that no erosion, sedimentation, flooding or other impacts will result from the concentrated discharge and obtain discharge authorization from the affected downstream land owner(s).
- F. Where a Development Site is traversed by existing watercourses, drainage easements shall be provided conforming to the line of such watercourses. The terms of the easement shall conform to the Stream Buffer Requirements contained in Section 306.D of this Ordinance.
- 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 DEP through the Joint Permit Application process, or, where deemed appropriate by DEP, the General Permit process. When there is a question whether wetlands may be involved, it is the responsibility of the Applicant 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 DEP.

- H. Storm water management facilities which involve a State Highway shall be subject to the approval of the PennDOT. Any alteration that affects stormwater flow directly or indirectly toward a PennDOT facility shall be subject to PennDOT regulations.
- I. Minimization of impervious surfaces and infiltration of runoff through seepage beds, infiltration trenches, etc. are encouraged, where soil conditions permit, to reduce the size or eliminate the need for detention facilities or other structural BMP's.
- J. Roof drains shall not be connected to sanitary sewers. Wherever possible, roof drains should not be connected to storm sewers or roadside ditches. Roof drains must be disconnected from impervious surfaces in order to promote overland flow and infiltration/ percolation of stormwater where advantageous to do so. When site conditions preclude infiltration/percolation, then it shall be permitted on a case by case basis by Maxatawny Township.
- K. All stormwater runoff shall be treated for water quality.
- L. Storm water runoff shall not be transferred from one watershed to another unless they are sub-watersheds of a common watershed which join together within the perimeter of the Development Site, or the effect of the transfer does not alter the peak discharge (in conformance with the requirements of the Act 167 Plan) onto adjacent lands, or drainage easements from the affected landowners are provided. Transference of runoff to or from an EV/HQ watershed is prohibited unless otherwise authorized by DEP, Delaware River Basin Commission or Susquehanna River Basin Commission.
- M. At a minimum, the applicant shall prove to the satisfaction of the Township Engineer that during earthmoving, construction or after development, peak stormwater discharge rates will not exceed the pre-development release rate(s) when compared with those that occurred prior to any of these activities.
- N. Runoff from impervious areas shall be drained to pervious areas of the Development Site.
- O. All storm water management site plans shall be designed and certified by individuals registered in the Commonwealth of Pennsylvania and qualified to perform such duties based on education and training in hydrology and hydraulics.
- P. All storm water runoff flowing over the Development Site shall be considered in the design of the storm water management facilities.

Section 302. Permit Requirements by Other Government Entities

Permits must comply with any and all applicable local, county, state and federal regulations.

Section 303. Erosion and Sediment Control During Regulated Earth Disturbance Activities

- A. No Regulated Earth Disturbance Activities within Maxatawny Township shall commence until Maxatawny Township receives an approval from the Berks County Conservation District of an Erosion and Sediment Control Plan for construction activities.
- B. DEP has regulations that require an Erosion and Sediment Control Plan for any earth disturbance activity of 5,000 square feet or more, under 25 Pa. Code § 102.4(b).
- C. In addition, under 25 Pa. Code Chapter 92, a DEP “NPDES Construction Activities” permit is required for Regulated Earth Disturbance Activities.
- D. Evidence of the issuance of an NPDES Construction Permit (or permit coverage under the statewide General Permit (PAG-2) or any other necessary permit(s) for Regulated Earth Disturbance activities from the appropriate DEP regional office or the Berks County Conservation District must be provided to Maxatawny Township, prior to the Final Land Development Plan Approval.
- E. A copy of the Erosion and Sediment Control plan and any required permit, as required by DEP regulations, shall be available at the project site at all times.
- F. Additional erosion and sediment control design standards and criteria are recommended to be applied where infiltration BMP’s are proposed shall include the following:
 - 1. Areas proposed for infiltration BMP’s shall be protected from sedimentation and compaction during the construction phase to maintain maximum infiltration capacity.
 - 2. Infiltration BMP’s shall not be constructed nor receive runoff until the entire contributory drainage area to the infiltration BMP has achieved final stabilization.

Section 304. Nonstructural Project Design (Sequencing to Minimize Stormwater Impacts)

- A. For projects disturbing one (1) acre or more, the design of all Regulated Activities shall include evaluation of practicable alternatives to the surface discharge of stormwater, the creation of impervious surfaces, and the degradation of waters of the Commonwealth, and must maintain as much as possible the natural hydrologic regime of the site.
 - 1. An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology and logistics in light of overall project purposes, and other Maxatawny Township requirements.

2. All practicable alternatives to the discharge of stormwater are presumed to have less adverse impact on quantity and quality of waters of the Commonwealth unless otherwise demonstrated.

B. The Applicant shall demonstrate that they designed the Regulated Activities that disturb one (1) acre or more included consideration of the following issues:

1. Prepare an Existing Resource and Site Analysis Map (ERSAM), showing environmentally sensitive areas including, but not limited to, steep slopes, ponds, lakes, streams, wetlands, hydric soils, vernal pools, flood plains, stream buffer zones, hydrologic soil groups A and B (areas conducive to infiltration), special geologic features, any existing recharge areas and any other requirements outlined in the Maxatawny Township Subdivision and Land Development Regulations.
2. Establish appropriate buffers for each of the delineated environmentally sensitive areas per the Maxatawny Township Zoning Ordinance and see Section 306.D. for stream buffers and Sections 305.C and 305.K. for special geologic feature buffers.
3. Prepare a draft project layout avoiding sensitive areas identified in Section 304.B.1.
4. Identify site specific existing conditions drainage areas, discharge points, recharge areas and hydrologic soil groups A and B.
5. Evaluate Nonstructural Stormwater Management Alternatives (per Appendix E)
 - a. Minimize earth disturbance
 - b. Minimize impervious surfaces
 - c. Break up large impervious surfaces.
6. Satisfy groundwater infiltration objective (per Section 305) and provide for stormwater pretreatment prior to infiltration. Pretreatment may not be necessary for rooftop runoff which enters the infiltration facility directly from a roof leader.
7. Satisfy water quality (per Section 306) and streambank erosion protection objective (per Section 307).
8. Determine what Management District the Site falls into (per Appendix D) and conduct an existing conditions runoff analysis.
9. Prepare final project design to maintain existing conditions drainage areas and discharge points, to minimize earth disturbance and impervious surfaces, and to the maximum extent possible, to ensure the remaining site development has no surface or point discharge.
10. Conduct a post development runoff analysis based on the final design and to meet the release rate and in turn the overbank flow and extreme event requirements per Section 308.
11. Manage any remaining runoff through treatment prior to discharge, as part of detention, bioretention, direct discharge or other structural control.
12. Follow Article VIII regarding Prohibitions.

Section 305 Ground Water Recharge (Infiltration/Recharge/Bioretention)

Maximizing the ground water recharge capacity of the area being developed is required. Design of the infiltration 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 disturbed or impervious surface is created. It is recommended that roof runoff be directed to infiltration BMP's which can be over-designed to compensate for the infiltration losses due to parking areas. These measures are required to be consistent with Section 103, and take advantage of utilizing any existing recharge areas. Infiltration BMP's shall not be placed in or on a special geologic feature(s). Additionally, stormwater runoff shall not be discharged into existing on-site sinkholes.

Infiltration may not be feasible on every site due to site-specific limitations such as soil type. If it cannot be physically accomplished, due to seasonal high water table, soil permeability rate, soil depth or setback distances from special geologic features, then the design professional shall be responsible to show that this cannot be physically accomplished. If it can be physically accomplished, then the volume of runoff to be infiltrated shall be determined from Sections 305.A.3 depending on demonstrated site conditions and shall be the greater of the two volumes.

A. Infiltration BMP's shall meet the following minimum requirements:

1. Infiltration Requirements:

a. Regulated Activities will be required to infiltrate, where site conditions permit, a portion of the runoff created by the Development as part of an overall stormwater management plan designed for the Site. The volume of runoff to be infiltrated shall be determined from Sections 305.A.3.a. or 305.A.3.b, depending upon demonstrated site conditions.

2. Infiltration BMP's 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. A minimum depth of 24 inches between the bottom of the BMP and the limiting zone.

b. An infiltration and/or percolation rate at the bottom of the BMP sufficient to accept the additional stormwater load and drain completely as determined by field tests conducted by the Applicant's design professional and witnessed by Maxatawny Township or its designee.

c. The infiltration facility shall be capable of completely infiltrating the required retention (infiltration) volume within 4 days (96 hours).

d. Pretreatment shall be provided prior to infiltration.

3. The size of the infiltration facility shall be based upon the following volume criteria:
 - a. NRCS Curve Number equation.

The NRCS runoff equation shall be utilized to calculate infiltration requirements (I) in inches.

$$I \text{ (Infiltration requirement in inches)} = (200 / CN) - 2 \quad \text{Eqn: 305.1}$$

Where:

CN = SCS (NRCS) curve number of existing conditions contributing to the infiltration facility.

This equation is displayed graphically in, and the infiltration requirement can be determined from Figure 305.1.

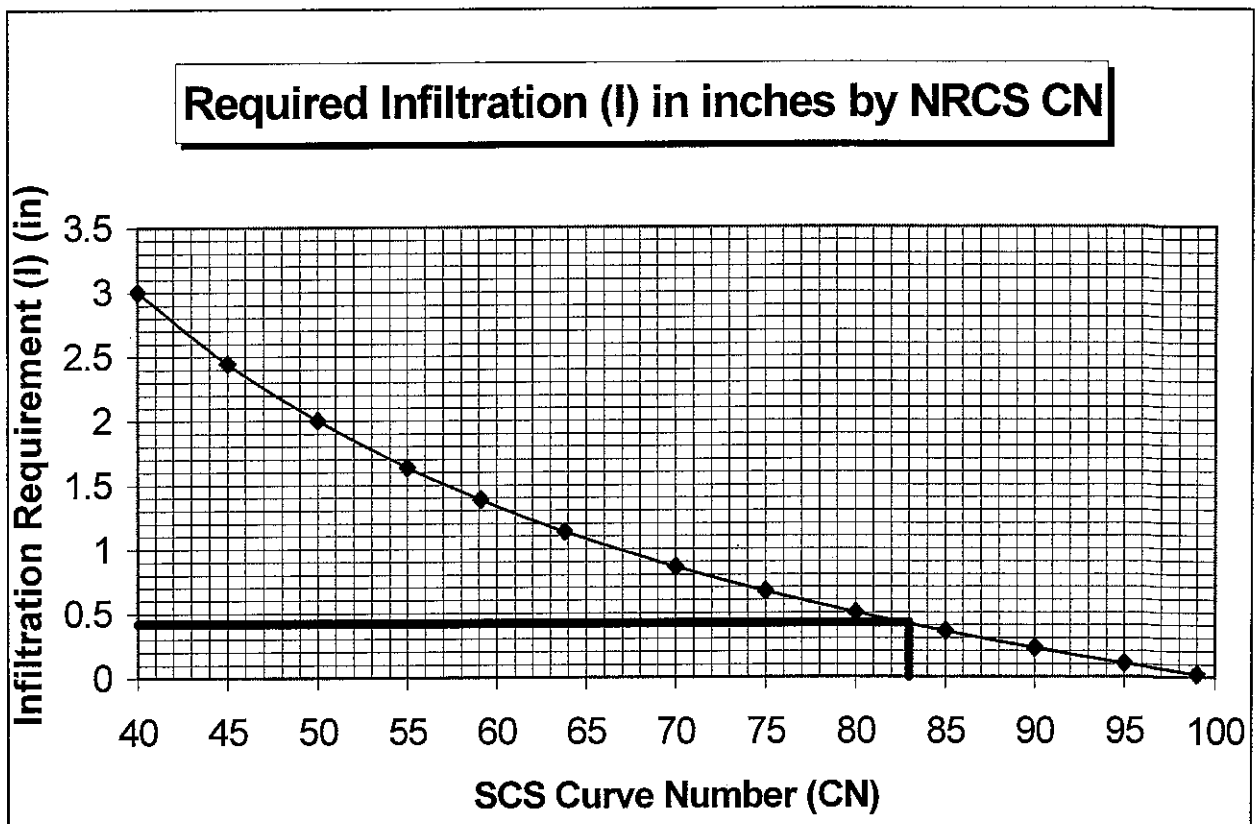


Figure 305.1. Infiltration requirement based upon NRCS Curve Number.

The retention (infiltration) volume (Re_v) required would therefore be computed as:

$$Re_v \text{ (Cubic Feet)} = I * \text{impervious area (square feet)} / (12 \text{ inches/ft}) \quad \text{Eqn: 305.2}$$

Where:

I = infiltration requirement (in inches)

b. Annual Recharge – Water Budget Approach.

It has been determined that infiltrating 0.42 inches of runoff from the impervious areas will aid in maintaining the hydrologic regime of the Watershed. If the goals of Sections 305.A.2.a cannot be achieved, then 0.42 inches of rainfall shall be infiltrated from all impervious areas, up to an existing site conditions curve number of 83. Above a curve number of 83, Equation 305.1 or the curve in Figure 305.1 should be used to determine the infiltration requirement.

The retention (infiltration) volume (Re_v) required would therefore be computed as:

$$Re_v (\text{Cubic Feet}) = (0.42 \text{ or } I, \text{ whichever is less}) * \text{impervious area (sq.ft.)} / (12 \text{ in/ft})$$

- B. Soils - A detailed soils evaluation of the project site shall be required where practicable to determine the suitability of recharge facilities. The evaluation shall be performed by a qualified design professional and witnessed by the Township Engineer, and at a minimum, address soil permeability, depth to bedrock and subgrade stability. The general process for designing the infiltration BMP shall be:
1. Analyze hydrologic soil groups as well as natural and man-made features within the site to determine general areas of suitability for infiltration practices. In areas where development on fill material is under consideration, conduct geotechnical investigations of sub-grade stability; infiltration is not permitted to be ruled out without conducting these tests.
 2. Provide field tests such as double ring infiltrometer or hydraulic conductivity tests (at the level of the proposed infiltration surface) and witnessed by the Township Engineer to determine the appropriate hydraulic conductivity rate. Percolation tests are not recommended for design purposes.
 3. Design the infiltration structure for the required retention (Re_v) volume based on field determined capacity at the level of the proposed infiltration surface.
 4. If on-lot infiltration structures are proposed by the Applicant's design professional, it must be demonstrated to Maxatawny Township that the soils are conducive to infiltrate on the lots identified.
- C. Carbonate Areas – The Applicant is required to investigate the ability of all areas on the site which are not underlain by carbonate rock to meet the infiltration requirements of Section 305.A. If this investigation proves infeasible, infiltration can occur on areas

underlain by carbonate rock by following the recommended procedure below in conjunction with Figure B-4 in Appendix B. *However, the Applicant is not required to use infiltration in carbonate areas even if the site falls into the "Recommended" range on Figure B-4 in Appendix B.* If infiltration is not proposed, the calculated infiltration volume (per Section 305.A) shall be treated by an acceptable BMP.

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. Soils used for the construction of basins shall have low-erodibility factors ("K" factors). Maxatawny Township may require the installation of an impermeable liner in detention basins.

Carbonate Geology - In areas of carbonate geology, a registered Professional Geologist shall certify the following:

1. No storm water facilities shall be placed in, over or immediately adjacent to the following features:
 - a. sinkholes
 - b. closed depressions
 - c. lineaments in carbonate areas
 - d. fracture traces
 - e. caverns
 - f. intermittent lakes
 - g. ephemeral streams
 - h. bedrock pinnacles (surface or subsurface)
2. Storm water management basins shall not be located closer than one hundred (100) feet from the rim of sinkholes or closed depressions, nor within one hundred (100) feet from disappearing streams; nor shall these basins be located closer than fifty (50) feet from lineaments or fracture traces; nor shall these basins be located closer than twenty-five (25) feet from surface or identified subsurface pinnacles.
3. Storm water resulting from regulated activities shall not be discharged into sinkholes.

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 engineer/surveyor/landscape architect/architect:

I, _____, certify that the proposed detention basin is/is not underlain by limestone.

Name: _____

Registration No.: _____

Infiltration BMP loading rate percentages in Figure B-4 in Appendix B shall be calculated as follows:

$$\left(\frac{\text{Area tributary to the infiltration BMP}}{\text{Base Area of the infiltration BMP}} \right) * 100\%$$

The area tributary to the infiltration BMP shall be weighted as follows:

Area Description	Weighting
All disturbed area to be made impervious	100%
All disturbed areas to be made pervious	50%
All undisturbed impervious areas	100%
All undisturbed pervious areas	0%

Soil thickness is to be measured from the bottom of any proposed infiltration BMP. The effective soil thickness in Figure B-4 in Appendix B is the measured soil thickness multiplied by the thickness factor based on soil permeability, as follows:

Permeability Range	Thickness Factor
6.0 to 12.0 inches/hr	0.8
2.0 to 6.0 inches / hr	1.0
1.0 to 2.0 inches/hr	1.4
0.75 to 1.0 inches/hr	1.2
0.5 to 0.75 inches/hr	1.0

The design of all Facilities over Karst shall include an evaluation of measures to minimize adverse effects.

- D. Stormwater Hotspots – Following is a list of examples of designated Hotspots. If a site is designated as a Hotspot, it has important implications for how stormwater is managed. First and foremost, untreated stormwater runoff from hotspots shall not be allowed to recharge into groundwater where it may contaminate water supplies. Therefore, the Rev requirement shall NOT applied to development sites that fit into the Hotspot category (the entire WQv must still be treated). Second, a greater level of stormwater treatment shall be considered at hotspot sites to prevent pollutant washoff after construction. EPA’s NPDES stormwater program requires some industrial sites to prepare and implement a Stormwater Pollution Prevention Plan.

Examples of Hotspots:

- Vehicle salvage yards and recycling facilities
- Vehicle fueling stations
- Vehicle service and maintenance facilities
- Vehicle and equipment cleaning facilities
- Fleet storage areas (bus, truck, etc.)
- Industrial sites (based on Standard Industrial Codes)
- Marinas (service and maintenance)

- Outdoor liquid container storage
- Outdoor loading/unloading facilities
- Public works storage areas
- Facilities that generate or store hazardous materials
- Commercial container nursery
- Other land uses and activities as designated by an appropriate review authority

The following land uses and activities are not normally considered hotspots:

- Residential streets and rural highways
- Residential development
- Institutional development
- Office developments
- Non-industrial rooftops
- Pervious areas, except golf courses and nurseries (which may need an Integrated Pest Management (IPM) Plan).

While large highways (average daily traffic volume (ADT) greater than 30,000 are not designated as a stormwater hotspot; it is important to ensure that highway stormwater management plans adequately protect groundwater.

- E. Caution shall be exercised where infiltration is proposed in Source Water Protection Areas as defined by Maxatawny Township or Maxatawny Township Municipal Authority.
- F. Infiltration facilities shall be used in conjunction with other innovative or traditional stormwater control facilities that are found within the PADEP State BMP Manual.
- G. Caution shall be exercised where salt or chloride would be a pollutant since soils do little to filter this pollutant and it may contaminate the groundwater. The Qualified Design Professional shall evaluate the possibility of groundwater contamination from the proposed infiltration facility and perform a hydrogeologic justification study if necessary. A hydrogeologic justification study would entail: Field reconnaissance, in which local geology, topographic features, local well characteristics, surface water flows, potential contamination, and nature of impermeable areas are determined. Data review of collected pertinent information such as geologic information, hydrologic data concerning both surface and groundwater, and geophysical data. With the collected data, a hydrologic model may be developed to determine the extent to which salt or chloride effects the groundwater.
- H. The infiltration requirement in High Quality or Exceptional Value waters shall be subject to the Department's Chapter 93 Antidegradation Regulations.
- I. Dependant upon certain land use's or Hotspots an impermeable liner will be required in detention basins where the possibility of groundwater contamination exists. A detailed hydrogeologic investigation may be required by Maxatawny Township.

- J. Maxatawny Township shall require the Applicant to provide safeguards against groundwater contamination for land uses that may cause groundwater contamination should there be a mishap or spill.
- K. For projects that disturb one (1) acre or more, unless otherwise specified in the Maxatawny Zoning Ordinance, the following setbacks for infiltration facilities shall apply:
- 100 feet from water supply wells
 - 10 feet downslope or 100 feet upslope from building foundations
 - 50 feet from septic system drainfields
 - 50 feet from a geologic contact with carbonate bedrock, unless a preliminary site investigation is done in the carbonate bedrock to show the absence of special geologic features within 50 feet of the proposed infiltration area;
 - 100 feet from the property line unless documentation is provided to show all setbacks from wells, foundations and drainfields on the neighboring property will be met.

Stricter Standards Shall Apply

Section 306. Water Quality Requirements

The Applicant shall comply with the following Water Quality Requirements of this Article.

- A. Developed areas shall provide adequate storage and treatment facilities necessary to capture and treat Stormwater Runoff. The retention volume computed under Section 305 may be a component of the water quality volume if the Applicant chooses to manage both components in a single facility. If the infiltration volume is less than the water quality volume, the remaining water quality volume may be captured and treated by methods other than recharge/infiltration BMP's. The required Water Quality Volume (WQv) is the storage capacity needed to capture and treat a portion of stormwater runoff from the developed areas of the site. To achieve this goal, the following criterion is established:

The following calculation formula is to be used to determine the Water Quality Storage Volume, (WQv), in acre-feet of storage for the Sacony Creek Watershed:

$WQv = [(P)(Rv)(A)]/12$	Eqn: 306.1
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Where:

WQv = Water Quality Volume (acre-feet)

P = 1 inch

A = Total contributing drainage area to the water quality BMP (acres)

Rv = 0.05 + 0.009(I) where I is the percent of the area that is impervious surface ((impervious area/A)*100)

This volume requirement can be accomplished by the permanent volume of a wet basin or the detained volume from other BMP's.

Release of water can begin 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 provide for protection from clogging and unwanted sedimentation.

- B. For areas within defined Special Protection subwatersheds, which include Exceptional Value (EV) and High Quality (HQ) waters and Cold Water Fishery (CWF), the temperature and quality of water and streams shall be maintained.
- C. To accomplish the above, the Applicant shall use innovative or traditional stormwater control facilities that are found within the DEP State BMP Manual. Maxatawny Township may consider alternative methods for meeting Water Quality Requirements of this Ordinance after consulting with the Department of Environmental Protection.
- D. If a perennial or intermittent stream passes through the site, the Applicant shall create a Stream Buffer Easement extending a minimum of fifty (50) feet to either side of the top-of-bank of the channel. The buffer easement area shall be maintained with appropriate native vegetation (Reference to Appendix F of Pennsylvania Handbook of Best Management Practices for Developing Area for plant lists). If the applicable rear or side yard setback is less than fifty (50) feet, the buffer easement width may be reduced to twenty-five (25) percent of the setback to a minimum of ten (10) feet. If an existing buffer easement is legally prescribed (i.e. deed, covenant, easement, etc.) and it exceeds the requirements of this Ordinance, the existing buffer easement shall be maintained. Maxatawny Township may select a flexible buffer easement width if desired, based upon proven hardship, but the selected buffer easement may not be less than ten (10) feet. This does not include lakes or wetlands.
- E. Evidence of any necessary permit(s) for Regulated Earth Disturbance Activities from the appropriate DEP regional office must be provided to Maxatawny Township. The issuance of an NPDES Construction Permit or permit coverage under the statewide General Permit (PAG-2) or the Berks County Conservation District must be provided to satisfy the requirements of subsection 306.A.

Section 307. Streambank Erosion Requirements

In addition to control of the Water Quality Volume, in order to minimize the impact of stormwater runoff on downstream streambank erosion, the primary requirement is to design a BMP to detain the post-development 2-year, 24-hour design storm to the existing conditions 1-year peak flow using the SCS Type II distribution. Additionally, provisions shall be made (such as adding a small orifice at the bottom of the outlet structure) so that the post-development 1-year storm takes at least 24 hours to drain from the facility from a point where the maximum volume of water from the 1-year storm is captured. (i.e., the maximum water surface elevation is achieved in the facility). Release of water can begin at the start of the storm (i.e., the invert of the water quality orifice is at the invert of the facility).

The minimum orifice size in the outlet structure to the BMP shall be a three (3) inch diameter orifice and a trash rack shall be installed to prevent clogging. On sites with small contributing drainage areas to this BMP that do not provide enough runoff volume to allow a 24 hour attenuation with the 3 inch orifice, the calculations shall be submitted showing this condition. Orifice sizes less than 3 inches can be utilized provided that the design will prevent clogging of the intake.

Section 308. Stormwater Management Districts

- A. The Sacony Creek Watershed has been divided into stormwater management districts as shown on the Management District Map in Appendix D.

In addition to the requirements specified in Table 308.1 below, the groundwater recharge (per Section 305), water quality (per Section 306), and streambank erosion control (per Section 307), requirements shall be implemented.

Standards for managing runoff from each Subarea in the Sacony Creek Watershed for the 2.33, 10, 25, 50 and 100-year design storms are shown in Table 308.1. Development sites located in each of the Districts must control post-development runoff rates to existing conditions runoff rates for the design storms in accord with Table 308.1.

TABLE 308.1 – Water Quantity Requirements

District	Proposed Conditions	(reduce to)	Existing Conditions	Equivalent Release Rate
A	2 - year		1 - year	-
	10 - year		10 - year	100%
	25 - year		25 - year	100 %
	50 - year		50 - year	100 %
	100 - year		100 - year	100%
B	2 - year		1 - year	-
	10 - year		2.33 - year	50 %
	50 - year		10 - year	50 %
	100 - year		100 - year	100%
C	2 - year		1 - year	-
	10 - year		2.33 - year	50%
	25 - year		25 - year	100 %
	50 - year		50 - year	100 %
	100 - year		100 - year	100%
D*	2 - year		1 - year	100%
	5 - year		5 - year	100%
	10 - year		10 - year	100%
	25 - year		25 - year	100%
	50 - year		50 - year	100%
	100 - year		100 - year	100%
E*	2 - year		1 - year	100%
	5 - year		5 - year	100%
	10 - year		10 - year	100%
	25 - year		25 - year	100%
	50 - year		50 - year	100%
	100 - year		100 - year	100%

*The minimum performance standard for development sites in Districts D & E is that stormwater management controls must be provided to limit the post-development peak rate of stormwater runoff to a rate that is equal to or less than the existing peak rate of stormwater runoff. This minimum performance criteria was set through a policy directive of the Pennsylvania Department of Environmental Protection. However, in the previous development of the Act 167 Plan, this district was originally established as a conditional no-detention district such that development sites which could discharge directly to the main channel of the Sacony Creek and its major tributaries, or indirectly to the main channel through an existing stormwater drainage system (i.e., storm sewer or open channel) could do so without control of the post-development peak rate of runoff. This conditional no-detention district is no longer allowed in this Plan.

All areas, regardless of the release rate, must still meet the requirements of the groundwater recharge criteria (per Section 305), water quality criteria (per Section 306), and streambank erosion criteria (per Section 307).

- B. General - Post-development rates of runoff from any regulated activity shall not exceed the peak release rates of runoff prior to development for the design storms specified on the Stormwater Management District Watershed Map (per Appendix D) and Section 308, of this Ordinance.
- C. District Boundaries - The boundaries of the Stormwater Management Districts are shown on an official map that is available for inspection at the Maxatawny Township office. A copy of the official map at a reduced scale is included in Appendix D. The exact location of the Stormwater Management District boundaries as they apply to a given development site shall be determined by mapping the boundaries using the two-foot topographic contours (or most accurate data required) provided as part of the Drainage Plan.
- D. Sites Located in More Than One District - For a Proposed Development Site located within two or more stormwater management district category subareas, the peak discharge rate from any subarea shall meet the Management District Criteria for which the discharge is located, as indicated in Section 308. The calculated peak discharges shall apply regardless of whether the grading plan changes the drainage area by subarea. An exception to the above may be granted if discharges from multiple subareas recombine in proximity to the discharge site. In this case, peak discharge in any direction shall follow Management District A criteria provided that the overall site discharge meets the Management District Criteria for which the discharge is located.
- E. Off-Site Areas - Off-site areas that drain through a Proposed Development Site are not subject to release rate criteria when determining allowable peak runoff rates. However, on-site drainage facilities shall be designed to safely convey off-site flows through the development site.
- F. Site Areas - Where the site area to be impacted by a proposed development activity differs significantly from the total site area, only the proposed impact area utilizing stormwater management measures shall be subject to the Management District Criteria. In other words, unimpacted areas bypassing the Stormwater Management Facilities would not be subject to the Management District Criteria.

Section 309. Calculation Methodology

- A. Stormwater runoff from all Development Sites with a drainage area of greater than 200 acres shall be calculated using a generally accepted calculation technique that is based on the NRCS soil cover complex method. Table 309-1 summarizes acceptable computation methods and the method selected by the design professional shall be based on the individual limitations and suitability of each method for a particular site. Maxatawny Township may allow the use of the Rational Method to estimate peak discharges from drainage areas that contain less than 200 acres. The Soil Complex Method shall be used for drainage areas greater than 200 acres.

**TABLE 309-1
Acceptable Computation Methodologies For
Stormwater Management Plans**

<u>METHOD</u>	<u>METHOD DEVELOPED BY</u>	<u>APPLICABILITY</u>
TR-20 (or commercial computer package based on TR-20)	USDA NRCS	Applicable where use of full hydrology computer model is desirable or necessary.
TR-55 (or commercial computer package based on TR-55)	USDA NRCS	Applicable for land development plans within limitations described in TR-55.
HEC-1 / HEC-HMS	US Army Corps of Engineers	Applicable where use of full hydrologic computer model is desirable or necessary.
PSRM	Penn State University	Applicable where use of a hydrologic computer model is desirable or necessary; simpler than TR-20 or HEC-1.
Rational Method or commercial computer package based on Rational Method)	Emil Kuichling(1889)	For sites less than 200 acres and with time of concentration less than 60 minutes (tc < 60 min), or as approved by Maxatawny Township
Other Methods	Varies	Other computation methodologies approved by Maxatawny Township.

*** Note: Successors to the above methods are also acceptable. These successors include WINNTR55 for TR55 and WINTR20 for TR20 and SWMM.**

- B. All calculations consistent with this Ordinance using the Soil Cover Complex Method shall use the appropriate design rainfall depths for the various return period storms according to the region in which they are located as presented in Table B-1 in Appendix B of this Ordinance. If a hydrologic computer model such as PSRM or HEC-1 / HEC-HMS is used for stormwater runoff calculations, then the duration of rainfall shall be 24 hours. The Alternating Block Method shown in Figure B-1, Appendix B of this Ordinance shall be used for the rainfall distribution.
- C. For the purposes of existing conditions flow rate determination, undeveloped land shall be considered as "meadow" in good condition, unless the natural ground cover generates a lower curve number or Rational 'C' value (i.e., forest), as listed in Table B-2 or B-3 in Appendix B of this Ordinance.
- 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) (Figures B-2 to B-3) and NOAA Atlas 14. 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. NRCS lag equation divided by 0.6 as acceptable method for Tc in undeveloped areas.

- 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 B-2 in Appendix B of this Ordinance.
- F. Runoff coefficients (c) for both existing and proposed conditions for use in the Rational method shall be obtained from Table B-3 in Appendix B 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 B-4 in Appendix B of the Ordinance. Full flow shall be assumed for closed conduits.
- H. Outlet structures for stormwater management facilities shall be designed to meet the performance standards of this Ordinance using any generally accepted hydraulic analysis technique or method.
- I. The design of any Stormwater Detention Facilities intended to meet the performance standards of this Ordinance shall be verified by routing the design storm hydrograph through these facilities using the Storage-Indication Method. For drainage areas greater than 200 acres in size, the design storm hydrograph shall be computed using a calculation method that produces a full hydrograph (i.e. TR-20, TR-55, HEC-1, PSRM). Maxatawny Township may approve the use of any generally accepted full hydrograph approximation technique that shall use a total runoff volume that is consistent with the volume from a method that produces a full hydrograph.

Section 310. Design of Basins (Detention and Retention)

Standards for detention/retention basins shall meet requirements listed in this Section.

A. General Requirements

- 1. Where retention (permanent pool) and detention (dry bottom) basins are utilized, adequate assurances of maintenance, indemnification, liability insurance, and security shall be provided and approved by the Township.
- 2. Retention and detention facilities shall be designed and located so as to not present a hazard to the public health or safety. Their design shall be approved by the Township.
- 3. Such facilities shall be designed so that no adverse effects will result from backwater flooding.

B. General Design Considerations

- 1. The required volume for stormwater detention or retention shall be calculated to reduce the increased rate of runoff caused by development of the property as established by this Ordinance.
- 2. The number and location of detention facilities are subject to the approval of the Township.

3. The detention facilities shall be designed to retard stormwater runoff rates after development to the required peak pre-development runoff rate.
4. All land within the subdivision which are fields shall be considered as pasture with good ground cover.
5. The design of all stormwater management facilities shall incorporate sound engineering principles and practices. Maxatawny Township 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.

C. Specific Design Considerations

1. Detention basins shall meet the following requirements to minimize the negative visual impact and to prevent hazard to public health and safety:
 - a. All stormwater detention facilities shall provide a minimum 1.0 foot freeboard above the maximum pool elevation associated with the 2-through 50-year runoff events. A 0.5 foot freeboard shall be provided above the maximum pool elevation of the 100-year runoff event. The freeboard shall be measured from the maximum pool elevation to the invert of the emergency spillway. The 2-through 100-year storm events shall be controlled by the primary outlet structure. An emergency spillway for each basin shall be designed to pass the 100-year return frequency storm peak basin inflow rate with a minimum 0.5 foot freeboard measured to the top of basin. The freeboard criteria shall be met considering any off site areas tributary to the basin as developed, as applicable. If this detention facility is considered to be a dam as per DEP Chapter 105, the design of the facility must be consistent with the Chapter 105 regulations, and may be required to pass a storm greater than the 100-year event.
 - b. The minimum circular orifice diameter for controlling discharge rates from detention facilities shall be three (3) inches. Designs where a lesser size orifice would be required to fully meet release rates shall be acceptable provided that as much of the site runoff as practical is directed to the detention facilities.
2. The following slope requirements shall also apply to basins:
 - a. Exterior slopes of compacted soil shall not be steeper than one (1) foot vertical for three (3) feet horizontal, and may be further made flatter if the soil has unstable characteristics.

- b. Interior slopes of the basin shall not be steeper than one (1) foot vertical in three (3) feet horizontal except with approval of Maxatawny Township.
- c. Where concrete, stone or brick walls are used with side slopes proposed to be steeper than one (1) foot vertical in three (3) feet horizontal, the basin shall be fenced by a permanent fence forty-two (42) inches in height and a ramp of durable, non-slip materials for maintenance vehicles shall be provided for access into the basin.
- d. A water surface limit shall be no closer than 100 feet to any residential building and no closer than 25 feet to any other type of building.
- e. Energy dissipaters and/or level spreaders shall be installed at points where pipes or drainage ways discharge from basins. Multiple outlet structures and multiple outlet piping from the basin may be required by Maxatawny Township to reduce the impact of point discharges
- f. A four-foot (4') high chain link fence may be required to fully surround the detention basins. The fence may also be landscaped screened as determined by the Township.
- g. If percolation of runoff is considered as a method of runoff abatement, percolation tests shall be taken at the site and depth of proposed detention facilities and witnessed by the Township. The results submitted to the Township for review in accordance with the provisions of this Ordinance.
- h. The height of berm shall not exceed fifteen feet (15'), unless approved by the Township.
- i. The minimum top width of berms up to fifteen feet (15') in height shall be equal to three-fourths of the dam height, but in no case shall the top width be less than eight feet (8').
- j. A key trench shall be provided under all berms. The key trench shall be at least two feet (2') deep, or extend down to stable subgrade, whichever is deeper. Minimum bottom widths for the cutoff trench and key trench shall be four feet (4'). Maximum side slopes for key trenches shall be one (1) horizontal to one (1) vertical. A compacted impervious core at least three feet (3') wide at the top, having a maximum side slope of one (1) horizontal to one (1) vertical, shall extend for the full length of the embankment, and the top

elevation shall be set at the twenty-five year design water surface elevation.

- k. All pipes and culverts through berms shall have properly designed and spaced concrete anti-seep collars.
- l. The top of berm shall be constructed at least six inches (6") above the design elevations to allow for settlement of the embankment.
- m. Emergency spillways shall be constructed in undisturbed earth wherever possible. When constructed in fill, sod, precast concrete paving blocks, concrete or permanent erosion control matting shall be used. Design calculations shall be submitted indicating that the specified material can withstand velocities based on the 100 year design storm event. When using sod, it shall be applied along the inside slope above the 25-year water surface elevation, along the face and sides of the spillway and down the outside slope to existing grade. Emergency spillways shall be designed to safely convey the one hundred (100) year basin inflow hydrograph through the basin assuming the principal outlet is completely blocked and the basin water surface elevation is equal to the spillway invert elevation.
- n. Basin inlet and outlet structures should be located at maximum distances from one another. Maxatawny Township may require a rock filter berm or rock-filled gabions between inlet and outlet areas when the distance is deemed insufficient for sediment trappings.
- o. Stormwater runoff shall discharge to a suitable natural drainage course or storm sewer system. Where not possible or not permitted, level spreading devices or other suitable facilities (i.e., swale) shall be designed with sufficient capacity to convey the 100-year storm event without creating any safety, flooding, or property hazard. Securing of necessary drainage easements for this purpose shall be the sole responsibility of the developer.
- p. Maxatawny Township may require soil samples from the site to be analyzed to determine if these soils are suitable for berm embankment construction. If in the opinion of Maxatawny Township, the soils are found to be unsuitable, the developer shall import suitable soils for constructing the basin.
- q. All wet basin designs shall incorporate biologic minimization controls consistent with the West Nile Guidance found in Appendix G.

- r. No Stormwater Detention Facility shall be placed within fifty (50) feet of a special geologic feature. No Stormwater Subsurface Conveyance Facility shall be constructed within fifty (50) feet of a special geologic feature, unless it is constructed of durable pipe utilizing watertight joints.

Section 311. Design of Storm Sewers

- A. Storm sewers, culverts, endwalls, inlets and related installations and improvements shall be provided in order to:
 - 1. Permit unimpeded flow of natural water courses;
 - 2. Ensure adequate drainage of all streets including all low points;
 - 3. Intercept storm water runoff along streets at intervals related to the extent and grade of the area drained;
 - 4. Provide positive drainage away from on-site sewage disposal facilities and buildings;
 - 5. Accommodate runoff so that there shall be no increase in rate of storm water peak discharge leaving the subdivision or land development during or after construction based on the required release rates established in this Ordinance;
 - 6. Ensure adequate drainage at intersections of driveways with streets;
 - 7. Provide that where existing storm sewers are reasonably accessible and of adequate capacity, subdivisions and land developments shall connect to the existing storm sewers;
 - 8. Provide that when no existing storm sewer is accessible and of adequate capacity, storm water shall discharge to an existing watercourse with defined bed and barriers. Runoff shall not be increased or concentrated onto adjacent properties, nor the velocity of flow increased beyond that existing prior to subdivision or land development unless written approval is given by the adjacent property owners for the proposed discharge of surface runoff and the written agreements are approved by the Township;
 - 9. Provide that when storm drainage will be directed into an adjacent municipality, all provisions for accommodating such storm drainage shall be submitted to the governing body of that municipality for review.

B. General Design of Storm Drainage Systems

1. Complete storm water calculations shall be prepared in accordance with the design standards and Appendices of this Ordinance. All designs for drainage facilities shall be submitted to the Township for review and approval.
2. Where a subdivision or land development is traversed by or contains a pond, lake, watercourse, drainage way, channel, storm drainage system, or stream, a drainage easement shall be provided. The minimum easement width shall be ten feet (10') from each side of the watercourse, waterbody, stream, pond, lake or drainage facility, but the Township may require a greater easement when necessary. When required by the Township, bearings and distances shall be provided to define the boundaries of the easements.
3. The design of all drainage facilities shall incorporate sound engineering principles and practices. Maxatawny Township 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.
4. All drainage facilities shall be designed to adequately handle surface runoff and carry it to suitable outlets and shall be designed in accordance with the minimum design standards established by this Ordinance.
5. Storm sewers, culverts, swales, channels, and related facilities shall be designed to accommodate and discharge all runoff from adjacent upstream drainage areas, assuming the upstream area is fully developed.
6. No stormwater runoff or natural drainage water shall be so diverted as to overload existing drainage systems, or create flooding or the need for additional drainage structures on other private properties or public lands, without proper and approved provisions being made for taking care of these conditions.

C. Specific Design of Drainage Systems

1. All streets shall be designed to provide for the discharge of surface water from their rights-of-way.
2. Storm sewer sizes shall be determined based upon the following design storm frequencies: Twenty-five (25) years in all subdivisions or land developments, unless otherwise specified by Maxatawny Township. The design of storm sewer systems within the drainage area of detention or retention facilities must be analyzed for adequacy during the 100-year storm, including the effects of the control facility tailwater. This may require a hydraulic grade line analysis. When approved by Maxatawny Township, overflow swales may be

provided at low points in streets to safely convey the full one hundred (100) year peak flow to the control facility, in lieu of providing the full capacity in the storm sewer.

3. The pavement cross slope on streets shall not be less than one-quarter inch (1/4") per foot and not more than one-half inch (1/2") per foot. The slope of the shoulder areas shall not be less than three-quarter inch (3/4") per foot and not more than one inch (1") per foot.
4. Storm sewer design shall be based upon PennDOT design methods. Inlet efficiency and bypass flow shall be determined for all inlets, and the gutter flow spread shall not exceed one-half (1/2) the travel lane width or to a maximum of eight (8) feet where parking is permitted. Maxatawny Township may require that a hydraulic grade line analysis be performed on storm sewer systems.
5. Surface cross drainage at intersections or other roadway sections will not be permitted.

D. Specific Design of Stormwater Collection Systems

The collection system shall be designed by the Rational Method of Design using the formula $Q = CiA$, unless otherwise approved by the Township.

The collection system shall be designed and installed in accordance with the design standards and requirements set forth in this Ordinance, the Township, the Township Engineer and as follows:

1. Curves in pipes or box culverts without an inlet or manhole are prohibited. Tee joints, elbows and wyes are also prohibited. Subsurface drainage systems shall have accessible manholes spaced at intervals not exceeding 400 feet and shall be located wherever branches are connected or sizes are changed and wherever there is a change in alignment or grade. Inlets or other means of interconnection may be used instead of manholes when approved by the Township, or as required for curbed streets.
2. On curbed streets, inlets shall be placed at points of abrupt changes in the horizontal or vertical directions of storm sewers, at curb tangents on uphill side of street intersections, at maximum distances as specified in accordance with the required pipe size, and to limit gutter flow as required. The Manning Equation shall be used to calculate the capacities of gutters. Pennsylvania Department of Transportation inlets should be used in accordance with the design procedures outlined in PennDOT Design Manual, Part 2. Manholes may be substituted for inlets at locations where inlets are not required to handle surface runoff.
3. Inlets shall be designed and located to prevent hazards to vehicles, bicycles, and pedestrians.

4. Storm sewer lines, within street rights-of-way, shall be located between the centerline of the street and the curb line and shall parallel the centerline of the street as far as practical. Locating storm sewers under curbs in curves or at street intersections will not be permitted.
5. Drainage structures that are to be located within State Highway rights-of-way shall be approved by the Pennsylvania Department of Transportation, and a letter from that Department indicating such approval shall be submitted to the Township.
6. Storm sewers shall have a minimum diameter of eighteen inches (18"). All storm sewer pipe and culverts shall be laid to a minimum depth of cover of one (1) foot from finished grade to the top of pipe.
7. Storm drains shall be designed to produce a minimum velocity of 3.0 feet per second when flowing full and shall not be designed or installed at less than a three quarter percent (0.75%) slope.
8. Reinforced concrete pipe shall be used for all storm sewer lines, including retention/detention facilities. Smooth-lined High Density Polyethylene Pipe with watertight joints may be used if approved by the Township. All pipe materials shall meet PennDOT requirements.
9. PennDOT approved endwalls or end sections shall be used in lieu of inlets where feasible to minimize clogging of grates with leaves, debris, etc.
10. Headwalls shall be used where storm runoff enters the storm sewer horizontally from a natural or man-made channel. The capacity of such storm sewers shall be evaluated using both Manning Equation and Inlet/Outlet Control procedures. The lower flow derived from these two procedures shall be the design capacity of the storm sewer.
11. Flow velocities from any storm sewer may not result in erosion of the receiving channel. Energy dissipators shall be placed at the outlets of all storm sewer pipes, culverts, and bridges where flow velocities exceed maximum permitted channel velocities. Provisions shall be made to minimize erosion within watercourses and at points of discharge from storm drainage facilities through the use of proper ground cover. Any riprap swale area shall be constructed with mixed stone sizes in accordance with PennDOT criteria for riprap and shall be lined with PennDOT approved geotextile fabric.
12. Stormwater roof drains and pipes shall not discharge water over a sidewalk, driveway or paved area.

13. Discharge structures shall be designed to minimize the impact of development on downstream properties. Flow retarding and dissipating facilities are required to meet this goal. Such structures shall be no closer than 20 feet to downstream, off-site properties or drainage easement boundaries.
14. Open pipe ends must be fitted with concrete endwalls or wing walls.
15. Trash racks shall be placed on all stormwater entrance structures.
16. All storm sewers shall be constructed per PennDOT specifications as outlined in Publication 408, Design Manual, Part 2, and the Highway Design and Standards for Roadway Construction, RC-Series unless otherwise dictated by Maxatawny Township.
17. Precast inlet tops and boxes shall meet the requirements of PennDOT Publication 408. PennDOT type "C" precast concrete Inlet tops are to be provided with "Dump No Waste - Drains To Waterway" plate with trout logo to be approved by the Township. All other PennDOT inlets are to be provided with either a painted stenciled logo on the roadway or another acceptable marking approved by Maxatawny Township.
18. The words "Dump No Waste - Drains To Waterway" in one and one-quarter (1-1/4") inch raised letters with bass logo shall be cast or stamped into the storm sewer manhole cover.
19. Manhole covers shall have the word "STORM" cast in two (2) inch high letters on the top of the cover.
20. Culverts shall be evaluated for inlet and outlet control restrictions.
21. At street intersections, every attempt should be made to place inlets in the tangent and not in the curved portion of the curbing.
22. Manning "n" values used for design of pipes and culverts shall be in accordance with Appendix B.
23. All storm sewers within the streets shall not be placed under the curbs or sidewalks.
24. Storm facilities not located within a public right-of-way shall be contained in and centered within a 20 feet wide easement.

E. Installation of Stormwater Collection Systems

1. Prior to laying the pipe in the trench, a bedding of Class B Fine Aggregate shall be placed on the trench bottom in accordance with PennDOT Publication 408. This material shall be a minimum of

four inches (4") in depth and thoroughly compacted with approved mechanical tampers. The bedding shall be graded by hand to provide a uniform and continuous bearing support for the pipe throughout its entire length.

F. Backfill of Stormwater Collection Systems

After proper installation of the pipe, backfilling may be performed. All backfill shall be thoroughly compacted at a minimum six (6) inch lifts through the use of approved mechanical tampers. All backfill material is subject to Township approval. Trenches within street rights-of-way shall be backfilled for the entire width and depth with PennDOT Type 2A coarse aggregate, in accordance with PennDOT Publication 408. Trenches outside street rights-of-way may be backfilled with ordinary backfill material consisting of clean dry earth or granular material.

G. Roof Drains

1. Storm water roof drains, sump pumps, and pipes, shall not directly discharge water into a street right-of-way or discharge into a sanitary sewer or storm sewer.
2. Proposed roof drains and collector locations shall be shown on the storm drainage plans.

Section 312. Design of Culverts and Bridges

Standards for culverts and bridges shall meet requirements listed in this Section.

1. Driveway bridges and culverts shall have ample waterway to carry the design flows, based on a minimum storm frequency of twenty-five (25) years, unless a larger design flow is required by PADEP. One hundred (100) year water depths shall not exceed six (6) inches above the roadway centerline elevation. Driveway bridge and/or culvert construction shall be in accordance with the PennDOT specifications and shall meet the requirements of the PADEP. The appropriate permits and approvals must be acquired by the applicant prior to final plan approval.
2. Culverts under roadways shall be provided with wing walls and constructed for the full width of the right-of-way. Easements shall be provided for maintenance.
3. Culverts not in roadways shall be provided with wing walls and extra wide easements shall be provided for access and maintenance.

4. If Maxatawny Township determines that the character of the road is expected to change for future planning, the cartway of the bridge shall be made to anticipate this condition. On each side of the bridge cartway, the bridge railing must be set back from the edge of the final cartway and this area may be used to place sidewalks, bike trails, etc. Easements shall be provided for maintenance.
5. Any facilities that constitute water obstructions (e.g., culverts, bridges, outfalls, or stream enclosures), water encroachments, and any work involving wetlands governed by DEP Chapter 105 Regulations (as amended or replaced from time to time by DEP), are subject to DEP Chapter 105 Regulations. Roadway crossings located within designated floodplain areas must be able to convey runoff from the 100-year design storm with a minimum 1.0 foot of freeboard measured below the lowest point along the top of the roadway. Any facility that constitutes a dam as defined in DEP Chapter 105 Regulations may require a permit under dam safety regulations.
6. Any drainage conveyance facility and/or channel that doesn't fall under DEP Chapter 105 Regulations, must be able to convey, without damage to the drainage structure or roadway, runoff, from the 100-year design storm. Conveyance Facilities to or exiting from Storm Water Management Facilities (e.g. detention basins) shall be designed to convey the design flow to or from that structure.

ARTICLE IV-DRAINAGE PLAN REQUIREMENTS

Section 401. General Requirements

For any of the Regulated Activities governed by this Ordinance, the preliminary or final approval of subdivision and/or land development plans, the issuance of any building or occupancy permit, or the commencement of any Earth Disturbance Activity may not proceed until the Property Owner or Applicant or his/her agent has submitted an application per Appendix C-1, fee and plan for review and has received written approval of a Drainage Plan from Maxatawny Township unless the project qualifies for an exemption ion Section 402 from the requirements to submit a Drainage Plan.

Section 402. Exemptions

A. General Exemptions

The following Regulated Activities are exempt from the Drainage Plan Submission requirements of this ordinance.

1. Use of land for gardening for home consumption.
2. Agricultural plowing and tilling are exempt from the rate control and SWM site plan preparation requirements of this ordinance provided the activities are performed according to the requirements of 25 PA Code, Chapter 102.
3. Forest Management and timber operations are exempt from the rate control and SWM site plan preparation requirements of this ordinance provided the activities are performed according to the requirements of 25 PA Code, Chapter 102.
4. Municipal road maintenance on existing roads.
5. Existing public road maintenance authorized by Maxatawny Township Board of Supervisors.
6. Prior Drainage Plan Approval – Any regulated activity for which a drainage plan was previously prepared as part of a subdivision or land development proposal that received preliminary plan approval from Maxatawny Township prior to the effective date of this Ordinance is exempt from the drainage plan preparation provisions of this Ordinance provided that the approved drainage plan included design of storm water facilities consistent with ordinance provisions in effect at the time of approval, provided that said drainage plan is constructed and approved by the Township within five (5) years from the effective date of this Ordinance. If significant revisions are made to the drainage plan after both the preliminary plan approval and the effective date of the Ordinance, preparation of a new drainage plan, subject to the provisions of this Ordinance shall be required.

B. Stormwater Quantity Control Exemption

Any Regulated Activity that meets the impervious area exemption criteria in Table 402-1 shall not be required to implement the stormwater quantity controls, specified in Section 308 of this Ordinance. These criteria shall apply to the total development even if development is to take place in phases. The date of the original 1998 Maxatawny Township 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 areas existing on the "parent tract" prior to adoption of this Ordinance shall not be considered in cumulative impervious area calculations for exemption purposes.

TABLE 402-1
Impervious Area Exemption Criteria

Total Parcel Size	Minimum Distance * (feet)	Impervious Area Exemption (sq.ft.)
≤ 1/4 acre	0	2,500 sq. ft.
>1/4 to 1 acre	0	5,000 sq. ft.
>1 acre	100	10,000 sq. ft.

* Note : The minimum distance between the proposed impervious area and / or stormwater controls / structures discharge point to the downstream property line.

Any exemption must first be approved by the Maxatawny Township Engineer. Drainage plans in accordance with Sections 403 A.2, 403 B.7, 8, 11, 15, and 22 and 403.D.2. must still be submitted. Submissions for projects that utilize the exemption under section 402.B shall reference Ordinance Appendix I to meet the requirements of groundwater recharge (per Section 305), water quality (per Section 306), and streambank erosion (per Section 307) controls of this Ordinance.

C. Additional Exemption Requirements:

1. Exemption does not relieve the Applicant from the responsibility to secure required permits or approvals for activities regulated by any other applicable state or local code, rule, act, or ordinance. Nor does exemption relieve the Applicant from meeting the water quality requirements of this Ordinance.
2. Exemption responsibilities – An exemption shall not relieve the Applicant from implementing such measures as are necessary to protect the public health, safety, and property. An exemption shall not relieve the Applicant from providing adequate Stormwater Management for Regulated Activities to meet the purpose of this Ordinance.
3. HQ and EV streams - This exemption shall not relieve the Applicant from meeting the special requirements for watersheds draining to High Quality (HQ) or Exceptional Value (EV) waters, and identified and Source Water Protection Areas (SWPA) and requirements for nonstructural project design sequencing (per Section 304), groundwater recharge (per Section 305), water quality (per Section 306), and streambank erosion (per Section 307). The volume and rate of the net increase in stormwater runoff from Regulated Activities must be managed to prevent the physical degradation of receiving

waters from such effects as scour and streambank destabilization, to satisfy State Water Quality Requirements;

All regulated activities occurring in drainage areas tributary to waters designated HQ/EV pursuant to 25 PA Code, Chapter 93, shall not change any biological, chemical, or physical characteristics, including volume, rate, velocity, course, current, cross section, or temperature of the waters, unless the activity is specifically permitted in accordance with the environmental laws of the Commonwealth.

4. Drainage Problems - If a drainage problem is documented or known to exist downstream of, or expected from the proposed activity, then Maxatawny Township may require a Drainage Plan submittal.

Section 403. Drainage Plan Contents

The Drainage Plan shall consist of a general description of the project including sequencing items described in Section 304, calculations, maps and plans. A note on the maps shall refer to the associated computations and erosion and sediment control plan by title and date. The cover sheet of the computations and erosion and sediment control plan shall refer to the associated maps by title and date. All Drainage Plan materials shall be submitted to Maxatawny Township in a format that is clear, concise, legible, neat, and well organized; otherwise, the Drainage Plan shall not be accepted for review and shall be returned to the Applicant. A Drainage Plan shall not be considered a land development plan/official plan submission as regulated by MPC Section 508 unless said Drainage Plan is submitted in conjunction with an administratively complete Preliminary or Final Plan as set forth by the Maxatawny Township Subdivision and Land Development Regulations.

The following items shall be included in the Drainage Plan:

A. General

1. General description of the project including those areas described in Section 304.
2. General description of permanent stormwater management techniques, including construction specifications of the materials to be used for stormwater management facilities.
3. Complete hydrologic, hydraulic, and structural computations for all stormwater management facilities.
4. An Erosion and Sediment Control Plan, including all reviews and approvals by the Conservation District.
5. A general description of nonpoint source pollution controls.
6. Regulated activities that create disconnected Impervious Areas smaller than Section 402.B are exempt from the Peak Rate Control and the SWM Drainage Plan preparation requirements of this ordinance.

B. Maps

Map(s) of the project area shall be submitted on 24-inch x 36-inch sheets and/or shall be prepared in a form that meets the requirements for recording at the offices of the Recorder of Deeds of Berks County. If the Maxatawny Township SALDO has more stringent criteria, then the more stringent criteria shall apply. 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 of two feet. In areas of steep slopes (greater than 15 percent), five-foot contour intervals may be used. Offsite drainage areas impacting the project including topographic detail.
3. Existing streams, lakes, ponds or other Waters of the Commonwealth within the project area.
4. Other physical features including flood hazard boundaries, stream buffers, existing drainage courses, swales, wetlands, closed depressions, sinkholes, 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 fifty (50) feet of property lines.
6. An overlay showing soil names and boundaries.
7. Limits of earth disturbance, 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 of 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. Location, horizontal and vertical profiles of all bridges, culverts, storm water pipe and open channels.
18. Overland drainage patterns and swales.
19. A fifteen foot wide access easement with bearings and distances around all stormwater management facilities that would provide ingress to and egress from a public right-of-way.
20. The location of all erosion and sediment control facilities.
21. A note on the plan indicating the location and responsibility for maintenance of stormwater management facilities that would be located on and/or off-site. All on and/or off-site facilities shall meet the performance standards and design criteria specified in this Ordinance.
22. A statement, signed by the landowner, acknowledging that the storm water management system is to be a permanent fixture that can be altered or removed only after approval of a revised plan by Maxatawny Township and any revision to the approved Drainage Plan must be approved by Maxatawny Township and the Berks County Conservation District.
23. The following signature block for the Design Engineer:

"I, (Design Engineer), on this date (date of signature), hereby certify that the Drainage Plan meets all design standards and criteria of the Sacony Creek Watershed Act 167 Stormwater Management Ordinance."
24. All other data required by the Maxatawny Township Subdivisions and Land Development Ordinance.

C. Supplemental Information

1. A written description of the following information shall be submitted.
 - a. The overall stormwater management concept for the project designed in accordance with Section 304.
 - 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. Development stages (project phases) if so proposed.
 - f. An operation and maintenance plan in accordance with Section 403.E of this Ordinance.
2. An erosion and sediment control plan, where applicable, including all reviews and approvals, as required by DEP.

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 Maxatawny Township stormwater collection system that may receive runoff from the project site.
5. A Declaration of Adequacy and Highway Occupancy Permit from the PaDOT District Office when utilization of a PaDOT storm drainage system is proposed.

D. Stormwater Management Facilities

1. All Stormwater Management Facilities and BMP's must be located on a plan and described in detail.
2. When infiltration facilities 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.
4. All site testing data used to determine the feasibility of infiltration on a site.

E. Responsibilities for Operations and Maintenance Plan for Stormwater Controls and BMP's

1. No Regulated Earth Disturbance activities within Maxatawny Township shall commence until approval by Maxatawny Township of a Stormwater Control and BMP Operations and Maintenance Plan which describes how the permanent (e.g., post-construction) stormwater controls and BMP's will be properly operated and maintained.
2. The following items shall be included in the Stormwater Control and BMP Operations and Maintenance Plan:
 - a. Map(s) of the project area, in a form that meets the requirements for recording at the offices of the Recorder of Deeds of Berks County, and shall be submitted on 24-inch x 36-inch sheets. The contents of the maps(s) shall include, but not be limited to:
 1. Clear identification of the location and nature of permanent stormwater controls and BMP's,
 2. The location of the project site relative to highways, municipal boundaries or other identifiable landmarks,
 3. Existing and final contours at intervals of two feet, or others as appropriate,
 4. Existing streams, lakes, ponds, or other bodies of water within the project site area,

5. Other physical features including flood hazard boundaries, sinkholes, streams, existing drainage courses, and areas of natural vegetation to be preserved,
 6. The locations of all existing and proposed utilities, sanitary sewers, and water lines within 50 feet of property lines of the project site,
 7. Proposed final changes to the land surface and vegetative cover, including the type and amount of impervious area that would be added,
 8. Proposed final structures, roads, paved areas, and buildings, and
 9. A fifteen-foot wide access easement with bearings and distances around all stormwater controls and BMP's that would provide ingress to and egress from a public right-of-way.
- b. A description of how each permanent stormwater control and BMP will be operated and maintained, and the identity of the person(s) responsible for operations and maintenance,
 - c. The name of the project site, the name and address of the owner of the property, and the name of the individual or firm preparing the plan, and
 - d. A statement, signed by the landowner, acknowledging that the stormwater controls and BMP's are fixtures that can be altered or removed only after approval by Maxatawny Township.
3. The Stormwater Control and BMP Operations and Maintenance Plan for the project site shall establish responsibilities for the continuing operation and maintenance of all permanent stormwater controls and BMP's, as follows:
 - a. If a Plan includes structures or lots which are to be separately owned and in which streets, sewers and other public improvements are to be dedicated to Maxatawny Township, stormwater controls and BMP's may also be dedicated to and maintained by Maxatawny Township;
 - b. If a Plan includes operations and maintenance by a single ownership, or if sewers and other public improvements are to be privately owned and maintained, then the operation and maintenance of stormwater controls and BMP's shall be the responsibility of the owner or private management entity.
 4. Maxatawny Township shall make the final determination on the continuing operations and maintenance responsibilities. Maxatawny Township reserves the right to accept or reject the operations and maintenance responsibility for any or all of the stormwater controls and BMP's.

F. Maxatawny Township Review of Stormwater Control and BMP Operations and Maintenance Plan

1. Maxatawny Township shall review the Stormwater Control and BMP Operations and Maintenance Plan for consistency with the purposes and requirements of this Ordinance, and any permits issued by DEP.
2. Maxatawny Township shall notify the Applicant in writing whether the Stormwater Control and BMP Operations and Maintenance Plan has been reviewed and is complete.
3. Maxatawny Township will require “as-built” (Record Drawing(s)) of all stormwater controls and BMP’s, and an explanation of any discrepancies with the Operations and Maintenance Plan.

Section 404. Plan Submission

Maxatawny Township shall require receipt of a complete drawing plan with application per Appendix C-1 and fee, as specified in this Ordinance.

For any activities that require an NPDES Permit for Stormwater Discharges from Construction Activities, a DEP Joint Permit Application, a PaDOT Highway Occupancy Permit, or any other permit under applicable state or federal regulations are regulated under Chapter 105 (Dam Safety and Waterway Management) or Chapter 106 (Floodplain Management) of DEP's Rules and Regulations, or, the proof of application for said permit(s) or approvals shall be part of the plan. The plan shall be coordinated with the state and federal permit process and the Maxatawny Township SALDO review process. However, a Drainage Plan submitted without a full preliminary or final plan as set forth in the Maxatawny Township Subdivision Regulations shall not be considered an official plan pursuant to the review process set forth in MPC Section 508.

- A. For projects which require SALDO approval, the Drainage Plan shall be submitted by the Applicant as part of the Preliminary Plan submission where applicable for the Regulated Activity.
- B. For these regulated activities that do not require SALDO approval, See Section 401, General Requirements.
- C. Seven (7) copies of the Drainage Plan shall be submitted and distributed as follows:
 1. One (1) copy to Maxatawny Township accompanied by the requisite Maxatawny Township Review Fee, as specified in this Ordinance.
 2. Two (2) copies to the Berks County Conservation District.
 3. Two (2) copies to the Maxatawny Township Engineer.
 4. One (1) copy to the County Planning Commission/Department.
 5. One (1) copy to the Township Solicitor.

Section 405. Drainage Plan Review

- A. Maxatawny Township shall review the Drainage Plan for consistency with the adopted Sacony Creek Watershed Act 167 Stormwater Management Plan. Any Drainage Plan found to be incomplete shall not be accepted for review and shall be returned to the Applicant. Maxatawny Township shall also review the Drainage Plan against any additional storm drainage provisions contained in the Maxatawny Township Subdivision and Land Regulation or Zoning Ordinance, as applicable.

- B. For Regulated Activities governed by this Ordinance, Maxatawny Township shall notify the Applicant in writing, within 45 calendar days after the first review by the Planning Commission or Township Engineer, whether the Drainage Plan is consistent with the Stormwater Management Plan.
 - 1. Should the Drainage Plan be determined to be consistent with the Stormwater Management Plan, the Maxatawny Township Engineer shall forward a compliance letter to the Maxatawny Township Secretary who will then forward a copy to the Applicant, once all fees are paid.

 - 2. Should the Drainage Plan be determined to be inconsistent with the Stormwater Management Plan, the Maxatawny Township Engineer shall forward a non-compliance letter to the Maxatawny Township Secretary who will then forward a copy to the Applicant. The non-compliance letter shall cite the reason(s) and specific Ordinance sections for the non-compliance. Non-compliance may be due to inadequate information to make a reasonable judgment as to compliance with the stormwater management plan. Any disapproved Drainage Plans may be revised by the Applicant and resubmitted consistent with Section 406.

- C. For Regulated Activities specified in Section 104 of this Ordinance, which require a building permit, the Maxatawny Township Engineer shall notify the Maxatawny Township Building Permit Officer in writing, within a time frame consistent with the Maxatawny Township Building Code and/or Maxatawny Township Subdivision Ordinance, whether the Drainage Plan is consistent with the Stormwater Management Plan and forward a copy of the compliance/non-compliance letter to the Applicant. Any disapproved drainage plan may be revised by the Applicant and resubmitted consistent with this Ordinance.

- D. For Regulated Activities under this ordinance that require an NPDES Permit Application, the Applicant shall forward a copy of the Maxatawny Township letter stating that the Drainage Plan is consistent with the stormwater management plan to the Berks County Conservation District. DEP and the Conservation District may consider the Maxatawny Township review comments in determining whether to issue a permit.

- E. Maxatawny Township shall not grant final approval or grant preliminary approval to any subdivision or land development for Regulated Activities specified in Section 105 of this Ordinance, if the Drainage Plan has been found to be inconsistent with the Stormwater

Management Plan, as determined by the Maxatawny Township Engineer. All required permits from DEP must be obtained prior to final approval of any subdivision or land development.

- F. The Applicant shall be responsible for completing record drawings of all stormwater management facilities included in the approved Drainage Plan. The record drawings and an explanation of any discrepancies with the design plans shall be submitted to the Maxatawny Township Engineer for final approval. Maxatawny Township may withhold approval of the record drawings until Maxatawny Township receives a copy of an approved Highway Occupancy Permit from the PaDOT District Office, NPDES Permit, and any other applicable permits or approvals, from DEP or the Berks County Conservation District. The above permits and approvals must be based on the record drawings.
- G. Maxatawny Township's approval of a Drainage Plan shall be valid for a period not to exceed 5 years, commencing on the date that Maxatawny Township approved Drainage Plan. If stormwater management facilities included in the approved Drainage plan have not been constructed, or if constructed, and record drawings of these facilities have not been approved within this 5 year time period, then Maxatawny Township may consider the Drainage plan disapproved and may revoke any and all permits. Drainage Plans that are considered disapproved by Maxatawny Township shall be resubmitted in accordance with Section 407 of this Ordinance.

Section 406. Modification of Plans

- A. A modification to a Drainage Plan under review by Maxatawny Township 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 Maxatawny Township, 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. The applicable Maxatawny Township Review and Inspection Fee must accompany a resubmission of a disapproved Drainage Plan.
- B. A modification to an already approved or disapproved Drainage Plan shall be submitted to Maxatawny Township, accompanied by the applicable Maxatawny Township Review and Inspection Fee. A modification to a Drainage Plan for which a formal action has not been taken by Maxatawny Township shall be submitted to Maxatawny Township, accompanied by the applicable Maxatawny Township Review and Inspection Fee.

Section 407. Resubmission of Disapproved Drainage Plans

A disapproved Drainage Plan may be resubmitted, with the revisions addressing the Maxatawny Township concerns documented in writing and addressed to the Maxatawny Township Secretary in accordance with Section 404 of this Ordinance and distributed accordingly and be subject to

review as specified in Section 405 of this Ordinance. The applicable Maxatawny Township Review and Inspection Fee must accompany a resubmission of a disapproved Drainage Plan.

ARTICLE V-INSPECTIONS

Section 501. Schedule of Inspections

- A. Maxatawny Township or their designee shall inspect all phases of the installation of the permanent Stormwater Management Facilities as deemed appropriate by Maxatawny Township.
- B. During any stage of the work, if Maxatawny Township or their designee determines that the permanent Stormwater Management Facilities are not being installed in accordance with the approved Stormwater Management Plan, Maxatawny Township shall revoke any existing building permits and issue a cease and desist order until a revised Drainage Plan is submitted and approved, as specified in this Ordinance.
- C. A final inspection of all Stormwater Management Facilities shall be conducted by Maxatawny Township or their designee and to confirm compliance with the approved Drainage Plan prior to the issuance of any Occupancy Permit.

ARTICLE VI-FEES AND EXPENSES

Section 601. Maxatawny Townshipity Drainage Plan Review and Inspection Fee

Fees shall be established by Maxatawny Township to defray plan review and construction inspection costs incurred by Maxatawny Township. All fees shall be paid by the Applicant at the time of Drainage Plan submission. Review and Inspection Fee Schedule shall be established by resolution of the Maxatawny Township Board of Supervisors based on the size of the Regulated Activity and based on Maxatawny Township's costs for reviewing Drainage Plans and conducting inspections pursuant to Section 501. Maxatawny Township shall periodically update the Review and Inspection Fee Schedule to ensure that review costs are adequately reimbursed.

Section 602. Expenses Covered by Fees

The fees required by this Ordinance and set forth in the Township's Review Fee Resolution shall at a minimum cover:

- A. Administrative costs.
- B. The review of the Drainage Plan by Maxatawny Township or its designee (including costs of document review by the Township Solicitor and its professional consultants as defined by the MPC).

- C. The site inspections.
- D. The inspection of Stormwater Management Facilities and Drainage Improvements during construction.
- E. The final inspection upon completion of the Stormwater Management Facilities and drainage improvements presented in the Drainage Plan.
- F. Any additional work required to enforce any permit provisions regulated by this Ordinance, correct violations, and assure proper completion of stipulated remedial actions.
- G. As built (Record Drawings).
- H. Maintenance Agreement per Article VII.

ARTICLE VII-MAINTENANCE RESPIBILITIONSES

Section 701. Performance Guarantee

- A. For Subdivisions and Land Developments, the Applicant shall provide a financial guarantee to Maxatawny Township for the timely installation and proper construction of all stormwater management controls as: 1) Required by the approved drainage plan equal to or greater than the full construction cost of the required controls or 2) in the amount and method of payment provided for in the Maxatawny Township Subdivision and Land Development Regulations.
- B. For other Regulated Activities, Maxatawny Township may require a financial guarantee from the Applicant.
- C. At the completion of the project, and as a prerequisite for the release of the Performance Guarantee, the Applicant or his representatives shall:
 - 1. Provide a certification of completion from an engineer, architect, surveyor or other qualified person verifying that all permanent facilities have been constructed according to the plans and specifications and approved revisions thereto.
 - 2. Provide a set of record drawings.
- D. After Maxatawny Township receives the certification, a final inspection shall be conducted by the Maxatawny Township Engineer or designee to certify compliance with this ordinance and before the release of the performance guarantee.

Section 702. Blank

Section 703. Blank

Section 704. Adherence to Approved Stormwater Control and BMP Operations and Maintenance Plan

It shall be unlawful to alter or remove any Permanent Stormwater Control and BMP required by an approved Stormwater Control and BMP Operations and Maintenance Plan, or to allow the property to remain in a condition which does not conform to an approved Stormwater Control and BMP Operations and Maintenance Plan.

Section 705. Operations and Maintenance Agreement for Privately Owned Stormwater Controls and BMP's

- A. The property owner shall sign an Operations and Maintenance Agreement with Maxatawny Township covering all stormwater controls and BMP's that are to be privately owned. The agreement shall be at a minimum substantially the same as the agreement in Appendix A of this Ordinance.
- B. Other items may be included in the Agreement where determined necessary to guarantee the satisfactory operation and maintenance of all permanent Stormwater Controls and BMP's. The Agreement shall be subject to the review and approval of Maxatawny Township's Board of Supervisors and Solicitor.

Section 706. Stormwater Management Easements

- A. Stormwater management easements are required for all areas used for off-site stormwater control, unless a waiver is granted by Maxatawny Township.
- B. Stormwater management easements shall be provided by the property owner if necessary for (1) access for inspections and maintenance, or (2) preservation of stormwater runoff conveyance, infiltration, and detention areas and other stormwater controls and BMP's, by persons other than the property owner. The purpose of the easement shall be specified in any agreement under Section 705.

Section 707. Maintenance Agreement for Privately Owned Stormwater Facilities

- A. Prior to final approval of the site's Drainage Plan, the Applicant shall sign and record the Maintenance Agreement with the minimum criteria contained in Appendix A which is attached and made part hereof, covering all stormwater control facilities that are to be privately owned (including ownership by Homeowners Association Condominium Association).
- 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 Maxatawny Township Solicitor and Board of Supervisors.

Section 708. Recording of Approved Stormwater Control and BMP Operations and Maintenance Plan and Related Agreements

- A. The owner of any land upon which permanent stormwater controls and BMP's will be placed, constructed or implemented, as described in the Stormwater Control and BMP Operations and Maintenance Plan, shall record the following documents in the Office of the Recorder of Deeds for Berks County, within 15 days of approval of the Stormwater Control and BMP Operations Plan by Maxatawny Township:
 - 1. The Operations and Maintenance Plan, or a summary thereof,
 - 2. Operations and Maintenance Agreements under Section 705, and
 - 3. Easements under Section 706.
- B. Maxatawny Township may suspend or revoke any approvals granted for the project site upon discovery of the failure of the owner to comply with this Section.

Section 709. Maxatawny Township Stormwater Control and BMP Operation and Maintenance Fund

- A. Persons installing stormwater controls or BMP's shall be required to pay a specified amount to the Maxatawny Township Stormwater Control and BMP Operation and 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 stormwater control or BMP is to be privately owned and maintained, the deposit shall cover the cost of periodic inspections performed by Maxatawny Township for a period of ten (10) years, as estimated by the Maxatawny Township Engineer. After that period of time, inspections will be performed at the expense of Maxatawny Township.
 - 2. If the stormwater control or BMP is to be owned and maintained by Maxatawny Township, the deposit shall cover the estimated costs for maintenance and inspections for ten (10) years. The Maxatawny Township Engineer will establish the estimated costs utilizing information submitted by the Applicant.
 - 3. The amount of the deposit to the fund shall be converted to present worth of the annual series values. The Maxatawny Township Engineer shall determine the present worth equivalents, which shall be subject to the approval of Maxatawny Township.
- B. If a Stormwater Control or BMP is proposed that also serves as a recreation facility (e.g., ballfield, lake), Maxatawny Township may reduce or waive the amount of the maintenance fund deposit based upon the value of the land for public recreation purpose.

- C. If at some future time a stormwater control or BMP (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.
- D. If Stormwater Controls or BMP's are accepted by Maxatawny Township for dedication, Maxatawny Township may require persons installing Stormwater Controls or BMP's to pay a specified amount to the Maxatawny Township Stormwater Control and BMP Operation and Maintenance Fund, to help defray costs of operations and maintenance activities. Said fees shall be established by Resolution. The amount may be determined as follows:
 - 1. If the stormwater control or BMP is to be owned and maintained by Maxatawny Township, the amount shall cover the estimated costs for operations and maintenance for ten (10) years, as determined by Maxatawny Township.
 - 2. The amount shall then be converted to present worth of the annual series values.
- E. If a stormwater control or BMP is proposed that also serves as a recreation facility (e.g. ball field, lake), Maxatawny Township may adjust the amount due accordingly.
- F. Long-Term Maintenance – Maxatawny Township shall require applicants to pay a fee to the Maxatawny Township Stormwater Maintenance Fund to cover long term maintenance of stormwater control and best management practices.
- G. Stormwater Related Problems - Maxatawny Township may require applicants to pay a fee to the Maxatawny Township Stormwater Maintenance Fund to cover stormwater related problems which may arise from the Land Development and earth disturbance.

ARTICLE VIII - PROHIBITIONS

Section 801. Prohibited Discharges and Connections

- A. Any drain or conveyance, whether on the surface or subsurface, which allows any non-stormwater discharge including sewage, process wastewater, and wash water to enter the waters of this Commonwealth is prohibited.
- B. No person shall allow, or cause to allow, discharges into surface waters of this Commonwealth which are not composed entirely of stormwater, except (1) as provided in subsection C below, and (2) discharges allowed under a state or federal permit.
- C. The following discharges are authorized unless they are determined to be significant contributors to pollution to the waters of this Commonwealth:

- Discharges from fire fighting activities	- Flows from riparian habitats and wetlands
- Potable water sources including water line flushing	- Uncontaminated water from foundations or from footing drains
- Irrigation drainage	- Lawn watering
- Air conditioning condensate	- Dechlorinated swimming pool discharges
- Springs	- Uncontaminated groundwater
- Water from crawl space pumps	- Water from individual residential car washing
- Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spill material has been removed) and where detergents are not used	- Routine external building wash down (which does not use detergents or other compounds)

- D. In the event that Maxatawny Township or DEP determines that any of the discharges identified in Subsection C, significantly contribute to pollution of the waters of this Commonwealth, Maxatawny Township or DEP will notify the responsible person(s) to cease the discharge.
- E. Upon notice provided by Maxatawny Township, the discharger will have a reasonable time, as determined by the Township, to cease the discharge consistent with the degree of pollution caused by the discharge.
- F. Nothing in this Section shall affect a discharger's responsibilities under State law or Federal law or other applicable local ordinances and regulations.

Section 802. Roof Drains

- A. Roof drains shall not be connected to streets, sanitary or storm sewers or roadside ditches, except as permitted by Maxatawny Township.
- B. When it is more advantageous to connect directly to streets or storm sewers, the connections of roof drains to streets or roadside ditches may be permitted by Maxatawny Township.
- C. Roof drains and sump pumps shall discharge to infiltration or vegetative BMP's and to the maximum extent practicable satisfy the criteria for Disconnected Impervious Areas

Section 803. Alteration of SWM BMP's

No person shall modify, remove, fill, landscape, or alter any SWM BMP's, facilities, areas, or structures, without the written approval of Maxatawny Township.

ARTICLE IX-ENFORCEMENT AND PENALTIES

Section 901. Right-of-Entry

- A. Upon presentation of proper credentials, duly authorized representatives of Maxatawny Township may enter at reasonable times upon any property within Maxatawny Township to inspect the implementation, condition, or operation and maintenance of the stormwater controls or BMP's in regard to any aspect governed by this Ordinance.
- B. Stormwater control and BMP owners and operators shall allow persons working on behalf of Maxatawny Township ready access to all parts of the premises for the purposes of determining compliance with this Ordinance.
- C. Persons working on behalf of Maxatawny Township shall have the right to temporarily locate on any stormwater control or BMP in Maxatawny Township such devices as are necessary to conduct monitoring and/or sampling of the discharges from such stormwater control or BMP.
- D. Unreasonable delays (>24 hrs.) in allowing Maxatawny Township access to a stormwater control or BMP is a violation of this Article.

Section 902. 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 and shall be enforced by Maxatawny Township Civil/Criminal Enforcement Ordinance as outlined by Section 905 of this Ordinance.

Section 903. Enforcement Generally

- A. Whenever Maxatawny Township finds that a person has violated a prohibition or failed to meet a requirement of this Ordinance, Maxatawny Township may order compliance by written notice to the responsible person. Such notice may require without limitation:
 - 1. The performance of monitoring, analyses, and reporting;
 - 2. The elimination of prohibited connections or discharges;
 - 3. Cessation of any violating discharges, practices, or operations;
 - 4. The abatement or remediation of stormwater pollution or contamination hazards and the restoration of any affected property;
 - 5. Payment of a fine to cover administrative and remediation costs;
 - 6. The implementation of stormwater controls and BMP's; and
 - 7. Operation and maintenance of stormwater controls and BMP's.

- B. Such notification shall set forth the nature of the violation(s) and establish a time limit for correction of these violations(s). Said notice may further advise that, if applicable, should the violator fail to take the required action within the established deadline, the work will be done by Maxatawny Township or designee and the expense thereof shall be charged to the violator.
- C. Failure to comply within the time specified shall also subject such person to the penalty provisions of this Ordinance. All such penalties shall be deemed cumulative and shall not prevent Maxatawny Township from pursuing any and all other remedies available in law or equity.

Section 904. Liability Disclaimer

- A. Neither the granting of any approval nor the compliance with the provisions of this ordinance or with any condition imposed by Maxatawny Township, its officials, employees or designated representatives hereunder, shall relieve any person from any responsibility for damage to persons or property resulting therefrom, or as otherwise imposed by law, nor impose any liability upon Maxatawny Township, its officials, employees or designated representatives to the maximum extent permitted by law.
- B. The granting of any permit which includes any stormwater management requirements shall not constitute a representation, guarantee or warranty of any kind by the Maxatawny Township officials, employees or designated representatives thereof, of the practicability or safety of any stormwater structure or facility, use or other plan proposed, and shall create no liability or cause of action upon Maxatawny Township, its officials, employees, or designated representatives for any damage that may result pursuant thereto to the maximum extent permitted by law.

Section 905. Suspension and Revocation of Permits and Approvals

- A. Any building, land development or other permit or approval issued by Maxatawny Township may be suspended or revoked, in whole or in part, by Maxatawny Township for:
 - 1. Non-compliance with or failure to implement any provision of the permit;
 - 2. A violation of any provision of this Ordinance; or
 - 3. 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.
- B. A suspended permit or approval may be reinstated by Maxatawny Township, in whole or in part, when:

1. Maxatawny Township or designee has inspected and approved the corrections to the stormwater controls and BMP's, or the elimination of the hazard or nuisance, and/or;
 2. Maxatawny Township is satisfied that the violation of the Ordinance, law, or rule and regulation has been corrected.
- C. A permit or approval which has been revoked in whole or in part, by Maxatawny Township cannot be reinstated. The applicant may apply for a new permit under the procedures outlined in this Ordinance.

Section 906. Penalties

- A. Any person or entity who fails to comply with any or all of the requirements or provisions of the Ordinance or who fails or refuses to comply with any notice, order or direction of the Building Permit Officer or any other authorized employee of Maxatawny Township shall be subject to the civil enforcement procedures, fines, and schedule of fines as set forth in the Civil/Criminal Enforcement Procedure Ordinance of Maxatawny Township. In addition to the above penalties all other actions are hereby reserved including an action in equity for the proper enforcement of this Ordinance. The imposition of a fine or penalty for any violation of, or non-compliance with, this Ordinance shall not excuse the violation or non-compliance or permit it to continue and all such persons shall be required to correct or remedy such violations and non-compliance within a reasonable time. Any development initiated of any structure or building constructed, reconstructed, enlarged, altered, or relocated, in non-compliance with this Ordinance may be declared by the Township to be public nuisance and abatable as such.
- B. Maxatawny Township may institute injunctive, mandamus, or any other appropriate action or proceeding at law in equity for the enforcement of the ordinance with the court of competent jurisdiction to obtain restraining orders, temporary or permanent injunctions, mandamus or other appropriate forms of remedy or relief. Any violation of this Ordinance shall be considered immediate and irreparable for purposes of pursuing equitable relief.

Section 907. 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, Maxatawny Township shall provide written notification of the violation. Such notification shall set forth the nature of the violation(s) and establish a time limit, usually sixteen (16) days, for correction of these violation(s). Failure to comply within the time specified shall subject such person to the penalty provisions of this Ordinance. All such penalties shall be deemed cumulative. It shall be 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.

Whenever the Building Permit Officer or other authorized Maxatawny Township representative determines that there are reasonable grounds to believe that there has been a violation of any provisions of the Ordinance, or of any regulation adopted pursuant thereto, the Building Permit Officer shall give notice of such alleged violation as hereinafter provided. Such notice shall (a) be in writing; (b) include a statement of the reasons for its issuance; (c) allow a reasonable time not to exceed a period of thirty (30) days for the performance of any act it requires; (d) be served upon the property owner or his agent as the case may require; provided, however, that such notice or order shall be deemed to have been properly served upon such owner or agent when a copy thereof has been served with such notice by any other method authorized or required by the laws of this State; and (e) contain an outline of remedial action which, if taken, will effect compliance with the provisions of the Ordinance.

Section 908. Enforcement

The Maxatawny Township Board of Supervisors 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 Maxatawny Township or other qualified persons designated by Maxatawny Township.

- A. A set of design plans approved by Maxatawny Township shall be on file at the site throughout the duration of the construction activity. Periodic inspections may be made by Maxatawny Township 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 105 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, architect, surveyor or other qualified person 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 (record) drawings.
- D. After receipt of the certification by Maxatawny Township, a final inspection shall be conducted by Maxatawny Township or designated representative to certify compliance with this ordinance.
- E. Prior to revocation or suspension of a permit and at the request of the applicant, Maxatawny Township will schedule a hearing to discuss the non-compliance if there is no immediate danger to life, public health or property. The expense of a hearing shall be the owner's responsibility.

F. **Occupancy Permit**

An occupancy permit shall not be issued unless the certification of completion pursuant to Section 907.C.1. has been secured. The occupancy permit shall be required for each lot owner and/or Applicant for all subdivisions and land developments in Maxatawny Township.

Section 909. Appeals


- A. Any person aggrieved by any action of Maxatawny Township or its designee may appeal to the Maxatawny Township Board of Supervisors within thirty (30) days of that action.
- B. Any person aggrieved by any decision of the Maxatawny Township Board of Supervisors, may appeal to the County Court of Common Pleas in the County where the activity has taken place within thirty (30) days of the Maxatawny Township decision.

Section 910. Miscellaneous

- A. All Ordinances or parts of Ordinances inconsistent with the provisions of this Ordinance are hereby repealed insofar, but only insofar, as the same are inconsistent herewith.
- B. The provisions of this Ordinance are severable and if any provision or part thereof shall be held invalid, unconstitutional or inapplicable to any person or circumstances, such invalidity, unconstitutionality or inapplicability shall not effect or impair the remaining provisions or parts thereof of this Ordinance.
- C. This Ordinance shall become effective five days after its adoption.

ORDAINED and ENACTED as an Ordinance by the Board of Supervisors of the Township of Maxatawny, Berks County, Pennsylvania, in lawful session duly assembled this 9TH day of JULY, 2008.

BOARD OF SUPERVISORS OF MAXTAWNY
TOWNSHIP, BERKS COUNTY, PA


Allen L. Leiby, Chairperson

Gayle Sanders, Supervisor


David Hoffman, Supervisor

ORDINANCE APPENDIX A

STORMWATER CONTROLS AND BEST MANAGEMENT PRACTICES AND ACCESS EASEMENT AND OPERATIONS AND MAINTENANCE AGREEMENT

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

WITNESSETH

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

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

WHEREAS, the Stormwater Controls and BMP Operations and Maintenance Plan reviewed by Maxatawny Township (hereinafter referred to as the “Plan”) for the property identified herein, which is attached hereto as Appendix A and made part hereof, as approved by Maxatawny Township, provides for an access easement and management of stormwater within the confines of the Property through the use of Best Management Practices (BMP’s); and

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

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

BMP – “Best Management Practice;” activities, facilities, designs, measures or procedures used to manage stormwater impacts from land development, to protect and maintain water quality and groundwater recharge and to otherwise meet the purposes of the Maxatawny Township Stormwater Management Ordinance, including but not limited to infiltration trenches, seepage pits, filter strips, bioretention, wet basins, permeable paving, rain gardens, grassed swales, forested buffers, sand filters and detention basins.

- Infiltration Trench – A BMP surface structure designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or groundwater aquifer,
- Seepage Pit – An underground BMP structure designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or groundwater aquifer,
- Rain Garden – A BMP overlain with appropriate mulch and suitable vegetation designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or underground aquifer, and

WHEREAS, Maxatawny Township requires, through the implementation of the Plan, that stormwater management BMP’s as required by said Plan and the Maxatawny Township Stormwater Management Ordinance be constructed and adequately operated and maintained by the Landowner/Developer, his successors and assigns. and

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

1. The BMP’s shall be constructed by the Landowner/Developer in accordance with the plans and specifications identified in the Plan.

2. The Landowner/Developer shall operate and maintain the BMP(s) as shown on the Plan in good working order acceptable to Maxatawny Township and in accordance with the specific maintenance requirements noted on the Plan.
3. The Landowner/Developer hereby grants permission to Maxatawny Township, 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, Maxatawny Township shall notify the Landowner/Developer prior to entering the property.
4. In the event the Landowner/Developer fails to operate and maintain the BMP(s) as shown on the Plan in good working order acceptable to Maxatawny Township, Maxatawny Township or its representatives may enter upon the Property and take whatever action is deemed necessary to maintain said BMP(s). This provision shall not be construed to allow Maxatawny Township to erect any permanent structure on the land of the Landowner/Developer. It is expressly understood and agreed that Maxatawny Township 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 Maxatawny Township.
5. In the event Maxatawny Township, 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/Developer shall reimburse Maxatawny Township for all expenses (direct and indirect) incurred within 10 days of receipt of invoice from Maxatawny Township.
6. The intent and purpose of this Agreement is to ensure the proper maintenance of the onsite BMP(s) by the Landowner/Developer; provided, however, that this Agreement shall not be deemed to create or effect any additional liability of any party for damage alleged to result from or be caused by stormwater runoff.
7. The Landowner/Developer, its executors, administrators, assigns, and other successors in interests, shall release Maxatawny Township's employees and designated representatives from all damages, accidents, casualties, occurrences or claims which might arise or be

asserted against said employees and representatives from the construction, presence, existence, or maintenance of the BMP(s) by the Landowner/Developer or Maxatawny Township. In the event that a claim is asserted against Maxatawny Township, its designated representatives or employees, Maxatawny Township shall promptly notify the Landowner/Developer and the Landowner/Developer shall defend, at his own expense, any suit based on the claim. If any judgment or claims against Maxatawny Township's employees or designated representatives shall be allowed, the Landowner/Developer shall pay all costs and expenses regarding said judgment or claim.

8. Maxatawny Township shall inspect the BMP(s) at a minimum of once every three years to ensure their continued functioning.

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

ATTEST:

WITNESS the following signatures and seals:

(SEAL)

For Maxatawny Township:

(SEAL)

For the Landowner/Developer:

ATTEST:

_____ (Township)

County of Berks, Pennsylvania

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

GIVEN UNDER MY HAND THIS _____ day of _____, 200__.

NOTARY PUBLIC

(SEAL)

ORDINANCE APPENDIX B
STORMWATER MANAGEMENT DESIGN CRITERIA

TABLE B-1

REGION 4 - DESIGN STORM RAINFALL AMOUNT

Source: "Field Manual of Pennsylvania Department of Transportation"
STORM INTENSITY-DURATION-FREQUENCY CHARTS
P D T - I D F May 1986.

FIGURE B-1

NRCS TYPE II RAINFALL DISTRIBUTION – S CURVE

Source: NRCS, TR-55, June 1986

FIGURE B-2

PENNDOT DELINEATED REGIONS

Source: "Field Manual of Pennsylvania Department of Transportation"
STORM INTENSITY-DURATION-FREQUENCY CHARTS
P D T - I D F May 1986.

FIGURE B-3

PENNDOT REGION 4 STORM INTENSITY-DURATION-FREQUENCY CURVE

Source: "Field Manual of Pennsylvania Department of Transportation"
STORM INTENSITY-DURATION-FREQUENCY CHARTS
P D T - I D F May 1986.

TABLE B-2

RUNOFF CURVE NUMBERS

Source: NRCS (SCS) TR-55

TABLE B-3

RATIONAL RUNOFF COEFFICIENTS

TABLE B-4

MANNING ROUGHNESS COEFFICIENTS

FIGURE B-4

**RECOMMENDATION CHART FOR INFILTRATION STORMWATER
MANAGEMENT BMP'S IN CARBONATE AREAS**

**TABLE B-1
DESIGN STORM RAINFALL AMOUNT (INCHES)**

The design storm rainfall amount chosen for design should be obtained from the PennDOT region in which the site is located according to Figure B-2.

Source: "Field Manual of Pennsylvania Department of Transportation"
STORM INTENSITY-DURATION-FREQUENCY CHARTS
P D T - I D F May 1986.

Duration	Region 4							
	Precipitation Depth (in)							
	1 Yr	1.5 Yr	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
5 min	0.30	0.33	0.35	0.41	0.45	0.50	0.55	0.61
15 min	0.58	0.63	0.68	0.80	0.93	1.03	1.13	1.25
1 hr	1.01	1.12	1.22	1.48	1.70	1.91	2.16	2.41
2 hr	1.24	1.37	1.50	1.84	2.14	2.46	2.80	3.18
3 hr	1.38	1.55	1.71	2.10	2.43	2.82	3.24	3.69
6 hr	1.68	1.86	2.04	2.52	3.06	3.60	4.14	4.74
12 hr	2.04	2.28	2.52	3.00	3.84	4.56	5.16	6.00
24 hr	2.40	2.64	2.88	3.60	4.56	5.76	6.48	7.44

FIGURE B-1
NRCS (SCS) TYPE II RAINFALL DISTRIBUTION - S CURVE

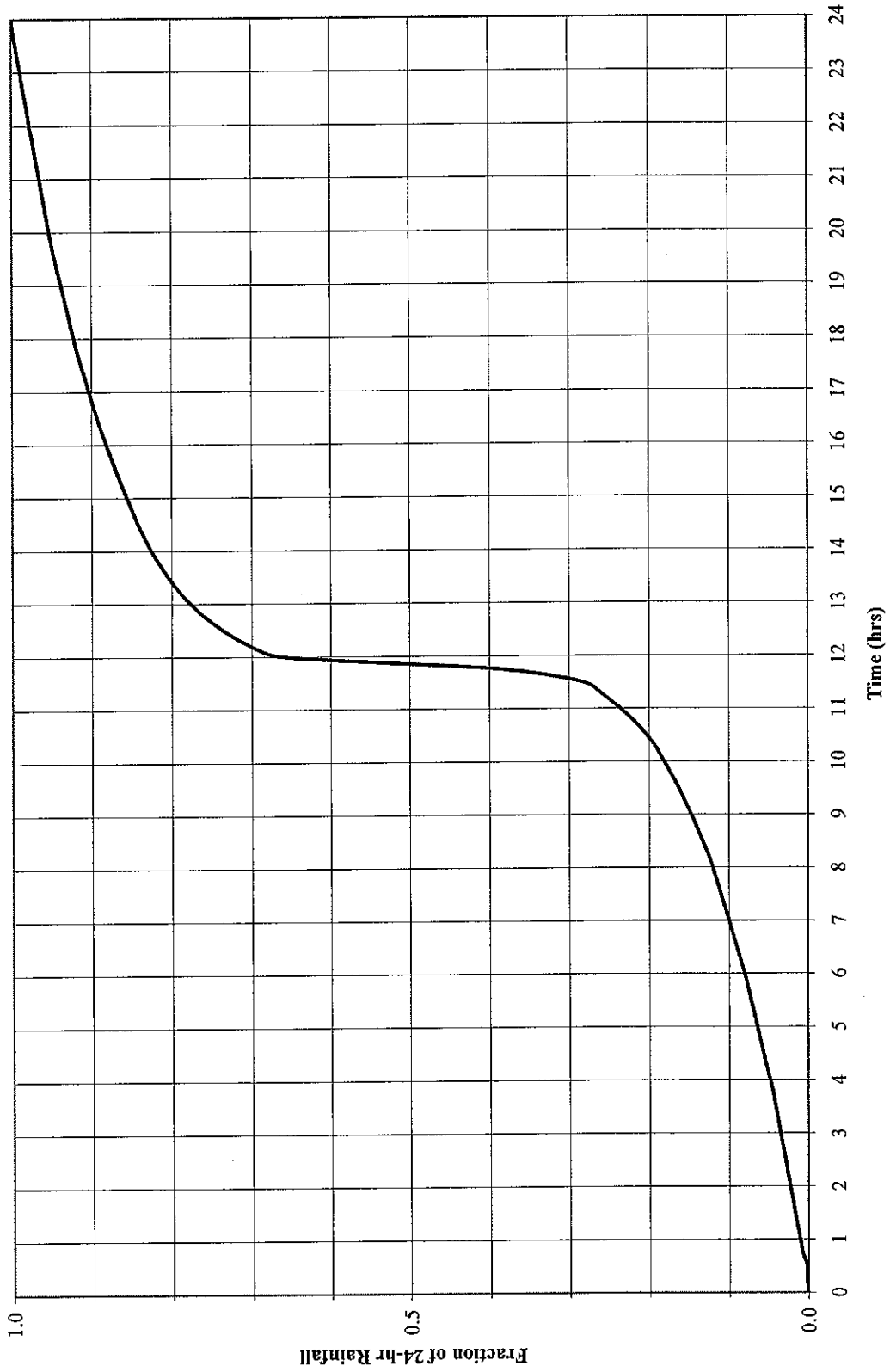


FIGURE B-2
PENNDOT DELINEATED REGIONS

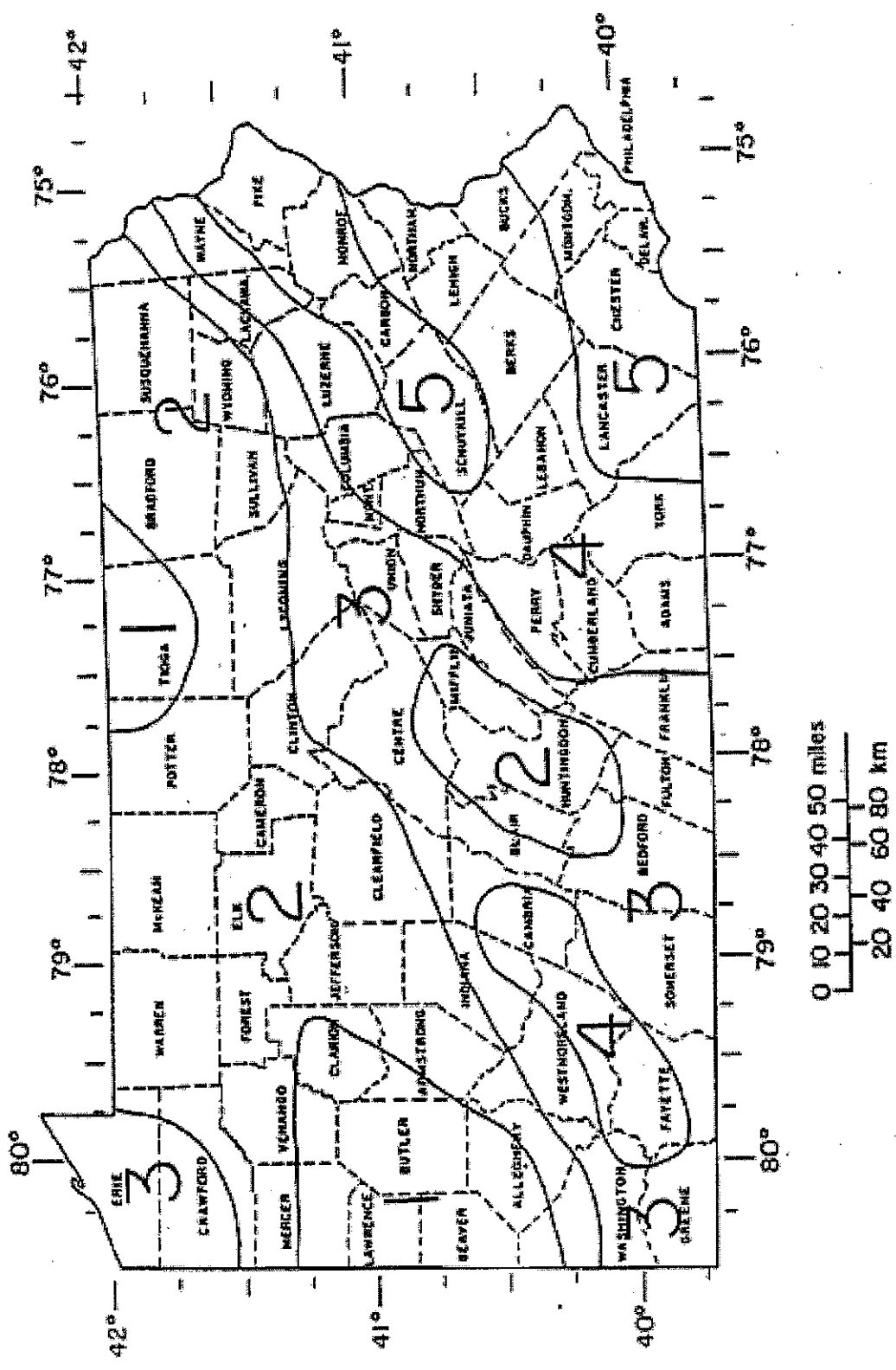


FIGURE B-3
PENNDOT REGION 4 STORM INTENSITY-DURATION-FREQUENCY CURVE

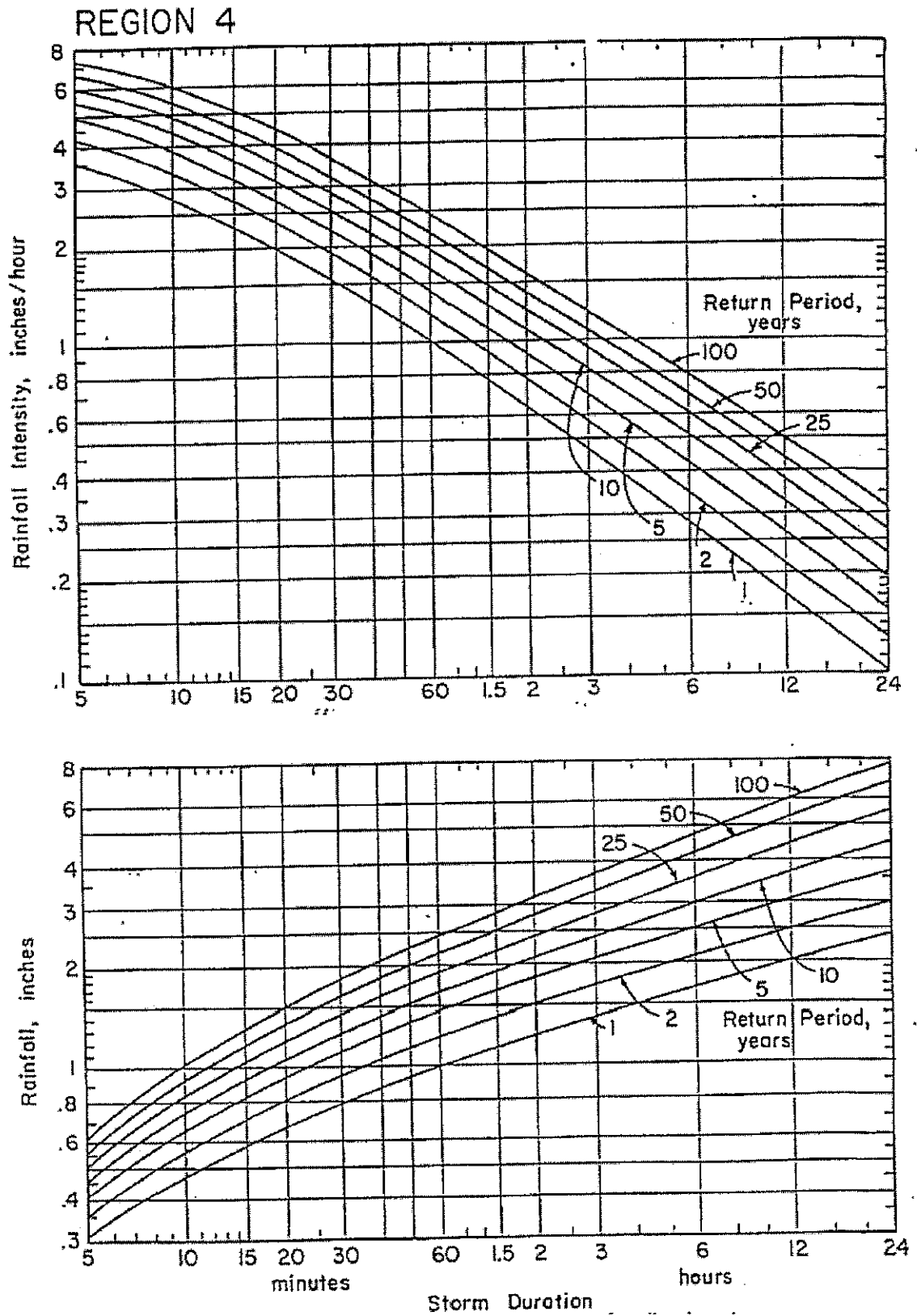


TABLE B-2
Runoff Curve Numbers
(From NRCS (SCS) TR-55)

LAND USE DESCRIPTION	HYDROLOGIC SOIL GROUP			
	A	B	C	D
Open Space	44	65	77	82
Meadow / Orchard	30	58	71	78
Agricultural	59	71	79	83
Forest	36	60	73	79
Commercial (85% Impervious)	89	92	94	95
Industrial (72% Impervious)	81	88	91	93
Institutional (50% Impervious)	71	82	88	90
Residential				
Average Lot Size	% impervious			
1/8 acre or less*	65	77	85	90
1/8 - 1/3 acre	34	59	74	82
1/3 - 1 acre	23	53	69	80
1 - 4 acres	12	46	66	78
Farmstead	59	74	82	86
Smooth Surfaces (Concrete, Asphalt, Gravel or Bare Compacted Soil)	98	98	98	98
Water	98	98	98	98
Mining/Newly Graded Areas (Pervious Areas Only)	77	86	91	94

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

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

TABLE B-3
RATIONAL RUNOFF COEFFICIENTS
 By Hydrologic Soils Group and Overland Slope (%)

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

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

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

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

TABLE B-4

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

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

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

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

(1) Depending upon type, coating and diameter

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

FIGURE B-4

Recommendation Chart for Infiltration Stormwater Management BMP's in Carbonate Bedrock

SITE RISK FACTORS		CARBONATE BEDROCK											
		2 to 4 Feet				Over 4 Feet to 8 Feet				Over 8 Feet			
Geology Type	Effective Soil Thickness	Low Buffer	Medium Buffer	High Buffer	Low Buffer	Medium Buffer	High Buffer	Low Buffer	Medium Buffer	High Buffer	Low Buffer	Medium Buffer	High Buffer
Special Geologic Features*	Low/High Buffer	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary	Preliminary
DESIGN FACTORS	(Unacceptable)	100-300-500	100-300-500	100-300-500	100-300-500	100-300-500	100-300-500	100-300-500	100-300-500	100-300-500	100-300-500	100-300-500	100-300-500
	(Unacceptable)	0-100% 300%	0-100% 300%	0-100% 300%	0-100% 300%	0-100% 300%	0-100% 300%	0-100% 300%	0-100% 300%	0-100% 300%	0-100% 300%	0-100% 300%	0-100% 300%
PROGRAM SUMMARY GUIDANCE **		NOT RECOMMENDED											

RECOMMENDED

NOT RECOMMENDED

* Special Geologic Feature Buffer widths are as follows:

Low Buffer is less than 50 feet

Medium Buffer is 50 feet to 100 feet

High Buffer is greater than 100 feet

** Rates greater than 500% not recommended.

*** Assures adequately permeable soils and lack of natural constraints as required for all infiltration systems.

1 Infiltration systems may be allowed at the determination of the Engineer and/or Geologist, provided that a Detailed Site Investigation is undertaken which confirms nature of rock, location of Special Geologic Features, and adequacy of the buffer between the SGF and the proposed stormwater system(s).

2 In these Special Geologic Features: Low Buffer situations, infiltration systems may be allowed at the determination of the Engineer and/or Geologist, provided that a Detailed Site Investigation is undertaken and a 25 foot buffer from SGFs is maintained.

ORDINANCE APPENDIX C-1 DRAINAGE PLAN APPLICATION

Application is hereby made for review of the Stormwater Management Plan and related data as submitted herewith in accordance with the Maxatawny Township Stormwater Management Ordinance.

_____ Final Plan _____ Preliminary Plan _____ Sketch Plan

Date of Submission _____ Submission No. _____

1. Name of subdivision or development _____

2. Name of Applicant _____ Telephone No. _____

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

_____ Officer 1
_____ Officer 2

Address _____

Zip _____

Applicants interest in subdivision or development
(if other than property owner give owners name and address)

3. Name of property owner _____ Telephone No. _____

Address _____

Zip _____

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

Address _____

Zip _____

5. Type of subdivision or development proposed:

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

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

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

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

8. Stormwater

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

b. Design storm utilized (on-site conveyance systems) (24 hr.) _____
No. of Subarea _____
Watershed Name _____

Explain: _____

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

d. Number of subarea(s) from Ordinance Appendix D of the Sacony Creek Watershed Stormwater Management Plan. _____

e. Type of proposed runoff control _____

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

If not, what variances/waivers are requested? _____

Reasons _____

f. Does the plan meet the requirements of Article III of the Stormwater Ordinances? _____

If not, what variances/waivers are requested? _____

Reasons Why _____

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

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

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

- k. Is a construction schedule or staging attached? _____
- l. Is a recommended maintenance program attached? _____
- 9. Erosion and Sediment Pollution Control (E&S):
 - a. Has the stormwater management and E&S plan, supporting documentation and narrative been submitted to the Berks County Conservation District? _____
 - b. Total area of earth disturbance _____ S.F.
- 10. Wetlands
 - a. Have the wetlands been delineated by someone trained in wetland delineation? _____
 - b. Have the wetland lines been verified by a state or federal permitting authority? _____
 - c. Have the wetland lines been surveyed? _____
 - d. Total acreage of wetland within the property _____
 - e. Total acreage of wetland disturbed _____
 - f. Supporting documentation _____
- 11. Filing
 - a. Has the required fee been submitted? _____
Amount _____
 - b. Has the proposed schedule of construction inspection to be performed by the Applicant's engineer been submitted? _____
 - c. Name of individual who will be making the inspections _____
 - d. General comments about stormwater management at the development _____

CERTIFICATE OF OWNERSHIP AND ACKNOWLEDGMENT OF APPLICATION:

COMMONWEALTH OF PENNSYLVANIA
COUNTY OF BERKS

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

_____ Property Owner

My Commission Expires _____ 20____
Notary Public _____

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

SIGNATURE OF APPLICANT _____

////////////////////////////////////

(Information Below This Line To Be Completed By Maxatawny Township)

_____ Maxatawny Township official submission receipt:

Date complete application received _____ Plan Number _____

Fees _____ date fees paid _____ received by _____

Official submission receipt date _____

Received by _____

Maxatawny Township

Drainage Plan Proposed Schedule Of Fees

Subdivision name _____ Submittal No. _____

Owner _____ Date _____

Engineer _____

1. Filing fee		\$ _____
2. Land use		
2a. Subdivision, campgrounds, mobile home parks, and multi-family dwelling where the units are located in the same local watershed.		\$ _____
2b. Multi-family dwelling where the designated open space is located in a different local watershed from the proposed units.		\$ _____
2c. Commercial/industrial.		\$ _____
3. Relative amount of earth disturbance		
3a. Residential		
road <500 l.f.		\$ _____
road 500-2,640 l.f.		\$ _____
road >2,640 l.f.		\$ _____
3b. Commercial/industrial and other		
impervious area <3,500 s.f.		\$ _____
impervious area 3,500-43,460 s.f.		\$ _____
impervious area >43,560 s.f.		\$ _____
4. Relative size of project		
4a. Total tract area <1 ac		\$ _____
1-5 ac		\$ _____
5-25 ac		\$ _____
25-100 ac		\$ _____
100-200 ac		\$ _____
>200 ac		\$ _____
5. Stormwater control measures		
5a. Detention basins & other controls which require a review of hydraulic routings (\$ per control).		\$ _____
5b. Other control facilities which require storage volume calculations but no hydraulic routings. (\$ per control)		\$ _____
6. Site inspection (\$ per inspection)		\$ _____
Total		\$ _____

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

ORDINANCE APPENDIX C-2 DRAINAGE PLAN CHECKLIST

Project: _____
Municipality: _____
Engineer: _____
Submittal No: _____
Date: _____
Project ID: _____ (for Municipal use ONLY)

SECTION I: REGULATED ACTIVITIES

Reference: Section 105

1. Is the Proposed Project within the Sacony Creek watershed? Yes No
2. Does the Proposed Project meet the definition of a "Regulated Activity"? Yes No

STOP – If you have checked NO for either of the above questions, you are not required to submit a Storm Water Management Plan under the Sacony Creek Storm Water management Ordinance.

SECTION II: EXEMPTION

Reference: Section 402

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

Parent Tract Area: _____ acres

Total Existing Impervious Area (as of _____): _____ acres

Total New Impervious Area (all Phases): _____ acres

Parcel IS Exempt from drainage plan submittal refer to appendix I Parcel IS NOT Exempt

SECTION III: NONSTRUCTURAL PROJECT DESIGN

Reference: Section 304

1. Has an Existing Resource and Site Analysis Map (ERSAM) been prepared?

Yes No, Explain _____

SECTION III: NONSTRUCTURAL PROJECT DESIGN (Continued)

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

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

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

- Yes No, Explain _____

4. Has a stream buffer been established per Section 306.F.?

- Yes No, Explain _____

SECTION IV: GROUNDWATER RECHARGE

Reference: Section 305

1. Is the proposed activity considered a "Stormwater Hotspot" as defined in Section 305.C.?

- Yes No

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

- Yes No, Explain _____

3. Total Recharge Volume Required: _____ cubic feet
(using: Method A; Method B)

4. How is the Required Recharge Volume being addressed?

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

SECTION V: WATER QUALITY

Reference: Section 306

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

Yes No, Explain _____

2. Total Water Quality Volume Required: _____ acre feet

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

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

Wet Detention Basin Sand Filter
 Extended Dry Detention Basin Constructed Wetlands
 Bioretention Other: _____

SECTION VI: STREAMBANK PROTECTION

Reference: Section 307

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

Yes No, Explain _____

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

Yes No, Explain _____

SECTION VII: OVERBANK AND EXTREME STORM EVENTS

Reference: Section 308

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

<input type="checkbox"/>	A	<input type="checkbox"/>	C	<input type="checkbox"/>	E
<input type="checkbox"/>	B	<input type="checkbox"/>	D		

2. Does the Proposed Conditions Runoff meet the Criteria established in Table 308.1?

Yes No, if you answered Yes proceed to Section VIII.

SECTION VIII: CALCULATION METHODOLOGY

Reference: Section 309

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

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

2. Was Table B-1 or Figure B-4 utilized in rainfall determination?

Yes No, Explain _____

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

Yes No, Explain _____

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

Yes No, Explain _____

SECTION IX: OTHER REQUIREMENTS

Reference: Section 310

1. Is this project subject to PENNDOT approval?

Yes No

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

Yes No, Explain _____

2. Have proposed wet detention basins incorporated biologic control consistent with the West Nile Guidelines presented in Appendix J?

Yes No Not Applicable

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

Yes No

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

Yes No, Explain _____

SECTION X: FACILITY OPERATION AND MAINTENANCE PLAN

Reference: Section 702

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

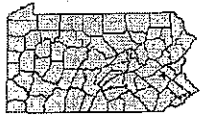
Yes No, Explain _____

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

Municipality Homeowner Association
 Private Owner Other _____

ORDINANCE APPENDIX D
STORMWATER MANAGEMENT DISTRICT
WATERSHED MAP

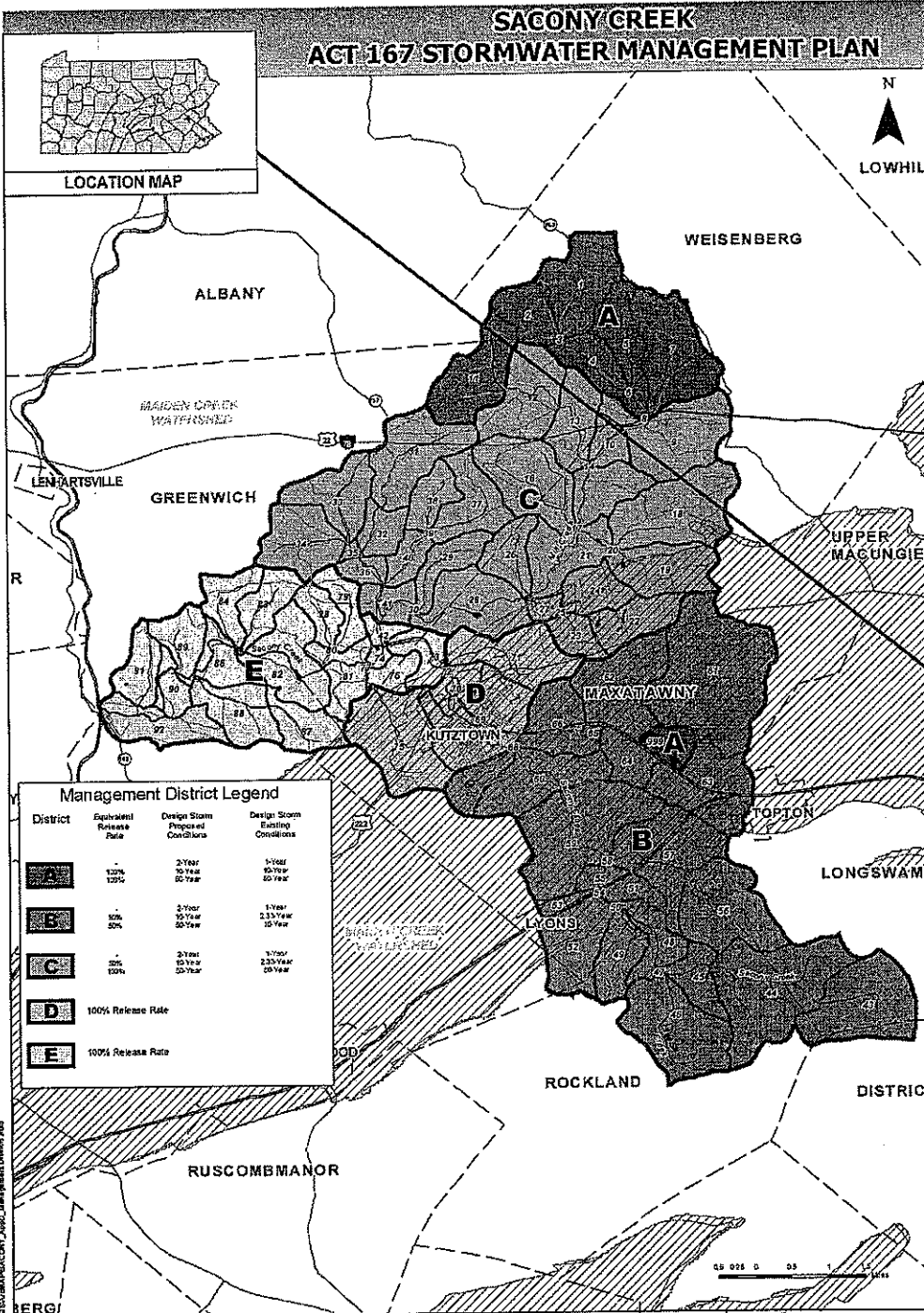
SAGONY CREEK ACT 167 STORMWATER MANAGEMENT PLAN



LOCATION MAP



LOWHIL



Management District Legend

District	Equivalent Release Rate	Design Storm Frequency Conditions	Design Storm Routing Conditions
A	100% 100%	2-Year 10-Year 50-Year	1-Year 10-Year 50-Year
B	50%	2-Year 10-Year 50-Year	1-Year 2.33-Year 10-Year
C	20%	2-Year 10-Year 50-Year	1-Year 2.33-Year 10-Year
D	100% Release Rate		
E	100% Release Rate		

ORDINANCE APPENDIX D MANAGEMENT DISTRICTS

Prepared For:
Berks County
Planning Commission
County Services Center
621 Court Street
Reading, PA 19601
817-476-6300



Map Legend

- WATERSHED BOUNDARY
- STREAMS
- WATER BODIES
- COUNTY BOUNDARIES
- MUNICIPAL BOUNDARIES
- HIGHWAYS
- OTHER ROADS
- RAILROADS
- SUBWATERSHEDS
- LIMESTONE

NOTE:
Portions of this map were generated from existing data sources as listed below. These data are shown on the map for spatial reference only. These data do not enter into any computations or affect the reliability of the hydrologic analysis. Barton Lawson Engineering has found some discrepancies in some of the data and has corrected the data in locations where discrepancies were obvious, however, it was not a part of this ACT 167 Plan to correct all of the mapping data.

DATA SOURCES:
Watershed Boundary - RRR News Act 167 Plan for Sagony Creek
Streams - RRR News Act 167 Plan for Sagony Creek
Water Bodies - RRR News Act 167 Plan for Sagony Creek (Derived from Streams data)
Roads - Berks Co. & Lehigh Valley Planning Commissions, PennDOT
Railroads - Berks Co. & Lehigh Valley Planning Commissions
Counties - West County Planning Commission
Municipalities - Berks Co. & Lehigh Valley Planning Commissions, PennDOT
Management Districts - RRR News Act 167 Plan for Sagony Creek



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PREPARED BY: SED CHECKED BY:

DATE: 12/1/2007 PROJECT #: 2503-1544-02

ORDINANCE APPENDIX E

LOW IMPACT DEVELOPMENT (LID) PRACTICES

ALTERNATIVE APPROACH FOR MANAGING STORMWATER RUNOFF

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

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

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

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

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

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

- **Avoiding introduction of impervious areas.** Careful site planning should consider reducing impervious coverage to the maximum extent possible. Building footprints, sidewalks, driveways and other features producing impervious surfaces should be evaluated to minimize impacts on runoff.
- **Reducing the Hydraulic Connectivity of Impervious Surfaces.** Impervious surfaces are significantly less of a problem if they are not directly connected to an impervious conveyance system (such as storm sewer). Two basic ways to reduce hydraulic connectivity are routing of roof runoff over lawns and reducing the use of storm sewers. Site grading should promote increasing travel time of stormwater runoff, and should help reduce concentration of runoff to a single point in the development.
- **Routing Roof Runoff Over Lawns.** Roof runoff can be easily routed over lawns in most site designs. The practice discourages direct connections of downspouts to storm sewers or parking lots. The practice also discourages sloping driveways and parking lots to the street. By routing roof drains and crowning the driveway to run off to the lawn, the lawn is essentially used as a filter strip.
- **Reducing the Use of Storm Sewers.** By reducing use of storm sewers for draining streets, parking lots, and back yards, the potential for accelerating runoff from the development can be greatly reduced. The practice requires greater use of swales and may not be practical for some development sites, especially if there are concerns for areas that do not drain in a “reasonable” time. The practice requires educating local citizens and public works officials, who expect runoff to disappear shortly after a rainfall event.
- **Reducing Street Widths.** Street widths can be reduced by either eliminating on-street parking or by reducing roadway widths. Maxatawny Township planners and traffic designers should encourage narrower neighborhood streets which ultimately could lower maintenance.
- **Limiting Sidewalks to One Side of the Street.** A sidewalk on one side of the street may suffice in low-traffic neighborhoods. The lost sidewalk could be replaced with bicycle/recreational trails that follow back-of-lot lines. Where appropriate, backyard trails should be constructed using pervious materials.
- **Using Permeable Paving Materials.** These materials include permeable interlocking concrete paving blocks or porous bituminous concrete. Such materials should be considered as alternatives to conventional pavement surfaces,

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

- **Reducing Building Setbacks.** Reducing building setbacks reduces driveway and entry walks and is most readily accomplished along low-traffic streets where traffic noise is not a problem.
- **Constructing Cluster Developments.** Cluster developments can also reduce the amount of impervious area for a given number of lots. The biggest savings is in street length, which also will reduce costs of the development. Cluster development clusters the construction activity onto less-sensitive areas without substantially affecting the gross density of development.

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

ORDINANCE APPENDIX F REFERENCES

BMP Manuals

California

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

Georgia

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

Maryland

2000 Maryland Stormwater Design Manual –

[http://www.mde.state.md.us/Programs/Waterprograms/SedimentandStormwater/stormwater design/index.asp](http://www.mde.state.md.us/Programs/Waterprograms/SedimentandStormwater/stormwater%20design/index.asp)

Massachusetts

Stormwater Management, Volume Two: Stormwater Technical Handbook (Massachusetts, 1997) – separate file available at

<http://www.state.ma.us/dep/brp/stormwtr/stormpub.htm>

Minnesota

Minnesota Urban Small Sites BMP Manual: Stormwater Best Management Practices for Cold Climates (July 2001) –

<http://www.metrocouncil.org/environment/Watershed/BMP/manual.htm>

New Jersey

Revised Manual for New Jersey: Best Management Practices for Control of Non-point Source Pollution from Stormwater (Fifth Draft May 2000) –

<http://www.state.nj.us/dep/watershedmgt/bmpmanual.htm>

New York

New York State Stormwater Management Design Manual (2001) –

<http://www.dec.state.ny.us/website/dow/swmanual/swmanual.html>

Pennsylvania

Pennsylvania Association of Conservation Districts, Pennsylvania Handbook of Best Management Practices for Developing Areas, November 14, 1997.

Washington

Stormwater Management Manual for Western Washington (August 2001) –

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

Federal

Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring (FHWA) – <http://www.fhwa.dot.gov/environment/ultraurb/3fs1.htm>

USEPA Infiltration Trench Fact Sheet (September 1999) –

<http://cfpub.epa.gov/npdes/stormwater/menuofBMP's/post.cfm>

Riparian Buffer References

Alliance for the Chesapeake Bay, Pennsylvania Department of Environmental Protection, September 2000. *Forest Buffer Toolkit*, Stream ReLeaf Program.

Penn State College of Agricultural Sciences, 1996. *Establishing Vegetative Buffer Strips Along Streams to Improve Water Quality*. Publication # AGRS-67.

Fike, Jean, June 1999. *Terrestrial & Palustrine Plant Communities of Pennsylvania*, Pennsylvania Natural Diversity Inventory, The Nature Conservancy, Western

- Pennsylvania Conservancy, and Pennsylvania Department of Conservation and Natural Resources.
- Pennsylvania Association of Conservation Districts, Inc., Keystone Chapter, Soil and Water Conservation Society, Pennsylvania Department of Environmental Protection, Natural Resources Conservation Service, 1998. *Pennsylvania Handbook of Best Management Practices for Developing Areas*. Prepared by CH2MHill.
- Palone, R. S. and A. H. Todd (eds), 1997. *Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers*. Chesapeake Bay Program and Northeastern Area State and Private Forestry. Natural Resources Conservation Service Cooperative State Research Education and Extension Services.
- The Federal Interagency Stream Restoration Working Group (FISRWG, 10/1998). *Stream Corridor Restoration Principles, Processes, and Practices*. GPO Item No. 0120-A; SuDocs No. A57.6/2:EN3/PT.653. ISBN-0-934213-59-3. Published October 1998. Revised August 2000.

Other References

- Center for Watershed Protection, *Urban Subwatershed Restoration Series, Manual # 8: Pollution Source Protection Practices*, April 2004

ORDINANCE APPENDIX G

West Nile Virus Guidance

(This source is from the Monroe County, PA Conservation District who researched the potential of West Nile Virus problems from BMP's due to a number of calls they were receiving)

**Monroe County Conservation District Guidance:
Stormwater Management and West Nile Virus**
**Source: Brodhead McMichaels Creeks Watershed Act 167 Stormwater
Management Ordinance Final Draft 2/23/04**

The Berks County Conservation District recognizes the need to address the problem of non-point source pollution impacts caused by runoff from impervious surfaces. The new stormwater policy being integrated into Act 167 Stormwater Management regulations by the PA Department of Environmental Protection (DEP) will make non-point pollution controls an important component of all future plans and updates to existing plans. In addition, to meet post-construction anti-degradation standards under the state National Pollution Discharge Elimination System (NPDES) permitting program, applicants will be required to employ Best Management Practices (BMP's) to address non-point pollution concerns.

Studies conducted throughout the United States have shown that wet basins and in particular constructed wetlands are effective in traditional stormwater management areas such as channel stability and flood control, and are one of the most effective ways to remove stormwater pollutants (United States Environmental Protection Agency 1991, Center for Watershed Protection 2000). From Maryland to Oregon, studies have shown that as urbanization and impervious surface increase in a watershed, the streams in those watersheds become degraded (CWP 2000). Although there is debate over the threshold of impervious cover when degradation becomes apparent (some studies show as little as 6% while others show closer to 20%), there is agreement that impervious surfaces cause non-point pollution in urban and urbanizing watersheds, and that degradation is ensured if stormwater BMP's are not implemented.

Although constructed wetlands and ponds are desirable from a water quality perspective there may be concerns about the possibility of these stormwater management structures becoming breeding grounds for mosquitoes. The Conservation District feels that although it may be a valid concern, Maxatawny Township should not adopt ordinance provisions prohibiting wet basins for stormwater management.

Mosquitoes

The questions surrounding mosquito production in wetlands and ponds have intensified in recent years by the outbreak of the mosquito-borne West Nile Virus. As is the case with all vector-borne maladies, the life cycle of West Nile Virus is complicated, traveling from mosquito to bird, back to mosquito and then to other animals including humans. *Culex pipiens* was identified as the vector species in the first documented cases from New York in 1999. This species is still considered the primary transmitter of the disease across its range. Today there are some 60 species of mosquitoes that inhabit

Pennsylvania. Along with *C. pipiens*, three other species have been identified as vectors of West Nile Virus while four more have been identified as potential vectors.

The four known vectors in NE Pennsylvania are *Culex pipiens*, *C. restuans*, *C. salinarius* and *Ochlerotatus japonicus*. All four of these species prefer, and almost exclusively use, artificial containers (old tires, rain gutters, birdbaths, etc.) as larval habitats. In the case of *C. pipiens*, the most notorious of the vector mosquitoes, the dirtier the water the better they like it. The important factor is that these species do not thrive in functioning wetlands where competition for resources and predation by larger aquatic and terrestrial organisms is high.

The remaining four species, *Aedes vexans*, *Ochlerotatus Canadensis*, *O. triseriatus* and *O. trivittatus* are currently considered potential vectors due to laboratory tests (except the *O. trivittatus*, which did have one confirmed vector pool for West Nile Virus in PA during 2002). All four of these species prefer vernal habitats and ponded woodland areas following heavy summer rains. These species may be the greatest threat of disease transmission around stormwater basins that pond water for more than four days. This can be mitigated however by establishing ecologically functioning wetlands.

Stormwater Facilities

If a stormwater wetland or pond is constructed properly and a diverse ecological community develops, mosquitoes should not become a problem. Wet basins and wetlands constructed as stormwater management facilities, should be designed to attract a diverse wildlife community. If a wetland is planned, proper hydrologic soil conditions and the establishment of hydrophytic vegetation will promote the population of the wetland by amphibians and other mosquito predators. In natural wetlands, predatory insects and amphibians are effective at keeping mosquito populations in check during the larval stage of development while birds and bats prey on adult mosquitoes.

The design of a stormwater wetland must include the selection of hydrophytic plant species for their pollutant uptake capabilities and for not contributing to the potential for vector mosquito breeding. In particular, species of emergent vegetation with little submerged growth are preferable. By limiting the vegetation growing below the water surface, larvae lose protective cover and there is less chance of anaerobic conditions occurring in the water.

Stormwater ponds can be designed for multiple purposes. When incorporated into an open space design a pond can serve as a stormwater management facility and a community amenity. Aeration fountains and stocked fish should be added to keep larval mosquito populations in check.

Publications from the PA Department of Health and the Penn State Cooperative Extension concerning West Nile Virus identify aggressive public education about the risks posed by standing water in artificial containers (tires, trash cans, rain gutters, bird baths) as the most effective method to control vector mosquitoes.

Conclusion

The Conservation District understands the pressure faced by Maxatawny Township when dealing with multifaceted issues such as stormwater management and encourages the incorporation of water quality management techniques into stormwater designs. As Berks County continues to grow, conservation design, groundwater recharge

and constructed wetlands and ponds should be among the preferred design options to reduce the impacts of increases in impervious surfaces. When designed and constructed appropriately, the runoff mitigation benefits to the community from these design options will far out weigh their potential to become breeding grounds for mosquitoes.

**ORDINANCE APPENDIX H
FLOW CHARTS**

ORDINANCE APPENDIX I

Voluntary Stormwater Management Practices for projects which are exempt under Section 402 of this Ordinance

VOLUNTARY STORMWATER MANAGEMENT PROCEDURES FOR PROJECTS MEETING THE LAND COVER EXEMPTION CRITERIA

What are the Act 167 Stormwater Management Requirements?

Pennsylvania Act 167 was authorized on October 4, 1978 (32 P.S., P.L. 864) and gave Pennsylvania Municipalities the power to regulate activities that affect stormwater runoff, surface and groundwater quantity and quality.

Who is affected by these requirements?

The Act 167 Stormwater Management Requirements affect all NEW development in the Sacony Creek watershed. Individual home construction projects on single family lots which are exempt under Section 402 of this Ordinance, are not required to submit formal drainage plans to the Municipality or County; however, they are still required to address Water Quality and Groundwater Recharge criteria specified in the Sacony Creek Watershed Stormwater Ordinance (Ord. Sections 305 and 306).

Do I require professional services to meet these requirements?

This brochure has been developed to assist the individual homeowner in meeting the water quality and groundwater recharge goals of the Sacony Watershed Stormwater Ordinance. If the guidelines presented in this brochure are followed, the individual homeowner will not require professional services to comply with these water quality and groundwater recharge goals.

What do I need to Send to the Municipality?

Even though a formal drainage plan is not required for individual lot owners, a brief description of the proposed infiltration facilities, including types of material to be used, total impervious areas and volume calculations as shown above, and a simple sketch plan showing the following information shall be submitted to the contractor prior to construction:

- Location of proposed structures, driveways or other paved areas with approximate size in square feet.
- Location of any existing or proposed on site septic system and/or potable water wells showing rough proximity to infiltration facilities.

Determination of Recharge Volume

The amount of recharge volume that should be provided can be determined by following the simple steps below. Impervious area calculations should include all areas on the individual lots that are covered by roof area or pavement which would prevent rain from naturally percolating into the ground, including sidewalks, driveways or parking areas. Sidewalks, driveways or patios that are constructed with gravel or turf pavers and will not be blacktopped in the future, need not be included in this calculation.

Example Recharge Volume:

STEP 1 – Determine Total Impervious Surfaces:

House Roof (Front)	12 ft. x 48 ft.	=	576 sq. ft.
House Roof (Rear)	12 ft. x 48 ft.	=	576 sq. ft.
Driveway	12 ft. x 50 ft.	=	600 sq. ft.
Parking Pad	12 ft. x 12 ft.	=	144 sq. ft.
Walkway	6 ft. x 20 ft.	=	120 sq. ft.

			2,016 sq. ft.

STEP 2 – Determine Required Infiltration Volume (Rv) Using the Following Equation

$$R_v = \frac{0.42 \text{ inches} \times (\text{total impervious area in square feet})}{12} = \text{_____ cubic feet of recharge}$$

$$R_v = \frac{0.42 \text{ in.} \times 2,016 \text{ sq. ft.}}{12} = 70.6 \text{ cu. ft.}$$

STEP 3 – Sizing of Select Infiltration Method

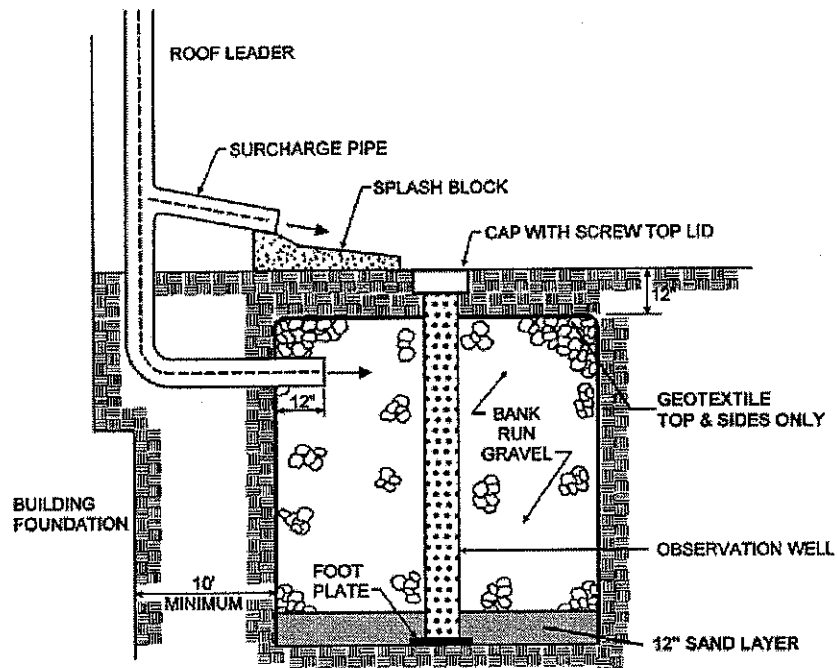
The following pages show several methods of infiltrating stormwater runoff from residential areas. Their appropriateness depends on the amount of infiltration volume required and the amount of land available. More than one method can be implemented on a site, depending on site constraints. Dry wells should be used only for receiving runoff from roof drains. Infiltration trenches are appropriate for receiving runoff from driveways, sidewalk or parking areas. Other methods may be appropriate, but these should be discussed with the municipal engineer prior to installation.

Dry Wells

Dry wells are effective methods of infiltrating runoff from roof leaders. These facilities should be located a minimum of 10 feet from the building foundation to avoid seepage problems. A dry well can be either a structural prefabricated chamber or an excavated pit filled with aggregate. Construction of a dry well should be performed after all other areas of the site are stabilized, to avoid clogging. During construction, compaction of the subgrade soil should be avoided and construction should be performed with only light machinery. Depth of dry wells in excess of 3 ½ feet should be avoided. Gravel fill should be an average 1.5 – 3.0 inches in diameter. Dry wells should be inspected at least four times annually as well as after large storm events.

FIGURE I-1

TYPICAL DRY WELL CONFIGURATION



Source: Maryland Stormwater Design Manual, 2000

Example Sizing:

STEP 1 – Determine Total Impervious Surfaces

House Roof Area: 12 ft. x 48 ft. = 576 sq. ft.

STEP 2 – Determine Require Infiltration Volume using Equation

$$\frac{0.42 \text{ in.} \times 576 \text{ sq. ft.}}{12} = 20.2 \text{ cu. ft.}$$

$$\frac{20.2 \text{ cu. ft.}}{0.4^*} = 50.4 \text{ cu. ft.} \text{ (* assume 40\% void ratio in gravel bed)}$$

STEP 3 – Sizing of Select Infiltration Method

Volume of facility = Depth x Width x Length

Set D = 3.5 ft.; Set W = L for a square chamber

$$50.4 \text{ cu. ft.} = 3.5 \text{ ft.} \times L \times L; L = 3.8 \text{ ft}$$

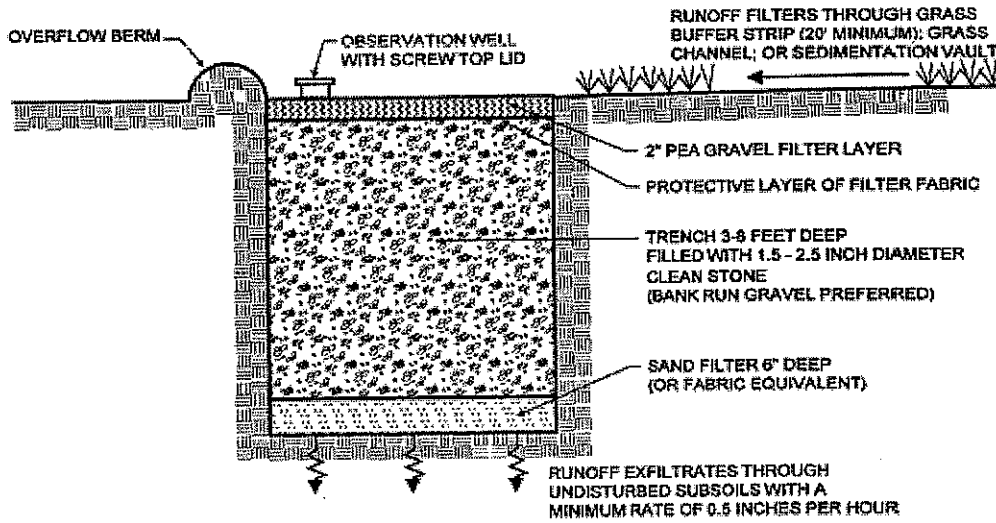
Final Facility Dimensions: 3.5 ft. (D) x 3.8 ft. (W) x 3.8 ft. (L)

Infiltration Trenches

An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. Runoff is stored in the void space between the stones and infiltrates through the bottom and into the soil matrix. Infiltration trenches perform well for removal of fine sediment and associated pollutants. Pretreatment using buffer strips, swales, or detention basins is important for limiting amounts of coarse sediment entering the trench which can clog and render the trench ineffective.

FIGURE I-2

TYPICAL INFILTRATION TRENCH CONFIGURATION



Source: Maryland Stormwater Design Manual, 2000

Example Sizing:

STEP 1 – Determine Total Impervious Surfaces

Driveway	12 ft. x 50 ft.	=	600 sq. ft.
Parking Pad	12 ft. x 12 ft.	=	144 sq. ft.
Walkway	6 ft. x 20 ft.	=	120 sq. ft.

			864 sq. ft.

STEP 2 -- Determine Required Infiltration Volume using Equation

$$\frac{0.42 \text{ in.} \times 864 \text{ sq. ft.}}{12} = 30.2 \text{ cu. ft.}$$

$$\frac{30.2 \text{ cu. ft.}}{0.4^*} = 75.5 \text{ cu. ft. (* assume 40% void ratio in gravel bed)}$$

STEP 3 -- Sizing of Select Infiltration Method

Volume of facility = Depth x Width x Length

Set D = 3 ft.; Determine Required Surface Area of Trench

$$75.5 \text{ cu. ft.} / 3 \text{ ft.} = 25.2 \text{ sq. ft.}$$

The width of the trench should be greater than 2 times its depth (2 x D); therefore in this example a trench width of 6 feet is selected;

$$\text{Determine trench length: } L = 25.2 \text{ sq. ft.} / 6 \text{ ft.} = 4.2 \text{ ft.}$$

Final Trench Dimensions: 3 ft. (D) x 6 ft. (W) x 4.2 ft. (L)

FIGURE I-3

SAMPLE SITE SKETCH PLAN

