CHAPTER 26

STORMWATER/WATER/WELLS

PART 1

STORMWATER MANAGEMENT

A. GENERAL PROVISIONS

§26-101. Short Title
§26-102. Statement of Findings
§26-103. Purpose
§26-104. Statutory Authority
§26-105. Applicability/Regulated Activities
§26-106. Exemptions
§26-107. Compatibility with Other Ordinance or Legal Requirements

B. DEFINITIONS

§26-111. Interpretation
§26-112. Definitions

C. STORMWATER MANAGEMENT

§26-121. General Requirements
§26-122. Permit Requirements by Other Governmental Entities
§26-123. Volume Control
§26-124. Stormwater Peak Rate Control and Management Districts
§26-125. Calculation Methodology
§26-126. Other Requirements

D. STORMWATER MANAGEMENT (SWM) SITE PLAN REQUIREMENTS

§26-131. General Requirements
§26-132. SWM Site Plan Requirements
§26-133. Plan Submission
§26-134. Stormwater Management (SWM) Site Plan Review
§26-135. Modification of Plans
§26-136. Resubmission of Disapproved SWM Site Plans
§26-137. Authorization to Construct and Term of Validity

E. INSPECTIONS

§26-141. Inspections

F. FEES AND EXPENSES

§26-151. Municipal Stormwater Management (SWM) Site Plan Review and Inspection Fee
§26-152. Expenses Covered by Fees

G. MAINTENANCE RESPONSIBILITIES

§26-161. Performance Guarantee
§26-162. Responsibilities for Operations and Maintenance (O&M) of Stormwater Facilities and BMPs
§26-163. Municipal Review of Stormwater Facilities and BMP Operations and Maintenance (O&M) Plan
§26-164. Operations and Maintenance (O&M) Agreement for Privately Owned Stormwater Facilities and BMPs
§26-165. Stormwater Management Easements

H. PROHIBITIONS

§26-171. Prohibited Discharges
§26-172. Roof Drains
§26-173. Alteration of SWM BMPs

I. ENFORCEMENT AND PENALTIES

§26-181. Right-of-Entry
§26-182. Inspection
§26-183. Enforcement
§26-184. Suspension and Revocation of Permits and Approvals
§26-185. Penalties
§26-186. Appeals

PART 2

WATER CONSERVATION

§26-201. General Policy
§26-202. Water Conservation Performance Standards for Plumbing Fixtures and Fittings
§26-203. Special Provisions
§26-204. Official Review and Modification
§26-205. Penalties

PART 3

WATER SUPPLY FACILITIES

§26-301. Water Facilities Plan
§26-302. Contents of the Water Facilities Plan
§26-303. Review and Approval Required for New Water Supply Systems and for Extension of Existing Systems
§26-304. Township Action on Application
§26-305. Violation and Penalties

PART 4

CONSTRUCTION OF WELLS AND THE WITHDRAWAL OF GROUNDWATER

§26-401. Purpose
§26-402. Severability
§26-403. Applicability
§26-404. Permit Procedures
§26-405. General Well Construction Standards
§26-406. Exemption

Appendix A Stormwater Runoff Peak Rate Districts Watershed Map
Appendix B Stormwater Management Design Criteria
Appendix C West Nile Virus Guidance
Appendix D Low-Impact Development (LID) Practices

PART 1

STORMWATER MANAGEMENT

A. General Provisions.

§26-101. Short Title.

This Part shall be known and may be cited as the "Neshaminy Creek Watershed Stormwater Management Ordinance" (a.k.a. Neshaminy/Little Neshaminy Stormwater Management Ordinance).

(Ord. 2011-04-01, 4/4/2011, §101)

§26-102. Statement of Findings.

The governing body of the Municipality finds that:

A. Inadequate management of accelerated stormwater runoff resulting from development and redevelopment throughout a watershed increases flood flows and velocities, contributes to erosion and sedimentation, overtaxes the carrying capacity of streams and storm sewers, greatly increases the cost of public facilities to 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 streambeds and streambanks, thereby elevating sedimentation), destroying aquatic habitat, and elevating aquatic pollutant concentrations and loadings such as sediments, nutrients, heavy metals, and pathogens.

C. A comprehensive program of stormwater management (SWM), including reasonable regulation of development and activities causing accelerated runoff, is fundamental to the public health, safety, welfare, and the protection of the people of the Municipality and all the people of the Commonwealth, their resources, and the environment.

D. Stormwater is an important water resource by providing groundwater recharge for water supplies and base flow of streams, which also protects and maintains surface water quality.

E. Public education on the control of pollution from stormwater is an essential component in successfully addressing stormwater.

F. Federal and State regulations require certain municipalities to implement a program of stormwater controls. These municipalities are required to obtain a permit for stormwater discharges from their separate storm sewer systems under the National Pollutant Discharge Elimination System (NPDES).

(Ord. 2011-04-01, 4/4/2011, §102)

§26-103. Purpose.

The purpose of this Part is to promote the public health, safety, and welfare within the Neshaminy Creek watershed by maintaining the natural hydrologic regime and by minimizing the harms and maximizing the benefits described in §26-102 of this Part, through provisions designed to:

A. Meet legal water quality requirements under State law, including regulations at 25 Pa.Code, Chapter 93, to protect, maintain, reclaim, and restore the existing and designated uses of the waters of this Commonwealth.

B. Minimize increases in stormwater volume and control peak flows.

C. Minimize impervious surfaces.

D. Provide review procedures and performance standards for stormwater planning and management.

E. Preserve the natural drainage systems as much as possible.

F. Manage stormwater impacts close to the runoff source, requiring a minimum of structures and relying on natural processes.

G. Focus on infiltration of stormwater to maintain groundwater recharge, to prevent degradation of surface and groundwater quality, and to otherwise protect water resources.

H. Preserve and restore the flood-carrying capacity of streams.

I. Prevent scour and erosion of streambanks and stream beds.

J. Provide standards to meet National Pollution Discharge Elimination System (NPDES) permit requirements.

K. Address certain requirements of the Municipal Separate Stormwater Sewer System (MS4) NPDES Phase II stormwater regulations.

Provide for proper operation and maintenance of all stormwater management facilities and best management practices (BMPs) that are implemented in the Municipality.

(Ord. 2011-04-01, 4/4/2011, §103)

§26-104. Statutory Authority.

The Municipality is empowered to regulate land use activities that affect runoff, surface, and groundwater quality and quantity by the authority of:

A. Pennsylvania Municipalities Planning Code, Act 247, as amended.

B. Cite applicable municipal code, (e.g., Second Class Township Code (Act 69 of 1933, P.L. 103; 53 P.S. §65101, as amended) and Borough Code (Act 581 of 1965, P.L. 1656; 53 P.S. §45101, as amended)).

(Ord. 2011-04-01, 4/4/2011, §104)

§26-105. Applicability/Regulated Activities.

1. All regulated activities and all activities that may affect stormwater runoff, including land development and earth disturbance activity, are subject to regulation by this Part.

2. Regulated activities include, but are not limited to:

A. Land development.

B. Subdivisions.

C. Prohibited or polluted discharges.

D. Alteration of the natural hydrologic regime.

E. Construction or reconstruction of, or addition of new impervious or semi-pervious surfaces (i.e., driveways, parking lots, roads, etc.), except for reconstruction of roads where there is no increase in impervious surface.

F. Construction of new buildings or additions to existing buildings.

G. Redevelopment.

H. Diversion piping or encroachments in any natural or man-made channel, and Nonstructural and structural stormwater management best management practices (BMPs) or appurtenances thereto.

I. Any of the above regulated activities which were approved more than five years prior to the effective date of this Part are resubmitted for municipal approval.

3. In the event of any conflict between the regulations and requirements set forth in this Part and the Township's Subdivision and Land Development Ordinance [Chapter 22], the more restrictive standard or the regulation imposing the higher standard

shall be controlling. The standards and requirements set forth in this Part and those similar standards and requirements set forth in the Township's Subdivision and Land Development Ordinance [Chapter 22] are intended to be read together when determining compliance.

(Ord. 2011-04-01, 4/4/2011, §105)

§26-106. Exemptions.

1. Regulated activities that create impervious surfaces smaller than or equal to 1,000 square feet are exempt from the peak rate control requirements and the SWM site plan preparation located in Subpart D of this Part unless the activity is found to be a significant contributor of pollution to the waters of this Commonwealth.

2. Regulated activities that create impervious surfaces between 1,001 square feet up to and including 5,000 square feet are exempt only from the peak rate control requirements of this Part.

Table 26-106.1
Impervious Surface Exemption Thresholds for the Neshaminy Creek Watershed

Ordinance Subpart or Section	Type of Project	Proposed Impervious Surface		
		0–1,000 sq. ft.	1,001–5,000 sq. ft.	5,000 + sq. ft.
Subpart D, SWM Site Plan Requirements	Development	Exempt	Not Exempt	Not Exempt
§26-123, Volume Control Requirements	Development	Not Exempt	Not Exempt	Not Exempt
§26-124, Peak Rate Control Requirements	Development	Exempt	Exempt	Not Exempt
Erosion and Sediment Pollution Control Requirements	Must comply with Title 25, Chapter 102 of the Pa.Code and any other applicable State, County, and municipal codes.			

3. Agricultural activity is exempt from the peak rate control requirements and SWM site plan preparation requirements of this Part provided the activities are performed according to the requirements of 25 Pa.Code, Chapter 102.

4. Forest management and timber operations are exempt from the peak rate control requirements and SWM site plan preparation requirements of this Part provided the activities are performed according to the requirements of 25 Pa.Code, Chapter 102.

5. Any aspect of BMP maintenance to an existing SWM system made in accordance with plans and specifications previously approved by the Township is exempt.

6. The use of land for gardening for home consumption is exempt from the requirements of this Part.

7. Exemptions from any provisions of this Part shall not relieve the applicant from the requirements in §26-121.4 through .12.

8. Additional Exemption Criteria:

   A. Exemption Responsibilities. An exemption shall not relieve the applicant from implementing such measures as are necessary to protect public health, safety, and property.

   B. Drainage Problems. Where drainage problems are documented or known to exist downstream of or is expected from the proposed activity, the Municipality may deny exemptions.

   C. Exemptions are limited to specific portions of this Part.

   D. HQ and EV Streams. The Municipality may deny exemptions in high quality (HQ) or exceptional value (EV) waters and source water protection areas (SWPA).

   E. Maintenance Exemption. Any maintenance to an existing stormwater management system made in accordance with plans and specifications approved by the Municipal Engineer or Township.

(Ord. 2011-04-01, 4/4/2011, §106)

§26-107. Compatibility with Other Ordinance or Legal Requirements.

Approvals issued pursuant to this Part do not relieve the applicant of the responsibility to secure required permits or approvals for activities regulated by any other applicable code, rule, act, or ordinance.

(Ord. 2011-04-01, 4/4/2011, §109)

B. Definitions.

§26-111. Interpretation.

For the purposes of this Part, 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."

(Ord. 2011-04-01, 4/4/2011, §210)

§26-112. 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 ACTIVITY—activities associated with agriculture such as agricultural cultivation, agricultural operation, and animal heavy use areas. This includes the work of producing crops including tillage, land clearing, plowing, disking, harrowing, planting, harvesting crops or pasturing and raising of livestock and installation of conservation measures. Construction of new buildings or impervious area is not considered an agricultural activity.

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 as the result of changing the land cover including the water, vegetation and bare soil.

APPLICANT—a person who has filed an application for approval to engage in any regulated activity defined in §26-105 of this Part.

AS-BUILT DRAWINGS—engineering or site drawings maintained by the contractor as he constructs the project and upon which he documents the actual locations of the building components and changes to the original contract documents. These documents, or a copy of same, are turned over to the qualified professional at the completion of the project.

BANKFULL—the channel at the top-of-bank, or point from 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.

BEST MANAGEMENT PRACTICES (BMP)—activities, facilities, designs, measures, or procedures used to manage stormwater impacts from regulated activities, to meet State water quality requirements, to promote groundwater recharge, and to otherwise meet the purposes of this Part. Stormwater BMPs are commonly grouped into one of two broad categories or measures: "structural" or "nonstructural." In this Part, nonstructural BMPs or measures refer to operational and/or behavior-related practices that attempt to minimize the contact of pollutants with stormwater runoff whereas structural BMPs or measures are those that consist of a physical device or practice that is installed to capture and treat stormwater runoff. Structural BMPs include, but are not limited to, a wide variety of practices and devices, from large-scale retention ponds and constructed wetlands, to small-scale underground treatment systems, infiltration facilities, filter strips, low impact design, bioretention, wet ponds, permeable paving, grassed swales, riparian or forested buffers, sand filters, detention basins, and manufactured devices. Structural stormwater BMPs are permanent appurtenances to the project site.

BIORETENTION—a stormwater retention area that utilizes woody and herbaceous plants and soils to remove pollutants before infiltration occurs.

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 (see "top-of-bank").

CHANNEL—an open drainage feature through which stormwater flows. Channels include, but shall not be limited to, natural and man-made watercourses, swales, streams, ditches, canals, and pipes that convey continuously or periodically flowing water.

CISTERN—an underground reservoir or tank for storing rainwater.

CONSERVATION DISTRICT—the Bucks County Conservation District.

CULVERT—a structure with its appurtenant works, which carries water under or through an embankment or fill.

CURVE NUMBER—value used in the soil cover complex method. It is a measure of the percentage of precipitation which is expected to run off from the watershed and is a function of the soil, vegetative cover, and tillage method.

DAM—a man-made barrier, together with its appurtenant works, constructed for the purpose of impounding or storing water or another fluid or semifluid. A dam may include a refuse bank, fill or structure for highway, railroad or other purposes which impounds or may impound water or another fluid or semifluid.

DEPARTMENT—the Pennsylvania Department of Environmental Protection (PADEP).

DESIGNEE—the agent of the Bucks County, Bucks County Conservation District, and/or agent of the governing body involved with the administration, review, or enforcement of any provisions of this Part by contract or memorandum of understanding.

DESIGN PROFESSIONAL (QUALIFIED)—a Pennsylvania registered professional engineer, registered landscape architect or registered professional land surveyor trained to develop stormwater management plans.

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.

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 soon after a rainfall event and become dry until the next rainfall event.

DETENTION VOLUME—the volume of runoff that is captured and released into the waters of the Commonwealth at a controlled rate.

DEVELOPER—a person that seeks to undertake a land development or subdivision.

DEVELOPMENT—any human-induced change to improved or unimproved real estate, whether public or private, including, but not limited to, land development, construction, installation, or expansion of a building or other structure, land division, street construction, drilling, and site alteration such as embankments, dredging, grubbing, grading, paving, parking or storage facilities, excavation, filling, stockpiling, or clearing. As used in this Part, development encompasses both new development and redevelopment.

DEVELOPMENT SITE—the specific tract or parcel of land where any regulated activity set forth in §26-105 is planned, conducted or maintained.

DIFFUSED DRAINAGE DISCHARGE—drainage discharge that is not confined to a single point location or channel, including sheet flow or shallow concentrated flow.

DISCHARGE—A. (verb) To release water from a project, site, aquifer, drainage basin or other point of interest (verb); B. (noun) The rate and volume of flow of water such as in a stream, generally expressed in cubic feet per second. See also “peak discharge.”

DISCHARGE POINT—the point of discharge for a stormwater facility.

DISCONNECTED IMPERVIOUS AREA (DIA)—an impervious or impermeable surface that is disconnected from any stormwater drainage or conveyance system and is redirected or directed to a pervious area, which allows for infiltration, filtration, and increased time of concentration.

DISTURBED AREAS—unstabilized land area where an earth disturbance activity is occurring or has occurred.

DITCH—a man-made waterway constructed for irrigation or stormwater conveyance purposes.

DRAINAGE CONVEYANCE FACILITY—a stormwater management facility designed to transport stormwater runoff that includes channels, swales, pipes, conduits, culverts, and storm sewers.

DRAINAGE EASEMENT—a right granted by a landowner to a grantee, allowing the use of private land for stormwater management purposes.

DRAINAGE PERMIT—a permit issued by the Municipality after the SWM site plan has been approved.

EARTH DISTURBANCE ACTIVITY—a construction or other human activity that disturbs the surface of land, including, but not limited to, clearing and grubbing, grading, excavations, embankments, land development, agricultural plowing or tilling, timber harvesting activities, road maintenance 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.

EXISTING RESOURCES AND SITE ANALYSIS MAP—a base map which identifies fundamental environmental site information, including floodplains, wetlands, topography, vegetative site features, natural areas, prime agricultural land and areas supportive of endangered species.

EROSION—the process by which the surface of the land, including water/stream channels, is worn away by water, wind, or chemical action.

EROSION AND SEDIMENT CONTROL PLAN—a site-specific plan identifying BMPs to minimize accelerated erosion and sedimentation. For agricultural plowing or tilling activities, the erosion and sediment control plan is that portion of a conservation plan identifying BMPs 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 antidegradation).

EXISTING CONDITIONS—the initial condition of a project site prior to the proposed alteration.

EXISTING RECHARGE AREA—undisturbed surface area or depression where stormwater collects and a portion of which infiltrates and replenishes the groundwater.

FLOOD—a temporary condition of partial or complete inundation of land areas from the overflow of streams, rivers, and other waters of the Commonwealth.

FLOODPLAIN—any land area susceptible to inundation by water from any natural source or as delineated by applicable Department of Housing and Urban Development, Federal Insurance Administration Flood Hazard Boundary Map as being a special flood hazard area.

FLOODWAY—the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

FOREST MANAGEMENT/TIMBER OPERATIONS—planning and associated activities necessary for the management of forestland. 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.

GOVERNING BODY—elected municipal officials of municipalities (e.g., Township Supervisors or Township Council or Borough Council).

GRADE—A. (noun) A slope, usually of a road, channel or natural ground specified in percent and shown on plans as specified herein. B. (verb) To finish the surface of a roadbed, the top of an embankment, or the bottom of excavation.

GROUNDWATER—water beneath the earth's surface that supplies wells and springs, and is often between saturated soil and rock.

GROUNDWATER RECHARGE—the replenishment of existing natural underground water supplies from rain or overland flow.

HEC-HMS—the U.S. Army Corps of Engineers, Hydrologic Engineering Center (HEC)-Hydrologic Modeling System (HMS). This model was used to model the Neshaminy Creek watershed during the Act 167 Plan development and was the basis for the standards and criteria of this Part.

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).

HOT SPOT—an area where land use or activity generates highly contaminated runoff, with concentrations of pollutants in excess of those typically found in stormwater. Typical pollutant loadings in stormwater may be found in Chapter 8, §6, of the Pennsylvania Stormwater Best Management Practices Manual, Pennsylvania Department of Environmental Protection (PADEP) No. 363-0300-002 (2006). More information concerning hot spots may be found in §26-126.1 of this Part.

HYDROGRAPH—a graph representing the discharge of water versus time for a selected point in the drainage system.

HYDROLOGIC REGIME—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—surfaces which prevent the infiltration of water into the ground, including all buildings, streets, parking areas, driveways, roads, sidewalks, swimming pools and any area in concrete, asphalt, gravel, stone or similar materials. Impervious surfaces also include other areas determined to be impervious by the Township Engineer.

IMPOUNDMENT—a retention or detention basin designed to retain stormwater runoff and release it at a controlled rate.

INFILL DEVELOPMENT—development that occurs on smaller parcels that remain undeveloped but are within or very close proximity to urban or densely developed areas. Infill development usually 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 percolated downward to recharge groundwater.

INFILTRATION STRUCTURES—a structure designed to direct runoff into the underground water (e.g., French drains, seepage pits, or seepage trenches).

INITIAL ABSTRACTION (Ia)—the value used to calculate the volume or peak rate of runoff in the soil cover complex method. It represents the depth of rain retained on vegetation plus the depth of rain stored on the soil surface plus the depth of rain infiltrated prior to the start of runoff.

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 or groundwater discharge.

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

LAND DEVELOPMENT—any of the following activities:

A. The improvement of one lot or two or more contiguous lots, tracts, or parcels of land for any purpose involving:

(1) A group of two or more residential or nonresidential buildings, whether proposed initially or cumulatively, or a single nonresidential building on a lot or lots regardless of the number of occupants or tenure.

(2) 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.

B. A subdivision of land.

C. Development in accordance with §503(1.1) of the PA Municipalities Planning Code.

LOT—a designated parcel, tract or area of land established by a plat or otherwise as permitted by law and to be used, developed or built upon as a unit.

LOW IMPACT DEVELOPMENT (LID) PRACTICES—practices that will minimize proposed conditions runoff rates and volumes, which will minimize needs for artificial conveyance and storage facilities.

MAIN STEM (MAIN CHANNEL)—any stream segment or other runoff conveyance used as a reach in the Neshaminy 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.

MUNICIPAL ENGINEER—a professional engineer licensed as such in the Commonwealth of Pennsylvania, duly appointed as the engineer for a municipality, planning agency or joint planning commission.

MUNICIPALITY—New Britain Township, Bucks County, Pennsylvania.

NATURAL HYDROLOGIC REGIME—see “hydrologic regime.”

NONPOINT 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.

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

NRCS—Natural Resource Conservation Service (previously Soil Conservation Service).

OUTFALL—"point source" as described in 40 CFR §122.2 at the point where the Municipality's storm sewer system discharges to surface waters of the Commonwealth.

OUTLET—points of water disposal to a stream, river, lake, tidewater or artificial drain.

PARENT TRACT—the parcel of land from which a land development or subdivision originates, determined from the date of municipal adoption of this Part.

PEAK DISCHARGE—the maximum rate of stormwater runoff from a specific storm event.

PENN STATE RUNOFF MODEL (PSRM)—the computer-based hydrologic model developed at the Pennsylvania State University.

PERENNIAL STREAM—a stream which contains water at all times except during extreme drought.

PIPE—a culvert, closed conduit, or similar structure (including appurtenances) that conveys stormwater.

PLANNING COMMISSION—the Planning Commission of New Britain 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 during which disturbed areas are stabilized, stormwater controls are in place and functioning, and all proposed improvements in the approved land development plan are completed.

PREDEVELOPMENT—see "existing condition."

PRETREATMENT—techniques employed in stormwater BMPs to provide storage or filtering to trap coarse materials and other pollutants before they enter the system, but not necessarily designed to meet the volume requirements of §26-123.

PERVIOUS SURFACE—a surface that allows the infiltration of water into the ground.

PROJECT SITE—the specific area of land where any regulated activities in the Municipality are planned, conducted or maintained.

QUALIFIED PROFESSIONAL—any person licensed by the Pennsylvania Department of State or otherwise qualified by law to perform the work required by the ordinance.

RATIONAL METHOD—a 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 Engineer to the client. The Engineer reviews the contractor's as-built drawings against his/her own records for completeness, then either turns these over to the client or transfers the information to a set of reproducibles, in both cases for the client's permanent records. Record drawings are not the same as record plans submitted for recording with the County in accordance with the PA Municipalities Planning Code (Act 247).

REDEVELOPMENT—any development that requires demolition or removal of existing structures or impervious surfaces at a site and replacement with new impervious surfaces. Maintenance activities such as top-layer grinding/milling and re-paving are not considered to be redevelopment and are not considered earth disturbance. Interior remodeling projects and tenant improvements are also not considered to be redevelopment. Utility trenches in streets are not considered redevelopment. The limit of disturbance for a utility trench shall be restricted to the trench width and include staging areas outside of an impervious surface.

REGULATED ACTIVITIES—any earth disturbance activities or any activities that involve the alteration or development of land in a manner that may affect stormwater runoff.

REGULATED EARTH DISTURBANCE ACTIVITY—activity involving earth disturbance subject to regulation under 25 Pa.Code, Chapter 92, 25 Pa.Code, 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 proposed conditions peak rate of runoff must be reduced to protect downstream areas.

REPAVING—replacement of the impervious surface that does not involve reconstruction of an existing paved (impervious) surface.

REPLACEMENT PAVING—reconstruction of and full replacement of an existing paved (impervious) surface.

RETENTION BASIN—a structure in which stormwater is stored and not released during the storm event. Retention basins are designed for infiltration purposes, and do not have an outlet. The retention basin must infiltrate stored water in three days or less.

RETENTION VOLUME/REMOVED RUNOFF—the volume of runoff that is captured and not released directly into the surface waters of the Commonwealth during or after a storm event.

RETURN PERIOD—the probability an event will occur in any given year. Typically displayed as a whole number, e.g., 25-year event, and represents the inverse of the frequency of that event. For example, the 25-year return period rainfall gives the probability, $^{1}/_{25}$ or 4%, which that size storm will occur in any given year.

ROAD MAINTENANCE—earth disturbance activities within the existing road cross-section, such as grading and repairing existing 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.

RUNOFF—any part of precipitation that flows over the land surface.

SALDO—Subdivision and Land Development Ordinance [Chapter 22].

SEDIMENT—soils or other materials transported by surface water as a product of erosion.

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. More information on seepage pits may be found in the PA BMP Manual, December 2006, Chapter 6, §4.

SEPARATE STORM SEWER SYSTEM—a conveyance or system of conveyances (including roads with drainage systems, municipal 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 PROTECTION SUBWATERSHEDS—watersheds that have been designated in Pennsylvania Code, Title 25, "Environmental Protection," Chapter 93, "Water Quality Standards," as exceptional value (EV) or high quality (HQ) waters.

SPILLWAY—a conveyance that is used to pass the peak discharge of the maximum design storm that is controlled by the stormwater facility.

STATE WATER QUALITY REQUIREMENTS—the regulatory requirements to protect, maintain, reclaim, and restore water quality under Title 25 of the Pennsylvania Code and the Clean Streams Law.

STORM FREQUENCY—the number of times that a given storm "event" occurs or is exceeded on the average in a stated period of years. See "return period."

STORM SEWER—a system of pipes and/or open channels that convey intercepted runoff and stormwater from other sources, but excludes domestic sewage and industrial wastes.

STORMWATER—the surface runoff generated by precipitation reaching the ground surface.

STORMWATER MANAGEMENT BEST MANAGEMENT PRACTICES—is abbreviated as BMPs or SWM BMPs throughout this Part.

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 watershed plan, known as the "Neshaminy Creek Watershed Act 167 Stormwater Management Plan," for managing those land use activities that will influence stormwater runoff quality and quantity and that would impact the Neshaminy Creek Watershed adopted by Bucks and Montgomery Counties as required by the Act of October 4, 1978, P.L. 864 (Act 167).

STORMWATER SWM 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 Part.

STREAM—a flow of water in a natural channel or bed, as a brook, rivulet, or a small river.

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 the Commonwealth.

STREAMBANK EROSION—the widening, deepening, or headward cutting of channels and waterways, caused by stormwater runoff or bankfull flows.

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 the subdivision by lease of land for agricultural purposes into parcels of more than 10 acres, not involving any new street or easement of access or any residential dwelling, shall be exempted.

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

SWALE—a low lying stretch of land that gathers or carries surface water runoff.

SWM SITE PLAN—the documentation of the stormwater management system to be used for a given development site, the contents of which are established in §26-132.

TIMBER OPERATIONS—see "forest management."

TIME-OF-CONCENTRATION (TC)—the time required 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.

TOTAL SITE AREA—the area of a site that is to be disturbed and all onsite areas, whether disturbed or undisturbed, that will drain to a proposed stormwater management facility.

VEGETATED SWALE—a natural or man-made waterway, usually broad and shallow, covered with erosion-resistant grasses, used to convey surface water.

VERNAL POOL—seasonal depressional 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 a 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 the Commonwealth.

WATERSHED—region or area drained by a river, watercourse, or other body of water, whether natural or artificial.

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. Wetlands generally include swamps, marshes, bogs, fens, and similar areas.

(Ord. 2011-04-01, 4/4/2011, §211)

C. **Stormwater Management**.

§26-121. General Requirements.

1. Applicants proposing regulated activities in the Neshaminy Creek watershed that do not fall under the exemption criteria shown in §26-106 shall submit a stormwater management (SWM) site plan consistent with the Neshaminy Creek Watershed SWM Plan to the Municipality for review. The SWM criteria of this Part shall apply to the total proposed development even if development is to take place in stages. Preparation and implementation of an approved SWM site plan is required. No regulated activities shall commence until the Municipality issues written approval of a SWM site plan, which demonstrates compliance with the requirements of this Part.

2. SWM site plans approved by the Municipality, in accordance with Subpart D, shall be on-site throughout the duration of the regulated activity.

3. The Municipality may, after consultation with the Department of Environmental Protection (PADEP), approve measures for meeting the State water quality requirements other than those in this Part, provided that they meet the minimum requirements of, and do not conflict with, State law including, but not limited to, the Clean Streams Law.

4. For all regulated earth disturbance activities, erosion and sediment (E&S) control best management practices (BMPs) shall be designed, implemented, operated, and maintained during the regulated earth disturbance activities (e.g., during construction) to meet the purposes and requirements of this Part and to meet all requirements under Title 25 of the Pennsylvania Code and the Clean Streams Law. Various BMPs and their design standards are listed in the Erosion and Sediment Pollution Control Program Manual, No. 363-2134-008 (April 15, 2000), as amended and updated.

5. For all regulated activities, implementation of the volume controls in §26-123 of this Part is required.

6. Impervious Areas.

   A. The measurement of impervious areas shall include all of the impervious areas in the total proposed development even if development is to take place in stages.

   B. For development taking place in stages, the entire development plan must be used in determining conformance with this Part.

   C. For projects that add impervious area to a parcel, the total impervious area on the parcel is subject to the requirements of this Part unless the new impervious area is under 5,000 square feet.

7. Stormwater flows onto adjacent property shall not be created, increased, decreased, relocated, or otherwise altered without written notification of the adjacent property owner(s). Such stormwater flows shall be subject to the requirements of this Part.

8. All regulated activities shall include such measures as necessary to:

   A. Protect health, safety, and property.

   B. Meet the water quality goals of this Part by implementing measures to:

      (1) Minimize disturbance to floodplains, wetlands, and wooded areas.

      (2) Create, maintain, repair or extend riparian buffers.

      (3) Avoid erosive flow conditions in natural flow pathways.

      (4) Minimize thermal impacts to waters of this Commonwealth.

      (5) Disconnect impervious surfaces (i.e., disconnected impervious areas, DIAs) by directing runoff to pervious areas, wherever possible.

   C. To the maximum extent practicable, incorporate the techniques for low impact development practices (e.g., protecting existing trees, reducing area of impervious surface, cluster development, and protecting open space) described in the Pennsylvania Stormwater Best Management Practices Manual, Pennsylvania Department of Environmental Protection (PADEP) No. 363-0300-002 (2006).

9. Infiltration BMPs should be spread out, made as shallow as practicable, and located to maximize the use of natural on-site infiltration features while still meeting the other requirements of this Part.

10. The design of all facilities over Karst shall include an evaluation of measures to minimize the risk of adverse effects.

11. Storage facilities should completely drain both the volume control and rate control capacities over a period of time not less than 24 and not more than 72 hours from the end of the design storm.

12. The design storm volumes to be used in the analysis of peak rates of discharge should be obtained from the Precipitation-Frequency Atlas of the United States, Atlas 14, Volume 2, Version 3.0, U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Weather Service, Hydrometeorological Design Studies Center, Silver Spring, Maryland. NOAA's Atlas 14 can be accessed at http://hdsc.nws.noaa.gov/hdsc/pfds/.

13. For all regulated activities, SWM BMPs shall be designed, implemented, operated, and maintained to meet the purposes and requirements of this Part and to meet all

requirements under Title 25 of the Pennsylvania Code, the Clean Streams Law, and the Storm Water Management Act.

14. Various BMPs and their design standards are listed in the Pennsylvania Stormwater Best Management Practices Manual (PA BMP Manual).

(Ord. 2011-04-01, 4/4/2011, §212)

§26-122. Permit Requirements by Other Governmental Entities.

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

(Ord. 2011-04-01, 4/4/2011, §213)

§26-123. Volume Control.

1. Volume controls will mitigate increased runoff impacts, protect stream channel morphology, maintain groundwater recharge, and contribute to water quality improvements. Stormwater runoff volume control methods are based on the net change in runoff volume for the two-year storm event.

2. Volume controls shall be implemented using the design storm method in Subsection A or the simplified method in Subsection B below. For regulated activities equal to or less than one acre, this Part establishes no preference for either methodology; therefore, the applicant may select either methodology on the basis of economic considerations, the intrinsic limitations of the procedures associated with each methodology, and other factors. All regulated activities greater than one acre must use the design storm method. For small projects that propose 1,000 square feet or less of impervious Subsection D should be used.

   A. Design-Storm Method (any regulated activity). This method requires detailed modeling based on site conditions. For modeling assumptions refer to §26-125.1.

      (1) Post-development total runoff should not be increased from pre-development total runoff for all storms equal to or less than the two-year 24-hour duration precipitation.

      (2) The following applies in order to estimate the increased volume of runoff for the two-year 24-hour duration precipitation event:

      To calculate the runoff volume (cubic feet) for existing site conditions (pre-development) and for the proposed developed site conditions (post-development), it is recommended to use the soil cover complex method as shown on the following page. The calculated volume shall be either

reused, evapotranspired, or infiltrated through structural or nonstructural means.

Soil Cover Complex Method:

Step 1:

$$\text{Runoff (in)} = Q = \frac{(P - 0.2S)^2}{(P + 0.8S)}$$

where

P = 2-year Rainfall (in)

$S = \left(\frac{1{,}000}{CN}\right) - 10$, the potential maximum retention (including initial abstraction, Ia)

Step 2:

Runoff Volume (Cubic Feet) = Q x Area x $^1/_{12}$
Q = Runoff (in)
Area = SWM Area (sq. ft.)

B. Simplified Method (regulated activities less than or equal to one acre):

(1) Stormwater facilities shall capture the runoff volume from at least the first two inches of runoff from all new impervious surfaces.

$$\text{Volume (cubic feet)} = \left(\frac{2''\ \text{runoff}}{12\ \text{inches}}\right) * \text{impervious surface (sq. ft.)}$$

(2) At least the first inch of runoff volume from the new impervious surfaces shall be permanently removed from the runoff flow–i.e., it shall not be released into the surface waters of the Commonwealth. The calculated volume shall be either reused, evapotranspired or infiltrated through structural or nonstructural means.

$$\text{Volume (cubic feet)} = \left(\frac{1''\ \text{runoff}}{12\ \text{inches}}\right) * \text{impervious surface (sq. ft.)}$$

(3) Infiltration facilities should be designed to accommodate the first half inch of the permanently removed runoff.

(4) No more than one inch of runoff volume from impervious surfaces shall be released from the site. The release time must be over 24 to 72 hours.

C. Stormwater Control Measures. The applicant must demonstrate how the required volume is controlled through stormwater best management practices (BMPs) which shall provide the means necessary to capture, reuse, evaporate, transpire or infiltrate the total runoff volume.

(1) If natural resources exist on the site, the applicant is required to submit a SWM site plan shall determine the total acreage of protected area where no disturbance is proposed. The acreage of the protected area should be subtracted from the total site area and not included in the stormwater management site area acreage used in determining the volume controls.

Stormwater Management Site Area = {Total Site Area (for both pre & post development conditions) – Protected Area}

Natural resource areas should be calculated based upon the Municipality's own natural resource protection ordinance. For additional reference see Chapter 5, §5.4.1, of the PA BMP manual.

(2) Calculate the volume controls provided through nonstructural BMPs.

(3) Volume controls provided through nonstructural BMPs should be subtracted from the required volume to determine the necessary structural BMPs.

Required Volume Control (ft^3) – Nonstructural Volume Control (ft^3) = Structural Volume Requirement (ft^3)

(4) Calculate the volume controls provided through structural BMPs. See PA BMP manual, Chapter 6, for description of the BMPs.

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

(a) A minimum soil depth of 24 inches between the bottom of the infiltration BMPs and the top of bedrock or seasonally high water table.

(b) An infiltration rate sufficient to accept the additional stormwater load and dewater completely as determined by field tests. A minimum of one-quarter inches/hour should be utilized and for acceptable rates a safety factor of 50% should be applied for design purposes (e.g., for soil which measured one-half in/hr, the BMP design should use one-quarter in/hr to insure safe infiltration rates after construction).

(c) All open-air infiltration facilities shall be designed to completely infiltrate runoff volume within three days (72 hours) from the start of the design storm.

(6) Soils. A soils evaluation of the project site shall be required to determine the suitability of infiltration facilities. All regulated activities are required to perform a detailed soils evaluation by a qualified design professional which at minimum address soil permeability, depth to

bedrock, and subgrade stability. The general process for designing the infiltration BMP shall be:

(a) 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 may not be ruled out without conducting these tests.

(b) Provide field tests such as double ring infiltrometer or hydraulic conductivity tests (at the level of the proposed infiltration surface) to determine the appropriate hydraulic conductivity rate. Percolation tests are not recommended for design purposes.

(c) Design the infiltration structure based on field determined capacity at the level of the proposed infiltration surface and based on the safety factor of 50%.

(d) If on-lot infiltration structures are proposed, it must be demonstrated to the Municipality that the soils are conducive to infiltrate on the lots identified.

(e) An impermeable liner will be required in detention basins where the possibility of groundwater contamination exists. A detailed hydrogeologic investigation may be required by the Municipality.

D. Small Project Stormwater Management Rate Control Requirements. This Section applies to only small projects (residential and non-residential) that propose less than 1,000 square feet of new impervious.

(1) Newly planted deciduous trees can reduce runoff volume by six cubic feet. Newly planted evergreen trees can reduce runoff volume by 10 cubic feet.

(2) Projects that proposed between zero square feet and 500 square feet of new impervious are required to plant trees that would reduce runoff volume by 10 cubic feet. Projects that proposed between 501 square feet and 1,000 square feet of new impervious are required to plant trees that would reduce runoff volume by 20 cubic feet.

(3) Proposed deciduous or evergreen trees must be selected from the Township's required plant material list from the Subdivision and Land Development Ordinance [Chapter 22].

(4) If an applicant demonstrates the required number of plantings can not be accommodated on the property the applicant is required to pay a fee-in-lieu of landscaping in an amount equal to $350 per tree.

(Ord. 2011-04-01, 4/4/2011, §214)

§26-124. Stormwater Peak Rate Control and Management Districts.

Peak rate controls for large storms, up to the 100-year event, is essential in order to protect against immediate downstream erosion and flooding. The following peak rate controls have been determined through hydrologic modeling of the Neshaminy Creek watershed.

A. Standards for managing runoff from each subarea in the Neshaminy Creek Watershed for the 2-, 5-, 10-, 25-, 50-, and 100-year design storms are shown in Table 26-124.1. Development sites must control proposed development conditions runoff rates to existing conditions runoff rates for the design storms in accordance with Table 26-124.1 on the following page.

Table 26-124.1
Peak Rate Runoff Control Standards by Stormwater Management Districts
In The Neshaminy Creek Watershed
(includes Little Neshaminy Creek)

District	Design Storm Post-Development (Proposed Conditions)	Design Storm Pre-Development (Existing Conditions)
New Britain	2-year	1-year
Township	5-year	2-year
	10-year	5-year
	25-year	10-year
	50-year	25-year
	100-year	50-year

B. General. Proposed conditions rates of runoff from any regulated activity shall not exceed the peak release rates of runoff from existing conditions for the design storms specified in this Section of this Part.

C. Off-Site Areas. When calculating the allowable peak runoff rates, developers do not have to account for runoff draining into the subject development site from an off-site area. On-site drainage facilities shall be designed to safely convey off-site flows through the development site.

D. Site Areas. The stormwater management site area is the only area subject to the management district criteria. The stormwater management site area included on-site areas that are not proposed to be disturbed, but drain to a proposed stormwater management facility. Non-impacted areas or non-regulated activities bypassing the stormwater management facilities would not be subject to the management district criteria.

E. Criteria for Redevelopment Sites. For redevelopment sites, meet the full requirements specified by Table 26-124.1 and Subsection A through D.

(Ord. 2011-04-01, 4/4/2011, §215)

§26-125. Calculation Methodology.

1. The following criteria shall be used for runoff calculations:

   A. For development sites not considered redevelopment, the ground cover used to determine the existing conditions runoff volume and flow rate shall be as follows:

      (1) For the wooded portion of sites use a ground cover of "woods in good condition." An area is classified as wooded if a continuous canopy of trees exists over a one-eighth acre.

      (2) The undeveloped portion of the site including agriculture, bare earth, and fallow ground shall be considered as "meadow in good condition," unless the natural ground cover generates a lower curve number (CN) or rational "c" value (i.e., woods).

   B. For development and redevelopment sites, the ground cover used to determine the existing conditions runoff volume and flow rate for the developed portion of the site shall be based upon actual land cover conditions, except that 50% of the impervious surface area shall be considered meadow in the model for existing conditions.

2. Stormwater runoff peak discharges from all development sites with a drainage area greater than one acre shall be calculated using a generally accepted calculation technique that is based on the NRCS Soil Cover Complex Method. Table 26-125.1 summarizes acceptable computation methods. The method selected by the design professional shall be based on the individual limitations and suitability of each method for a particular site. The Municipality may allow the use of the Dekalb Rational Method (Q=CIA) to estimate peak discharges from drainage areas that contain one acre of less.

   Q = Peak flow rate, cubic feet per second (CFS)
   C = Runoff coefficient, dependent on land use/cover
   I = Design rainfall intensity, inches per hour
   A = Drainage Area, acres

3. All calculations consistent with this Part using the soil cover complex method shall use the appropriate design rainfall depths for the various return period storms according to the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 rain data corresponding to the Doylestown rain gage. These rainfall depths are: 2.7" (1-year), 3.3" (2-year), 4.1" (5-year), 4.8" (10-year), 5.8" (25-year), 6.7" (50-year) and 7.6" (100-year). This data may also be directly retrieved from the NOAA Atlas 14 website: http://hdsc.nws.noaa.gov/hdsc/pfds/orb/papfds.html. 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.

Table 26-125.1
Acceptable Computation Methodologies for Stormwater Management Plans

Method	Method Developed by	Applicability
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	U.S. 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.
Dekalb Rational Method (or commercial computer package based on Rational Method)	Emil Kuichling (1889)	For sites one acre or less, or as approved by the Municipality and/or Municipal Engineer.
Other Methods	Varies	Other computation methodologies approved by the Municipality

4. All calculations using the rational method shall use rainfall intensities consistent with appropriate times-of-concentration for overland flow and return periods from NOAA Atlas 14, Volume 2 Version 2.1. 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 from time-to-time by NRCS). Times-of-concentration for channel and pipe flow shall be computed using Manning's equation.

5. Runoff curve numbers (CN) for both existing and proposed conditions to be used in the soil cover complex method shall be based on TR-55.

6. Runoff coefficients (C) for both existing and proposed conditions for use in the rational method shall be consistent with Table B-7 below.

Table B-7. 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] 0.14[b]	0.13 0.18	0.16 0.22	0.11 0.16	0.15 0.21	0.21 0.28	0.14 0.20	0.19 0.25	0.26 0.34	0.18 0.24	0.23 0.29	0.31 0.41
Pasture	0.12 0.15	0.20 0.25	0.30 0.37	0.18 0.23	0.28 0.34	0.37 0.45	0.24 0.30	0.34 0.42	0.44 0.52	0.30 0.37	0.40 0.50	0.50 0.62
Meadow	0.10 0.14	0.16 0.22	0.25 0.30	0.14 0.20	0.22 0.28	0.30 0.37	0.20 0.26	0.28 0.35	0.36 0.44	0.24 0.30	0.30 0.40	0.40 0.50
Forest	0.05 0.08	0.08 0.11	0.11 0.14	0.08 0.10	0.11 0.14	0.14 0.18	0.10 0.12	0.13 0.16	0.16 0.20	0.12 0.15	0.16 0.20	0.20 0.25
Residential												
Lot Size ⅛ Acre	0.25 0.33	0.28 0.37	0.31 0.40	0.27 0.35	0.30 0.39	0.25 0.44	0.30 0.38	0.33 0.42	0.38 0.49	0.33 0.41	0.36 0.45	0.42 0.54
Lot Size ¼ Acre	0.22 0.30	0.26 0.34	0.29 0.37	0.24 0.33	0.29 0.37	0.33 0.42	0.27 0.36	0.31 0.40	0.36 0.47	0.30 0.38	0.34 0.42	0.40 0.52
Lot Size ⅓ Acre	0.19 0.28	0.23 0.32	0.26 0.35	0.22 0.30	0.26 0.35	0.30 0.39	0.25 0.33	0.29 0.38	0.34 0.45	0.28 0.36	0.32 0.40	0.39 0.50
Lot Size ½ Acre	0.16 0.25	0.20 0.29	0.24 0.32	0.19 0.28	0.23 0.32	0.28 0.36	0.22 0.31	0.27 0.35	0.32 0.42	0.26 0.34	0.30 0.38	0.37 0.48
Lot Size 1 Acre	0.14 0.22	0.19 0.26	0.22 0.29	0.17 0.24	0.21 0.28	0.26 0.34	0.20 0.28	0.25 0.32	0.31 0.40	0.24 0.31	0.29 0.35	0.35 0.46
Industrial	0.67 0.85	0.68 0.85	0.68 0.86	0.68 0.85	0.68 0.86	0.69 0.86	0.68 0.86	0.69 0.86	0.69 0.87	0.69 0.86	0.69 0.86	0.70 0.88
Commercial	0.71 0.88	0.71 0.88	0.72 0.89	0.71 0.89	0.72 0.89	0.72 0.89	0.72 0.89	0.72 0.89	0.72 0.90	0.72 0.89	0.72 0.89	0.72 0.90
Streets	0.70 0.76	0.71 0.77	0.71 0.79	0.71 0.80	0.72 0.82	0.74 0.84	0.72 0.84	0.73 0.85	0.76 0.89	0.73 0.89	0.75 0.91	0.78 0.95
Open Space	0.05 0.11	0.10 0.16	0.14 0.20	0.08 0.14	0.13 0.19	0.19 0.26	0.12 0.18	0.17 0.23	0.24 0.32	0.16 0.22	0.21 0.27	0.28 0.39
Parking	0.85 0.95	0.86 0.96	0.87 0.97	0.85 0.95	0.86 0.96	0.87 0.97	0.85 0.95	0.86 0.96	0.87 0.97	0.85 0.95	0.86 0.96	0.87 0.97

[a] Runoff coefficients for storm recurrence intervals less than 25 years.
[b] Runoff coefficients for storm recurrence intervals 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

7. The Manning equation is preferred for one-dimensional, gradually-varied, open channel flow. In other cases, appropriate, applicable methods should be applied, however, early coordination with the Municipality is necessary.

8. Outlet structures for stormwater management facilities shall be designed to meet the performance standards of this Part using the generally accepted hydraulic analysis technique or method of the Municipality.

9. The design of any stormwater detention facilities intended to meet the performance standards of this Part shall be verified by routing the design storm hydrograph through these facilities using the Storage-Indication Method. For drainage areas greater than one acre in size, the design storm hydrograph shall be computed using a calculation method that produces a full hydrograph. The Municipality may approve

the use of any generally accepted full hydrograph approximation technique that shall use a total runoff volume that is consistent with the volume from a method that produces a full hydrograph.

(Ord. 2011-04-01, 4/4/2011, §216)

§26-126. Other Requirements.

1. Hot Spots.

   A. The use of infiltration BMPs is prohibited on hot spot land use areas, such as vehicle fueling stations, public works storage areas, recycling facilities, fleet storage areas, facilities that make or store hazardous materials, etc.

   B. Stormwater runoff from hot spot land uses shall be pretreated. In no case may the same BMP be employed consecutively to meet this requirement.

2. West Nile Guidance Requirements. All wet basin designs shall incorporate biologic controls to deter the breeding of mosquitoes.

(Ord. 2011-04-01, 4/4/2011, §217)

D. Stormwater Management (SWM) Site Plan Requirements.

§26-131. General Requirements.

For any of the activities regulated by this Part, the preliminary or final approval of subdivision and/or land development plans, the issuance of any building or occupancy permit, the commencement of any earth disturbance, or activity may not proceed until the property owner or applicant or his/her agent has received written approval of a SWM site plan from the Municipality and an approval of an adequate erosion and sediment (E&S) control plan review from the Municipality or County Conservation District.

(Ord. 2011-04-01, 4/4/2011, §218)

§26-132. SWM Site Plan Requirements.

1. The SWM site plan shall consist of a general description of the project, including calculations, maps, and plans. A note on the maps shall refer to the associated computations and E&S control plan by title and date. The cover sheet of the computations and E&S control plan shall refer to the associated maps by title and date. All SWM site plan materials shall be submitted to the Municipality in a format that is clear, concise, legible, neat, and well organized; otherwise, the SWM site plan shall not be accepted for review and shall be returned to the applicant.

2. The following items shall be included in the SWM site plan:

   A. General.

      (1) General description of the project including plan contents described in Subsection 2.

      (2) General description of proposed SWM techniques to be used for SWM facilities.

      (3) Complete hydrologic and hydraulic computations for all SWM facilities.

      (4) All reviews and letters of adequacy from the Conservation District for the erosion and sedimentation plan as required by New Britain Township, County or State regulations.

      (5) A general description of proposed nonpoint source pollution controls.

      (6) Appropriate sections from the Municipality's Subdivision and Land Development Ordinance [Chapter 22], and other applicable local ordinances, shall be followed in preparing the SWM site plan.

   B. Plans. SWM site plan shall provide the following information:

      (1) The overall stormwater management concept for the project.

(2) A determination of natural site conditions and stormwater management needs. This shall include, but not be limited to:

(a) Site Features.

1) The location of the project relative to highways, municipal boundaries or other identifiable landmarks.

2) The locations of all existing and proposed utilities, sanitary sewers, and water lines on site and to within 50 feet of property lines.

3) Proposed structures, roads, paved areas, and buildings.

4) The total tract boundary and size with distances marked to the nearest foot and bearings to the nearest degree.

5) Plan and profile drawings of all SWM BMP's, including drainage structures, pipes, open channels, and swales. At a minimum this should include pre- and post-drainage area maps, an overall post construction stormwater management plan, stormwater details sheets, and landscape plans (if proposing bio-retention facilities, low impact development, bioretention, or vegetative basins).

6) The locations and minimum setback distances of existing and proposed on-lot wastewater facilities and water supply wells.

7) The location of all erosion and sediment control facilities.

8) The location of proposed septic tank infiltration areas and wells in cases where groundwater recharge measures such as seepage pits, beds or trenches are proposed.

(b) Natural Site Conditions.

1) An existing resource and site analysis map (ERSAM) showing environmentally sensitive areas including, but not limited to:

a) Steep slopes.

b) Ponds.

c) Lakes.

d) Streams.

e) Wetlands.

f) Hydric soils.

g) Hydrologic soil groups A and B.

h) Vernal pools.

i) Stream buffers.

j) Open channels.

k) Existing recharge areas.

l) Floodplains.

The area of each of these sensitive areas shall be calculated and should be consistent with the runoff volume calculation §26-123.2.C(1).

2) A detailed site evaluation for projects proposed in areas of frequent flooding, Karst topography, and other environmentally sensitive areas, such as brownfields and source water protection areas.

3) Existing and proposed contour lines (two ft.).

4) The total extent of the drainage area upstream from the site and all down gradient receiving channels, swales and waters to which stormwater runoff or drainage will be discharged.

(c) Stormwater runoff design computations and documentation as specified in this Part, or as otherwise necessary to demonstrate that the maximum practicable measures have been taken to meet the requirements of this Part, including the recommendations and general requirements in §26-121.

(d) The effect of the project (in terms of runoff volumes, water quality, and peak flows) on surrounding properties and aquatic features and on any existing stormwater conveyance system that may be affected by the project.

C. The format of the plan shall include the following:

(1) The expected project time schedule.

(2) 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.

(3) The date of submission.

(4) A graphic and written scale of one inch equals no more than 50 feet; for tracts of 20 acres or more, the scale shall be one inch equals no more than 100 feet.

(5) A north arrow.

(6) An access easement around all stormwater management facilities is required that would provide ingress to and egress from a public right-of-way. The size of the easement shall commensurate with the maintenance and access requirements determined in the design of the BMP.

(7) A key map showing all existing man-made features beyond the property boundary that would be affected by the project.

(8) A note on the plan indicating the location and responsibility for maintenance of stormwater management facilities. All facilities shall meet the performance standards and design criteria specified in this Part.

(9) The following signature block for the design engineer: "I, (Design Engineer), on this date (date of signature), hereby certify that the SWM site plan meets all design standards and criteria of the Neshaminy Creek Watershed Act 167 Stormwater Management Ordinance or Plan."

(10) A statement signed by the applicant acknowledging that any revision to the approved SWM site plan must be approved by the Municipality and that a revised E&S plan must be submitted to the Conservation District.

D. A soil erosion and sediment control plan, where applicable, as prepared for and submitted to the approval authority.

E. The SWM site plan shall include an operations and maintenance (O&M) plan for all existing and proposed physical stormwater management facilities, as well as schedules and costs for O&M activities. This plan shall address long-term ownership and responsibilities for O&M.

(Ord. 2011-04-01, 4/4/2011, §219)

§26-133. Plan Submission.

The Municipality requires submission of a complete SWM site plan, as specified in this Part.

A. Proof of application or documentation of required permit(s) or approvals for the programs listed below shall be part of the plan:

(1) NPDES Permit for Stormwater Discharges from Construction Activities.

(2) Any other permit under applicable State or Federal regulations.

B. Six (6) copies of the SWM site plan shall be submitted to the following agencies:

(1) Two copies to the Municipality accompanied by the requisite municipal review fee, as specified in this Part.

(2) Two copies to the County Conservation District.

(3) One copy to the Municipal Engineer (where applicable).

(4) One copy to the County Planning Commission if the regulated activity is also required to submit a subdivision and/or land development plan to the Planning Commission in accordance with the Pennsylvania Municipal Planning Code.

C. Any submissions to the agencies listed above that are found to be incomplete shall not be accepted for review and shall be returned to the applicant with a notification in writing of the specific mariner in which the submission is incomplete.

D. Additional copies shall be submitted as requested by the Municipality or PADEP.

(Ord. 2011-04-01, 4/4/2011, §220)

§26-134. Stormwater Management (SWM) Site Plan Review.

1. The SWM site plan shall be reviewed by a qualified professional on behalf of the Municipality for consistency with the provisions of this Part. After review, the qualified professional shall provide a written recommendation for the Municipality to approve or disapprove the SWM site plan. If it is recommended to disapprove the SWM site plan, the qualified professional shall state the reasons for the disapproval in writing. The qualified professional also may recommend approval of the SWM site plan with conditions and, if so, shall provide the acceptable conditions for approval in writing. The SWM site plan review and recommendations shall be completed within the time allowed by the Municipalities Planning Code for reviewing subdivision plans.

2. The Municipality will notify the applicant in writing within 45 days whether the SWM site plan is approved or disapproved. If the SWM site plan involves a subdivision and land development plan, the notification period is 90 days. If a longer notification period is provided by other statute, regulation, or ordinance, the applicant will be so notified by the Municipality. If the Municipality disapproves the SWM site plan, the Municipality shall cite the reasons for disapproval in writing.

(Ord. 2011-04-01, 4/4/2011, §221)

§26-135. Modification of Plans.

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

(Ord. 2011-04-01, 4/4/2011, §222)

§26-136. Resubmission of Disapproved SWM Site Plans.

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

(Ord. 2011-04-01, 4/4/2011, §223)

§26-137. Authorization to Construct and Term of Validity.

The Municipality's approval of an SWM site plan authorizes the regulated activities contained in the SWM site plan for a maximum term of validity of five years following the date of approval. The Municipality may specify a term of validity shorter than five years in the approval for any specific SWM site plan. Terms of validity shall commence on the date the Municipality signs the approval for an SWM site plan. If an approved SWM site plan is not completed according to this Section within the term of validity, the Municipality may consider the SWM site plan disapproved and may revoke any and all permits. SWM site plans that are considered disapproved by the Municipality shall be resubmitted in accordance with §26-136 of this Part.

(Ord. 2011-04-01, 4/4/2011, §224)

E. Inspections.

§26-141. Inspections.

1. The Municipality shall inspect all phases of the installation of the best management practices (BMPs) and/or stormwater management (SWM) facilities as deemed appropriate by the Municipality.

2. During any stage of the work, if the Municipality determines that the BMPs and/or stormwater management facilities are not being installed in accordance with the approved SWM site plan, the Municipality shall revoke any existing permits or other approvals and issue a cease and desist order until a revised SWM site plan is submitted and approved, as specified in this Part and until the deficiencies are corrected.

3. A final inspection of all BMPs and/or stormwater management facilities may be conducted by the Municipality to confirm compliance with the approved SWM site plan prior to the issuance of any occupancy permit.

4. The applicant and/or developer shall be responsible for providing as-built plans of all SWM BMPs included in the approved SWM site plan. The as-built plans and an explanation of any discrepancies, which were reviewed and received approval by the Municipality, shall be submitted to the Municipality.

5. The as-built submission shall include a certification of completion signed by a qualified professional verifying that all SWM BMPs have been constructed according to the approved plans and specifications. If any qualified professionals contributed to the construction plans, they must sign and seal the completion certificate.

(Ord. 2011-04-01, 4/4/2011, §225)

F. Fees and Expenses.

§26-151. Municipal Stormwater Management (SWM) Site Plan Review and Inspection Fee.

Fees shall be established by the Municipality to cover plan review and construction inspection costs incurred by the Municipality. All fees shall be paid by the applicant at the time of SWM site plan submission. A review and inspection fee schedule shall be established by resolution of the municipal governing body based on the size of the regulated activity and based on the Municipality's costs for reviewing SWM site plans and conducting inspections pursuant to §26-141. The Municipality shall periodically update the review and inspection fee schedule to ensure that review costs are adequately reimbursed.

(Ord. 2011-04-01, 4/4/2011, §226)

§26-152. Expenses Covered by Fees.

The fees required by this Part (unless otherwise waived by the Municipality) shall, at a minimum, cover:

A. Administrative costs.

B. The review of the stormwater (SWM) site plan by the Municipality.

C. The review of as-built drawings.

D. The site inspections.

E. The inspection of SWM facilities and drainage improvements during construction.

F. The final inspection at the completion of the construction of the SWM facilities and drainage improvements presented in the SWM site plan.

G. Any additional work required to enforce any permit provisions regulated by this Part, correct violations, and assure proper completion of stipulated remedial actions.

(Ord. 2011-04-01, 4/4/2011, §227)

G. Maintenance Responsibilities.

§26-161. Performance Guarantee.

1. For subdivisions and land developments, the applicant shall provide a financial guarantee to the Municipality for the timely installation and proper construction of all stormwater management (SWM) facilities as:

   A. Required by the approved SWM site plan equal to or greater than the full construction cost of the required controls.

   B. The amount and method of payment provided for in the Subdivision and Land Development Ordinance [Chapter 22].

2. For other regulated activities, the Municipality shall require a financial guarantee from the applicant.

(Ord. 2011-04-01, 4/4/2011, §228)

§26-162. Responsibilities for Operations and Maintenance (O&M) of Stormwater Facilities and BMPs.

1. The owner of any land upon which stormwater facilities and BMPs will be placed, constructed, or implemented, as described in the stormwater facility and BMP O&M plan, shall record the following documents in the Office of the Recorder of Deeds for Bucks County, within 45 days of approval of the stormwater facility and BMP O&M plan by the Municipality:

   A. The O&M plan, or a summary thereof.

   B. O&M agreements under §26-164.

   C. Easements under §26-165.

2. The Municipality may suspend or revoke any approvals granted for the project site upon discovery of failure on the part of the owner to comply with this Section.

3. The following items shall be included in the stormwater facility and BMP O&M 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 Bucks 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 stormwater facilities and BMPs.

(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 on site and 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.

(9) A 20-foot-wide access easement around all stormwater facilities and BMPs that would provide ingress to and egress from a public right-of-way.

B. A description of how each stormwater facility and BMP will be operated and maintained, and the identity and contact information associated with the person(s) responsible for O&M.

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.

D. A statement, signed by the facility owner, acknowledging that the stormwater facilities and BMPs are fixtures that can be altered or removed only after approval by the Municipality.

4. The stormwater facility and BMP O&M plan for the project site shall establish responsibilities for the continuing O&M of all stormwater facilities and BMPs, 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 the Municipality, stormwater facilities and BMPs may also be offered for dedication to and maintained by the Municipality.

B. If a plan includes O&M by single ownership, or if sewers and other public improvements are to be privately owned and maintained, the O&M of stormwater facilities and BMPs shall be the responsibility of the owner or private management entity.

5. The Municipality shall make the final determination on the continuing O&M responsibilities. The Municipality reserves the right to accept or reject the O&M responsibility for any or all of the stormwater facilities and BMPs.

6. Facilities, areas, or structures used as BMPs shall be enumerated as permanent real estate appurtenances and recorded as deed restrictions or conservation easements that run with the land.

7. The O&M plan shall be recorded as a restrictive deed covenant that runs with the land.

8. The Municipality may take enforcement actions against an owner for any failure to satisfy the provisions of this Subpart and this Part.

(Ord. 2011-04-01, 4/4/2011, §229)

§26-163. Municipal Review of Stormwater Facilities and BMP Operations and Maintenance (O&M) Plan.

1. The Municipality shall review the stormwater facilities and BMP O&M plan for consistency with the purposes and requirements of this Part, and any permits issued by PADEP.

2. The Municipality shall notify the applicant in writing whether the stormwater facility and BMP O&M plan is approved.

3. The Municipality shall require a "record drawing" of all stormwater facilities and BMPs.

(Ord. 2011-04-01, 4/4/2011, §230)

§26-164. Operations and Maintenance (O&M) Agreement for Privately Owned Stormwater Facilities and BMPs.

1. The owner shall sign an O&M agreement with the Municipality covering all stormwater facilities and BMPs that are to be privately owned. The O&M agreement shall be transferred with transfer of ownership. The agreement shall be prepared by the Municipal Solicitor.

2. Other items may be included in the O&M agreement where determined necessary to guarantee the satisfactory O&M of all stormwater controls and BMPs. The O&M agreement shall be subject to the review and approval of the Municipality.

3. The owner is responsible for the O&M of the SWM BMPs. If the owner fails to adhere to the O&M agreement, the Municipality may perform the services required and charge the owner appropriate fees. Nonpayment of fees may result in a lien against the property.

(Ord. 2011-04-01, 4/4/2011, §231)

§26-165. Stormwater Management Easements.

1. The owner must obtain all necessary real estate rights to install, operate, and maintain all stormwater facilities in the SWM site plan.

2. The owner must provide the municipal easements, or other appropriate real estate rights, to perform inspections and maintenance for the preservation of stormwater runoff conveyance, infiltration, and detention areas.

(Ord. 2011-04-01, 4/4/2011, §232)

H. Prohibitions.

§26-171. Prohibited Discharges.

1. Any drain or conveyance, whether on the surface or subsurface, that allows any nonstormwater discharge, including sewage, process wastewater, and wash water to enter the waters of the Commonwealth is prohibited.

2. No person shall allow, or cause to allow, discharges into surface waters of this Commonwealth which are not composed entirely of stormwater, except (A) as provided in Subsection 3 below, and (B) discharges allowed under a State or Federal permit.

3. The following discharges are authorized unless they are determined to be significant contributors to pollution to the waters of the Commonwealth:

   A. Discharges from firefighting activities.

   B. Potable water sources, including water line flushing.

   C. Irrigation drainage.

   D. Air conditioning condensate.

   E. Springs.

   F. Water from crawl space pumps.

   G. Flows from riparian habitats and wetlands.

   H. Uncontaminated water from foundations or from footing drains.

   I. Lawn watering.

   J. De-chlorinated swimming pool discharges (per Department of Environmental Protection (PADEP) requirements).

   K. Uncontaminated groundwater.

   L. Water from individual residential car washing.

   M. Routine external building wash down (which does not use detergents or other compounds).

4. In the event that the Municipality or PADEP determines that any of the discharges identified in Subsection 3 significantly contribute to pollution of the waters of this Commonwealth, the Municipality or PADEP will notify the responsible person(s) to cease the discharge.

(Ord. 2011-04-01, 4/4/2011, §233)

§26-172. Roof Drains.

Roof drains and sump pumps shall discharge to infiltration or vegetative BMPs and to the maximum extent practicable satisfy the criteria for disconnected impervious areas (DIAs).

(Ord. 2011-04-01, 4/4/2011, §234)

§26-173. Alteration of SWM BMPs.

1. No person shall modify, remove, fill, landscape, or alter any stormwater management (SWM) best management practices (BMPs), facilities, areas, or structures unless it is part of an approved maintenance program and written approval of the Municipality has been obtained.

2. No person shall place any structure, fill, landscaping, or vegetation into a stormwater facility or BMP or within a drainage easement which would limit or alter the functioning of the stormwater facility or BMP without the written approval of the Municipality.

(Ord. 2011-04-01, 4/4/2011, §235)

I. Enforcement and Penalties.

§26-181. Right-of-Entry.

1. Upon presentation of proper credentials, duly authorized representatives of the Municipality may enter at reasonable times upon any property within the municipality to inspect the implementation, condition, or operation and maintenance of the stormwater facilities or best management practices (BMPs) in regard to any aspect governed by this Part.

2. Landowners with stormwater facilities and BMPs on their property shall allow persons working on behalf of the Municipality ready access to all parts of the premises for the purposes of determining compliance with this Part.

3. Persons working on behalf of the Municipality shall have the right to temporarily locate on any stormwater facility or BMP in the municipality such devices as are necessary to conduct monitoring and/or sampling of the discharges from such stormwater facilities or BMP.

(Ord. 2011-04-01, 4/4/2011, §236)

§26-182. Inspection.

Stormwater management (SWM) best management practices (BMPs) should be inspected for proper operation by the landowner, or the owner's designee (including the Municipality for dedicated and owned facilities), according to the following list of minimum frequencies:

A. Annually for the first five years,

B. Once every three years thereafter,

C. During or immediately after the cessation of a 10-year or greater storm, and/or as specified in the operations and maintenance (O&M) agreement.

(Ord. 2011-04-01, 4/4/2011, §237)

§26-183. Enforcement.

All inspections regarding compliance with the stormwater management (SWM) site plan and this Part shall be the responsibility of the Municipality.

A. Whenever the Municipality finds that a person has violated a prohibition or failed to meet a requirement of this Part, the Municipality may order compliance by written notice to the responsible person. Such notice may, without limitation, require the following remedies:

(1) Performance of monitoring, analyses, and reporting.

(2) Elimination of prohibited connections or discharges.

(3) Cessation of any violating discharges, practices, or operations.

(4) 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) Implementation of stormwater facilities and best management practices (BMPs).

(7) Operation and maintenance (O&M) of stormwater facilities and BMPs.

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 the Municipality and the expense may be charged to the violator.

C. Failure to comply within the time specified may subject a violator to the penalty provisions of this Part. All such penalties shall be deemed cumulative and shall not prevent the Municipality from pursuing any and all other remedies available in law or equity.

(Ord. 2011-04-01, 4/4/2011, §238)

§26-184. Suspension and Revocation of Permits and Approvals.

1. Any building, land development, or other permit or approval issued by the Municipality may be suspended or revoked, in whole or in part, by the Municipality for:

A. Noncompliance with or failure to implement any provision of the permit.

B. A violation of any provision of this Part.

C. The creation of any condition or the commission of any act during construction or development which constitutes or creates a hazard or nuisance, pollution or which endangers the life, health, or property of others.

2. A suspended permit may be reinstated by the Municipality when:

A. The Municipality has inspected and approved the corrections to the stormwater facilities and BMPs or the elimination of the hazard or nuisance.

B. The Municipality is satisfied that all applicable violations in this Part have been corrected.

3. Any permit or approval that has been revoked by the Municipality cannot be reinstated. The applicant may apply for a new permit under the procedures outlined of this Part.

(Ord. 2011-04-01, 4/4/2011, §239)

§26-185. Penalties.

1. Any person violating the provisions of this Part shall be subject to penalties that may range from liens against the property to fines for each violation, recoverable with costs. Each day that the violation continues shall constitute a separate offense and the applicable fines are cumulative.

2. In addition, the Municipality may institute injunctive, mandamus or any other appropriate action or proceeding at law or in equity for the enforcement of this Part. Any court of competent jurisdiction shall have the right to issue restraining orders, temporary or permanent injunctions, mandamus, or other appropriate forms of remedy or relief.

(Ord. 2011-04-01, 4/4/2011, §240)

§26-186. Appeals.

1. As per the Pennsylvania Municipalities Planning Code (MPC), §909.1(9), any person aggrieved by any action pursuant to this Part may appeal to New Britain Township Zoning Hearing Board within 30 days of that action.

2. Any person aggrieved by any decision of New Britain Township Board of Supervisors, relevant to the provisions of this Part, may appeal to the County Court of Common Pleas in the County where the activity has taken place within 30 days of the Municipal decision.

(Ord. 2011-04-01, 4/4/2011, §241)

PART 2

WATER CONSERVATION

§26-201. General Policy.

No water shall be provided for internal or external use to any residential, commercial, industrial, agricultural, recreational, governmental or public building or structure of any kind which in constructed or remodeled and in which plumbing, water piping or water fixtures are to be installed, extended or altered in any way and for which construction a permit is required to be obtained from New Britain Township (or would be required but for an exemption from a permit requirement for public or governmental agencies) unless the new, extended or altered plumbing, water piping and other water using fixtures therein conform to the requirements and standards of §26-202 of this Part. The provisions of this Part shall apply to any such building or structure for which such a building permit is issued or would otherwise be required to be issued but for such an exemption, on or after June 24, 1991.

(Ord. 91-06-02, 1/24/1991, §1)

§26-202. Water Conservation Performance Standards for Plumbing Fixtures and Fittings.

1. Water Closets and Associated Flushing Mechanisms. The water consumption of water closets shall not exceed an average of 1.6 gallons per flush cycle over a range of test pressures from 20 to 80 psi. The fixture shall perform in accordance with the test requirements of the ANSI A112.19.2M and ANSI A112.19.6M.

2. Urinals and Associated Flushing Mechanisms. Urinal water consumption shall not exceed an average of 1.5 gallons per flush cycle over a range of test pressures from 20 to 80 psi. The fixtures shall perform in accordance with the test requirements of the ANSI A112.19.2M and ANSI A112.19.6M.

3. Showerheads. Showerhead discharge rates shall not exceed 3.0 gallons of water per minute over a range of test pressures from 20 to 80 psi. The fixture shall perform in accordance with the test requirements of ANSI A112.18.1M.

4. Faucets. Sink and lavatory discharge rates shall not exceed 3.0 gallons of water per minute over a range of test pressures from 20 to 80 psi. The fixture shall perform in accordance with the test requirements of ANSI A112.18.1M.

(Ord. 91-06-02, 1/24/1991, §2)

§26-203. Special Provisions.

1. Special Purpose Equipment. The performance standards of §26-202 shall not apply to fixtures and fittings such as emergency showers, aspirator faucets and blowout fixtures that, in order to perform a specialized function, cannot meet the specified standards.

2. Exemptions. Any person(s) may apply to the New Britain Township Code Review Board for an exemption to the terms of this Part which may be granted upon proof that some other device, system or procedure will save as much or more water as those set forth herein or that those set forth herein cannot be complied with, without undue hardship.

(Ord. 91-06-02, 1/24/1991, §3)

§26-204. Official Review and Modification.

The Board of Supervisors may, from time to time, modify, add to or remove from the standards and restrictions herein.

(Ord. 91-06-02, 1/24/1991, §4)

§26-205. Penalties.

Any person, firm or corporation who shall violate any provision of this Part, upon conviction thereof in an action brought before a Magisterial District Judge in the manner provided for the enforcement of summary offenses under the Pennsylvania Rules of Criminal Procedure, shall be sentenced to pay a fine of not more than $1,000 plus costs and, in default of payment of said fine and costs, to a term of imprisonment not to exceed 90 days. Each day that a violation of this Part continues or each Section of this Part which shall be found to have been violated shall constitute a separate offense.

(Ord. 91-06-02, 1/24/1991, §5; as amended by Ord. 2007-02-01, 2/12/2007)

PART 3

WATER SUPPLY FACILITIES

§26-301. Water Facilities Plan.

The Township shall prepare and maintain a water facilities plan, either by compilation and listing or by map or other appropriate form, for the orderly expansion of water supply facilities to various areas of the Township.

(Ord. 85-8-6, 6/22/1987, §1)

§26-302. Contents of the Water Facilities Plan.

The water facilities plan shall include the following information:

A. Existing water supply systems, including water supply sources, trunk and distribution mains and areas served.

B. Sources of present water supply to the Township such as wells and treatment plants and planned future sources and their capacities.

C. Areas in which water supply facilities can properly be extended within a ten-year period and thereafter taking into account existing subdivision approvals, permitted zoning density, projected population growth, the provision of other services such as transportation and sewage facilities and other goals and objectives of the Comprehensive Plan.

D. Designation of proposed sources of supply for extensions of service within the ten-year period.

(Ord. 85-8-6, 6/22/1987, §2)

§26-303. Review and Approval Required for New Water Supply Systems and for Extension of Existing Systems.

All new water supply facilities and subsequent extensions of water supply facilities into areas of the Township not presently served by public water supply shall first be submitted to the Township for review. Township review shall evaluate the new system or proposed extension for consistency with the Township's Water Facilities Plan. No new system or extension of water supply shall be permitted except following review and approval by the Township.

(Ord. 85-8-6, 6/22/1987, §3)

§26-304. Township Action on Application.

Upon completion of its review, the Township may:

A. Approve the proposal as submitted, if it determines that it is consistent with the Township's water supply facilities plan.

B. Approve the proposed system, as consistent with the water supply facilities plan but require a different entity to operate the system, which entity may be another municipality or private water company designated by the Township pursuant to §1601 of the Second Class Township Code, 53 P.S. §66601 or which entity may be the Township itself.

C. Approve the proposed system as an amendment to the existing water supply facilities plan even though inconsistent with the existing plan, where the applicant demonstrates to the satisfaction of the Township that such an amendment is justified.

D. Disapprove the proposed system as inconsistent with the water supply facilities plan.

(Ord. 85-8-6, 6/22/1987, §4)

§26-305. Violation and Penalties.

Any person, firm or corporation who shall violate any provision of this Part, upon conviction thereof in an action brought before a Magisterial District Judge in the manner provided for the enforcement of summary offenses under the Pennsylvania Rules of Criminal Procedure, shall be sentenced to pay a fine of not more than $1,000 plus costs and, in default of payment of said fine and costs, to a term of imprisonment not to exceed 90 days. Each day that a violation of this Part continues or each Section of this Part which shall be found to have been violated shall constitute a separate offense. In addition to any other remedies, the Township may seek an injunction against the construction or operation of any unapproved water supply facilities or seek other appropriate legal or equitable relief from a court of competent jurisdiction.

(Ord. 85-8-6, 6/22/1987, §5)

PART 4

CONSTRUCTION OF WELLS AND THE WITHDRAWAL OF GROUNDWATER

§26-401. Purpose.

The purpose of this Part is to ensure that new wells constructed in New Britain Township are able to provide a reliable, safe and adequate supply of water to support the intended use within the capacity of available groundwater resources. Also, it is to ensure that new wells do not infringe upon the performance of existing wells. Lastly, it is to provide an opportunity to collect accurate information on the aquifers in the Township.

(Ord. 02-05-04, -/-/2002, §1)

§26-402. Severability.

If any sentence, clause, Section or part of this Part is for any reason found to be unconstitutional, illegal or invalid, such unconstitutionality, illegality or invalidity shall not affect or impair any of the remaining provisions, sentences, clauses, Sections or Parts of this Part. It is hereby declared as the intent of the New Britain Township Board of Supervisors that this Part would have been adopted had such unconstitutional, illegal or invalid sentence, clause, Section or part thereof not been included herein.

(Ord. 02-05-04, -/-/2002, §2)

§26-403. Applicability.

1. No person, firm, corporation or other entity within the Township shall withdraw groundwater for any purpose by use of a well, except as permitted by this Part.

2. No building permit for a new residential building or nonresidential building or addition to a building which is to be served by a new well, shall be issued unless the well intended to serve the building has been drilled, tested and certified by a licensed State laboratory to be in compliance with this Part.

3. This Part shall apply to any and all situations where a new well is to be drilled for an existing use and where a building permit and/or occupancy permit is required by the New Britain Township Zoning Ordinance [Chapter 27].

(Ord. 02-05-04, -/-/2002, §3)

§26-404. Permit Procedures.

Prior to commencing the construction of a well, the owner or agent shall obtain a well drilling permit from New Britain Township in accordance with the following:

A. The required drilling, pump testing and water quality analysis shall be completed in compliance with the standards herein, prior to the issuance of a building permit to verify adequate water supply is available for the lot and water is potable.

B. There are two phases of a well permit. Phase I consists of the permit requirements for drilling the well. Phase II consists of sampling and analysis of the water quality.

(1) Phase I Drilling Requirements.

(a) The following information shall be shown on a plot plan of the property and submitted with the Township's well permit application:

1) One hundred foot isolation distance for the proposed well to verify compliance with the regulations of Pa. Title 25 Chapter 73, Standards for Sewage Disposal Facilities.

2) Location of all existing or proposed onsite sewage disposal systems.

3) Location of dwelling and utility services for the lot.

(b) In order to be certified for use for a single-family dwelling, a well shall have a production of not less than six gallons per minute as certified by a licensed well driller. If less than six gallons per minute yield is established, such a well may still be certified for use if sufficient storage is provided to meet the calculated peak demand. In no case shall a well yielding less than two gallons per minute be certified for use by the Township.

(c) Each proposed well for a single-family dwelling shall be evaluated through a two-part pump test comprised of a peak demand test and a constant rate pump test. Such pumping tests and any required storage shall be calculated in accordance with the New Jersey Geological Survey Groundwater Report Series No. 1, Two-Part Pump Test for Evaluating the Water Supply Capabilities of Domestic Wells, as prepared by Jeffrey L. Hoffman and Robert Canace for the New Jersey Geological Survey. The domestic well worksheet contained in the above-referenced report shall be submitted to the Township for approval prior to issuance of any building permits.

(2) Phase II Water Quality Analysis Requirements.

(a) Samples shall be obtained from the well at the termination of pump testing to demonstrate drinking water quality conforming to this Section. Additional or specialized analysis should be discussed with the Township Engineer prior to sampling for the purposes of streamlining the permitting process; however, said discussion shall not be construed as final approval of the proposed testing.

(b) All samples shall be collected, transported and analyzed in accordance with USEPA and PADEP protocol for drinking water. Sample testing shall be performed by a laboratory certified by the Commonwealth to perform drinking water analysis. Laboratory reports shall contain sufficient quality assurance and quality control data to explain any analysis and reporting conditions or deficiencies.

(c) Water quality must comply with currently published USEPA National Primary and Secondary Drinking Water Standards and Health Advisories.

(d) Water quality testing shall include, at a minimum, the following parameters, total coliform, nitrate/nitrite, pH, iron, manganese, lead, chloride, hardness, total dissolved solids, surfactants (detergents), volatile organic compounds – Group 1 (VOC1) + 10 unknowns[16], MTBE, herbicides – Group 1 (H1) and pesticides – Group 3 (P3).

(e) The applicant shall perform a survey to identify and evaluate potential sources of contamination that may impact water quality in the proposed well(s) and shall perform additional sampling and analysis as may be required to assure water quality is satisfactory for the protection of human health and the environment.

(f) Additional sampling and analysis will be required to quantify any observed objectionable effects resulting from the quality of the water including, but not limited to, odor, color, foaming, staining, scaling and sedimentation.

(g) A well that does not meet the above standards will be required to meet them through adequate treatment facilities. After

[16] A library search for tentatively identified compounds (TICs). Additional analysis will be required if TICs are discovered. Group 1 (VOC1), etc., refers to PADEP categories of contaminants.

treatment facilities are installed, the applicant shall have the water supply tested again.

(h) The following information shall be submitted to the Township with the water quality report:

1) The report from the laboratory shall contain the name, license number and address of the laboratory.

2) Depth and diameter of the well, including the ground elevation at the well head.

3) Drilling method and type of casing and grouting used.

4) Type of treatment and storage, if applicable.

(i) A bacterial test shall be performed on the well after installation of the house plumbing, but within 30 days of requesting issuance of an occupancy permit for the dwelling. The guidelines set forth by the Bucks County Department of Health shall be followed for disinfecting a contaminated well.

(Ord. 02-05-04, -/-/2002, §4)

§26-405. General Well Construction Standards.

1. All well construction shall be in accordance with the construction requirements set forth by the PADEP Public Water Supply Manual, latest edition and as contained in this Part. If there is a conflict between the requirements of the PADEP and the requirements of this Part, the more restrictive shall be applicable.

2. When drilling or increasing the depth of a well, an accurate well drilling log shall be maintained. This log shall contain the following information:

A. Interval. The depth in feet below a datum level such as ground level or top of casing through which the drill is advancing.

B. Geologic Description. A description of the rock type penetrated through the particular interval. The description shall include such things as color, texture, rock type and geologic name, in known.

C. Yield. The total yield of water at the base of the interval last described.

D. General Comments. Includes anything that the driller finds noteworthy, i.e., water bearing zones, artesian conditions, change in pressure, loss of fluid, etc.

3. The pump shall be so located and designed as to make the use of a pump pit unnecessary. Pitless adapters shall conform to the standards set forth by the PADEP.

4. The space between the pump column and the casing of each well shall be provided with a vent which shall be protected with an elbow facing downward or mushroom type head located at least 18 inches above flood levels. All vents shall be screened to prevent the entry of insects.

5. The casing shall be temporarily capped and any open space covered until the well has been grouted and the pump installed. The cap should be either threaded onto the casing or be a friction type device which locks onto the outside of the casing.

6. The well head shall be constructed so as to assure the maximum protection of the well and to exclude entry of any contaminant. All wells shall be cased to protect against contamination. Water bearing formations that are known to be contaminated or identified as being in danger of contamination shall be sealed off with casing and grout. Sealing shall be accomplished by a method approved by the PADEP.

7. Completed wells shall be properly capped with sanitary seals to prevent the entry of contamination.

8. All wells shall be provided with a watertight, 1/4 inch thick welded steel pipe casing. Pipe shall be in accordance with AWWA Standard C200. The minimum length of casing shall be 40 feet or 10 feet into bedrock, whichever is greater. All joints between sections of the casing shall be made by continuous welding in accordance with AWWA Standard C206. All casing shall be extended at least 18 inches above final grade or 12 inches above the basement floor. The space between the earth and outside casing shall be filled with cement grout to a distance of at least six feet below the ground surface.

9. Any existing well that is to be abandoned shall be properly sealed. The "Water Well Abandonment Procedures," as published in Chapter 7 of the PADEP Groundwater Monitoring Guidance Manual, February, 1996 edition, as amended, shall be followed for all well abandonment.

(Ord. 02-05-04, -/-/2002, §5)

§26-406. Exemption.

1. A well drilling permit is not required when an existing well is to be drilled to a greater depth and the anticipated withdrawal from the well is to remain the same. If the depth of a well is to be increased and the quality of water withdrawn is to be increased, a permit is required and compliance with all applicable well drilling provisions of the New Britain Township Subdivision and Land Development Ordinance [Chapter 22].

2. Either the property owner or the well driller shall notify the Township that the existing well has lost its supply and it will be modified by increasing the depth of the well or a new well will be drilled to replace it.

3. Within two weeks of the modified or replacement well being in operation, the property owner or well driller shall supply the Township a copy of the well drilling log documenting the quantity of water to be withdrawn from the well.

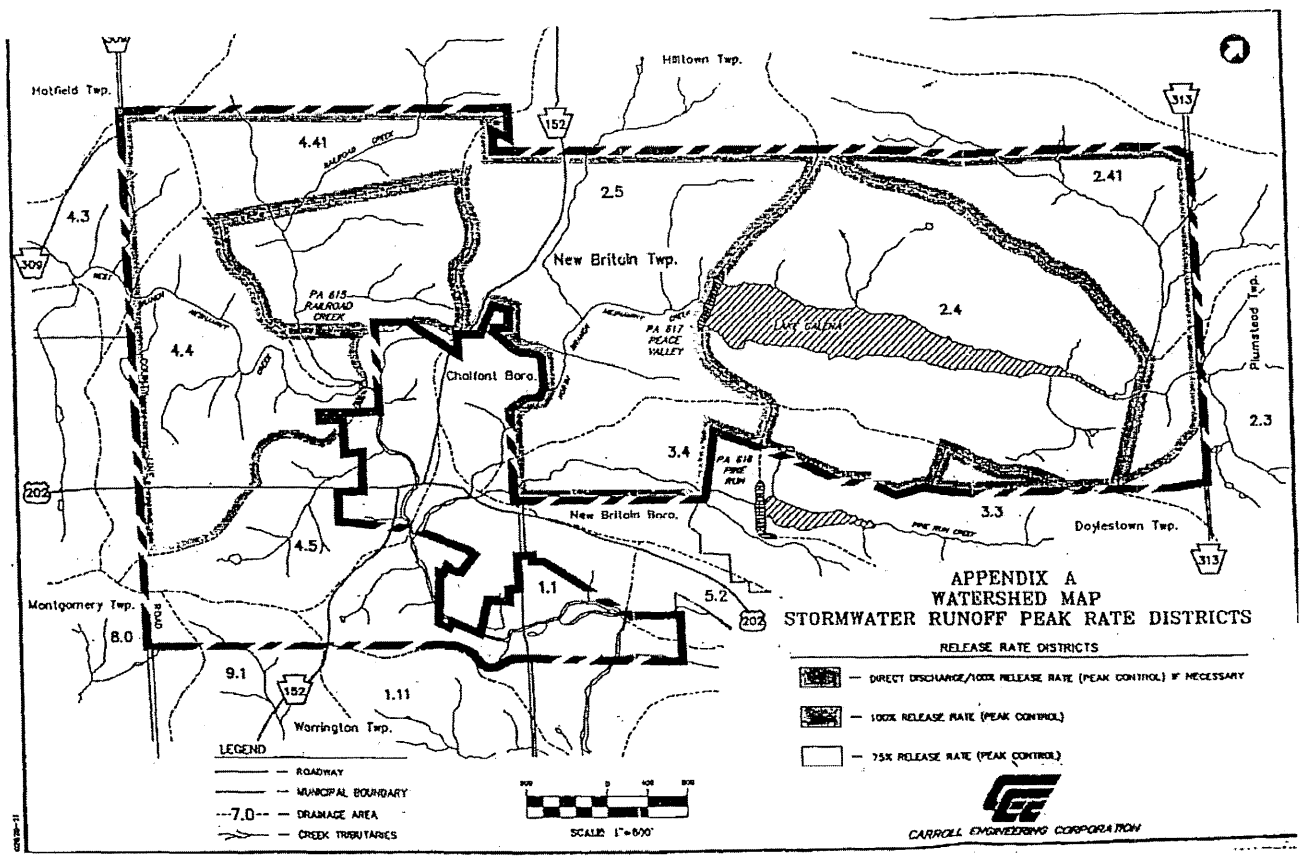
(Ord. 02-05-04, -/-/2002, §6)

26 Attachment 1

Township of New Britain

APPENDIX A

WATERSHED MAP



26 Attachment 2

Township of New Britain

APPENDIX B

STORMWATER MANAGEMENT DESIGN CRITERIA

TABLE B-1
DESIGN STORM RAINFALL AMOUNT
Source: "Field Manual of Pennsylvania Department of Transportation"
STORM INTENSITY-DURATION-FREQUENCY CHARTS
PDT – IDF May 1986.

FIGURE B-1
ALTERNATING BLOCK METHOD FOR RAINFALL DISTRIBUTION
Source: Applied Hydrology, Chow, Maidment, Mays, 1988

FIGURE B-2
PENNDOT DELINEATED REGIONS
Source: "Field Manual of Pennsylvania Department of Transportation"
STORM INTENSITY-DURATION-FREQUENCY CHARTS
PDT – IDF May 1986.

FIGURE B-3
RAINFALL DISTRIBUTION – S CURVE

FIGURE B-4
PENNDOT REGION 4 STORM INTENSITY-DURATION-FREQUENCY CURVE
Source: "Field Manual of Pennsylvania Department of Transportation"
STORM INTENSITY-DURATION-FREQUENCY CHARTS
PDT – IDF May 1986.

FIGURE B-5
PENNDOT REGION 5 STORM INTENSITY-DURATION-FREQUENCY CURVE
Source: "Field Manual of Pennsylvania Department of Transportation"
STORM INTENSITY-DURATION-FREQUENCY CHARTS
PDT – IDF 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

TABLE B-5
NONSTRUCTURAL STORMWATER MANAGEMENT MEASURES

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
PDT – IDF May 1986.

Region 4
Precipitation Depth (inches)

Duration	1 Yr.	2 Yr.	5 Yr.	10 Yr.	25 Yr.	50 Yr.	100 Yr.
5 min.	0.30	0.35	0.41	0.45	0.50	0.55	0.61
15 min.	0.58	0.68	0.80	0.93	1.03	1.13	1.25
1 hr.	1.01	1.22	1.48	1.70	1.91	2.16	2.41
2 hrs.	1.24	1.50	1.84	2.14	2.46	2.80	3.18
3 hrs.	1.38	1.71	2.10	2.43	2.82	3.24	3.69
6 hrs.	1.68	2.04	2.52	3.06	3.60	4.14	4.74
12 hrs.	2.04	2.52	3.00	3.84	4.56	5.16	6.00
24 hrs.	2.40	2.88	3.60	4.56	5.76	6.48	7.44

Region 5
Precipitation Depth (inches)

Duration	1 Yr	2 Yr	5 Yr	10 Yr	25 Yr	50 Yr	100 Yr
5 min	0.33	0.38	0.45	0.50	0.56	0.63	0.68
15 min	0.64	0.75	0.90	1.00	1.15	1.35	1.50
1 hr	1.10	1.35	1.61	1.85	2.15	2.60	2.98
2 hrs	1.34	1.66	2.00	2.34	2.70	3.26	3.76
3 hrs	1.50	1.86	2.28	2.67	3.09	3.69	4.29
6 hrs	1.86	2.28	2.82	3.36	3.90	4.62	5.40
12 hrs	2.28	2.76	3.48	4.20	4.92	5.76	6.72
24 hrs	2.64	3.36	4.32	5.28	6.24	7.20	8.40

FIGURE B-1
ALTERNATING BLOCK METHOD FOR RAINFALL DISTRIBUTION
Source: Applied Hydrology, Chow, Maidment, Mays, 1988

The Alternating Block Method can be utilized to develop design hydrographs from the PennDOT Storm Intensity-Duration-Frequency (PDT-IDF) curves. This method redistributes the incremental rainfall values developed from the PDT-IDF curves in a quasi-symmetrical form, where the block of maximum incremental depth is positioned at the middle of the required duration and the remaining blocks of rainfall are arranged in descending order, alternately to the right and to the left of the central block. Example B-1 below shows this method for a one-hundred-year, two-hour duration storm with ten-minute time intervals.

Example B-1
One-Hundred-Year, Two-Hour Duration Storm Hydrograph Development
Region 5

(1)	(2)	(3)	(4)	(5)
Time (minutes)	**100-Year Rainfall Intensity (inches/hour)**	**100-Year Accumulated Rainfall Depth (inches)**	**100-Year Incremental Rainfall Depth (inches)**	**100-Year Rainfall Distribution (inches)**
0	0.00	0.00	0.00	0.00
10	6.91	1.15	1.15	0.07
20	5.34	1.78	0.63	0.15
30	4.41	2.21	0.43	0.21
40	3.78	2.52	0.32	0.26
50	3.33	2.78	0.26	0.43
60	2.98	2.98	0.21	1.15
70	2.75	3.20	0.22	0.63
80	2.51	3.35	0.15	0.32
90	2.28	3.42	0.07	0.22
100	2.15	3.58	0.16	0.16
110	2.01	3.69	0.11	0.11
120	1.88	3.76	0.07	0.07

Notes:

Values from Column (2) are derived from the appropriate rainfall chart based on the location of the site under analysis. (Region 5 in this example, therefore, use Figure B-5).

Column (3) = Column (2) * Column (1)/60 minutes (i.e., 6.91 inches/hr * 10 min/60 = 1.15).

Column (4) = Difference in Column (3) for each time interval (i.e., 1.78 - 1.15 = 0.63).

Column (5) is Column (4) rearranged with the maximum increment from Column (4) placed at the middle of the event (Time = 60 minutes, in this example), then rearranging the remaining values from Column (4) in descending order, alternately right and left (below and above) the central block.

FIGURE B-2
PENNDOT DELINEATED REGIONS

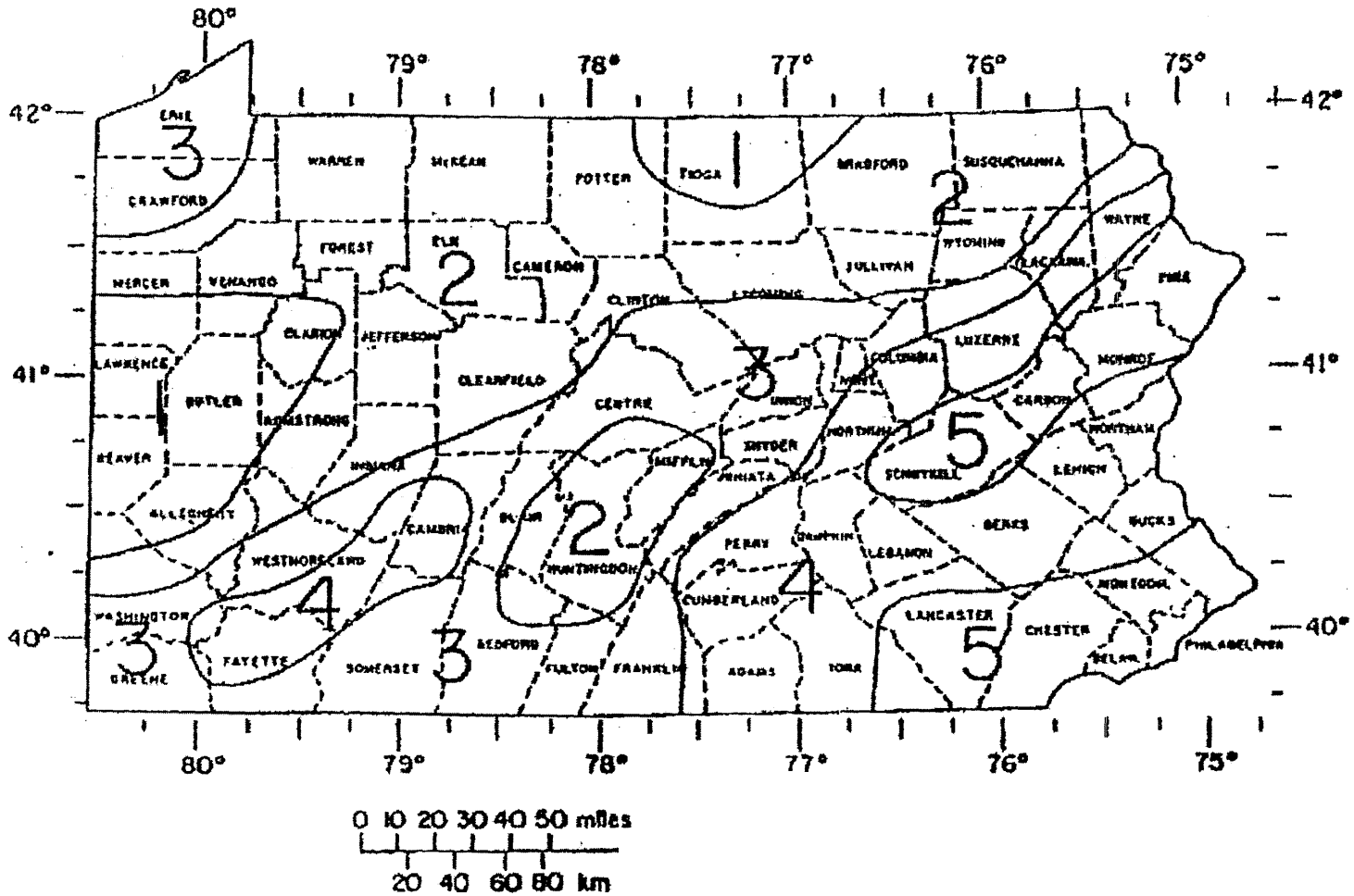
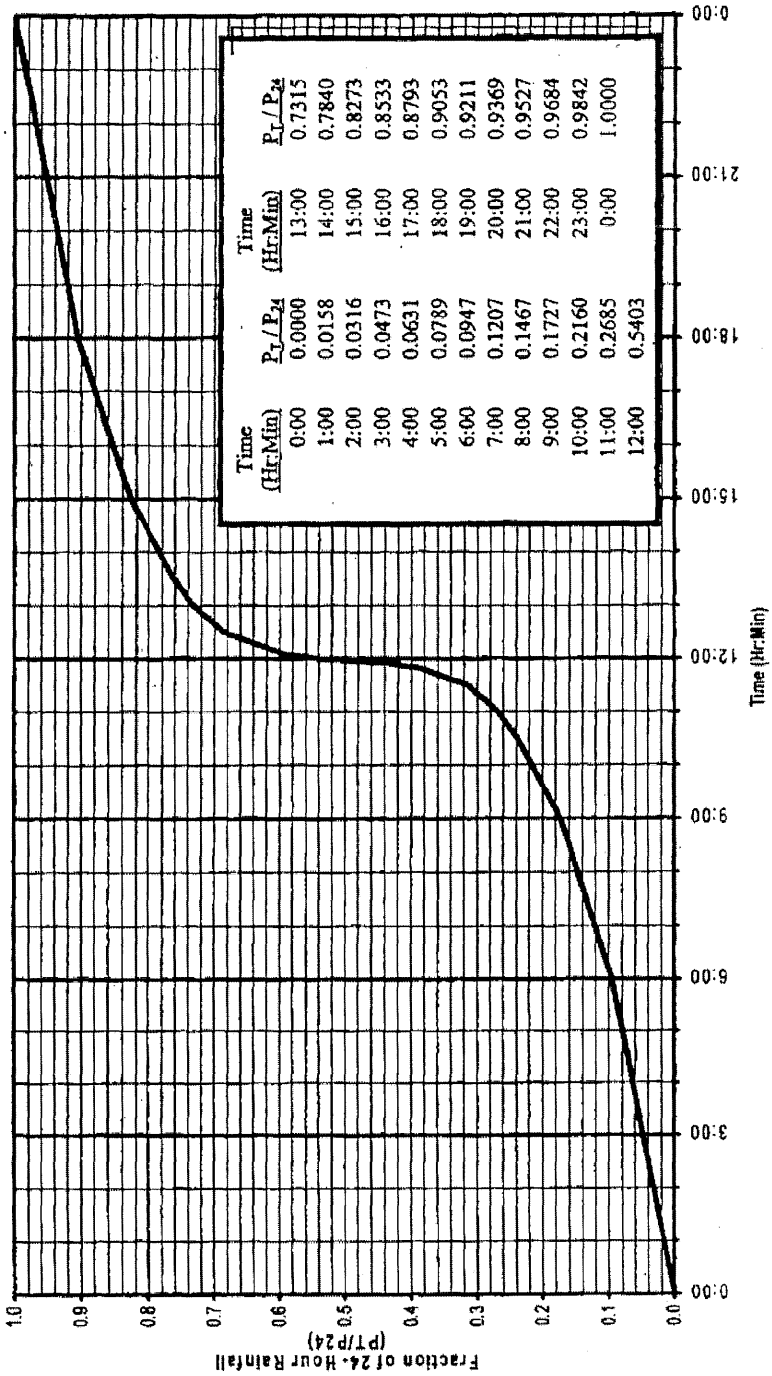


FIGURE B-3

RAINFALL DISTRIBUTION – S CURVE



Time (Hr:Min)	P_T / P_{24}	Time (Hr:Min)	P_T / P_{24}
0:00	0.0000	13:00	0.7315
1:00	0.0158	14:00	0.7840
2:00	0.0316	15:00	0.8273
3:00	0.0473	16:00	0.8533
4:00	0.0631	17:00	0.8793
5:00	0.0789	18:00	0.9053
6:00	0.0947	19:00	0.9211
7:00	0.1207	20:00	0.9369
8:00	0.1467	21:00	0.9527
9:00	0.1727	22:00	0.9684
10:00	0.2160	23:00	0.9842
11:00	0.2685	0:00	1.0000
12:00	0.5403		

Note: Rainfall Distribution Curve developed from PennDOT Rainfall Intensity-Duration-Frequency Curves (Aron, 1986).

FIGURE B-4

PENNDOT REGION 4 STORM INTENSITY-DURATION-FREQUENCY CURVE

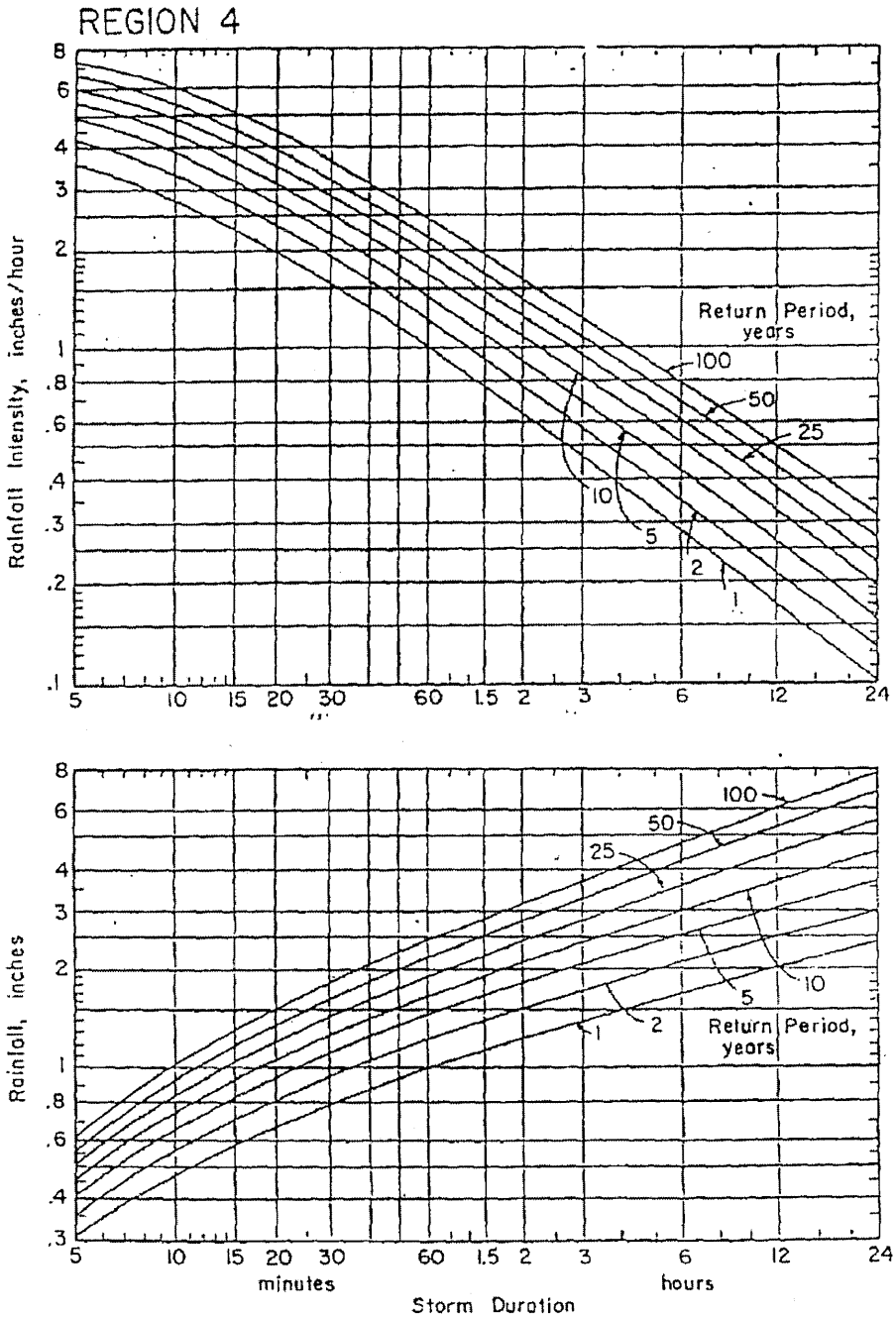


FIGURE B-5

PENNDOT REGION 5 STORM INTENSITY-DURATION-FREQUENCY CURVE

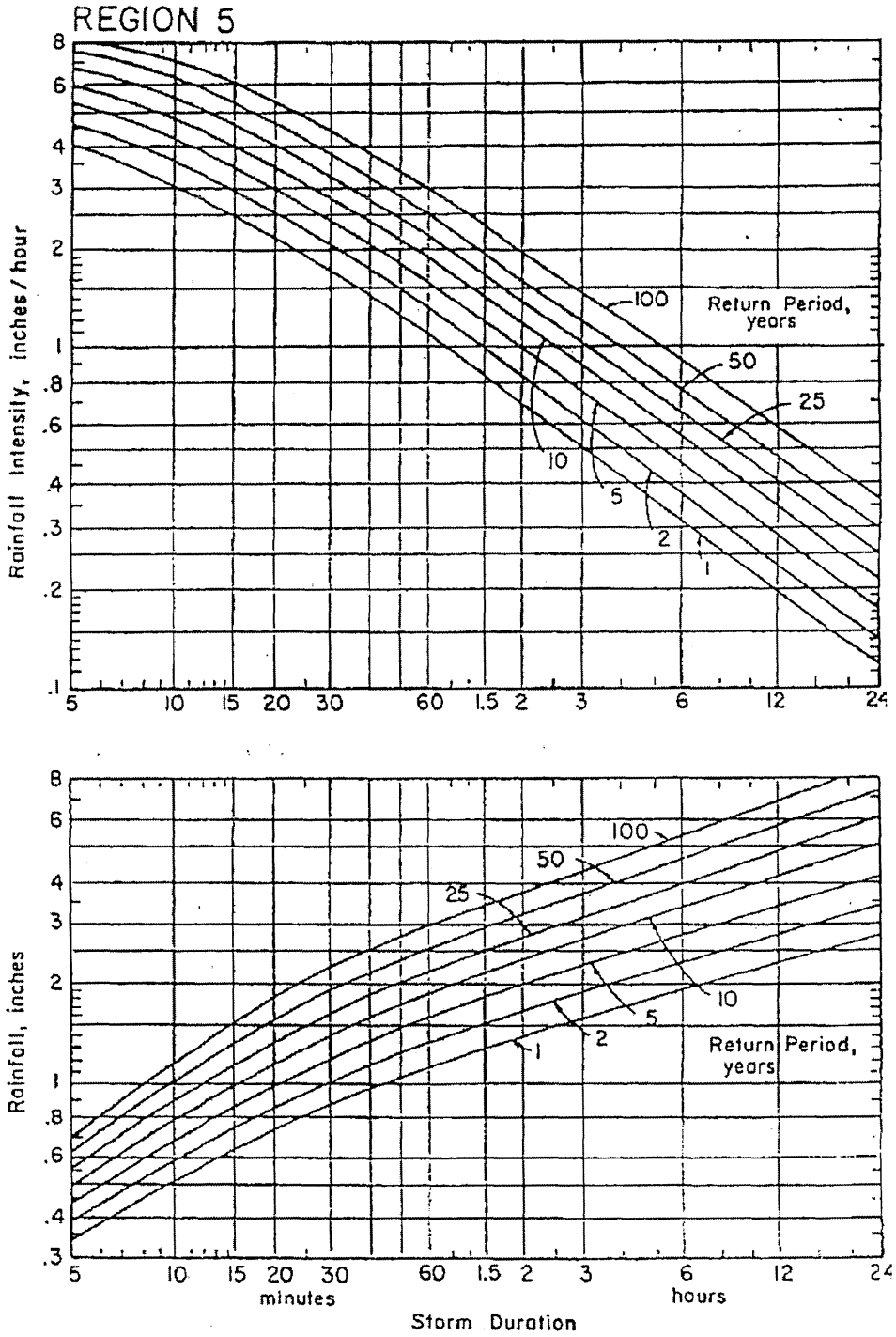


TABLE B-2
Runoff Curve Numbers
(From NRCS (SCS) TR-55)

LAND USE DESCRIPTION	Hydrologic Condition	HYDROLOGIC SOIL GROUP A	B	C	D
Open space					
Grass cover <50%	Poor	68	79	86	89
Grass cover 50% to 75%	Fair	49	69	79	84
Grass cover >75%	Good	39	61	74	80
Meadow		30	58	71	78
Agricultural					
Pasture, grassland, or range – continuous forage for grazing	Poor	68	79	86	89
Pasture, grassland, or range – continuous forage for grazing	Fair	49	69	79	84
Pasture, grassland, or range – continuous forage for grazing	Good	39	61	74	80
Brush-brush-weed-grass mixture with brush the major element	Poor	48	67	77	83
Brush-brush-weed-grass mixture with brush the major element	Fair	35	56	70	77
Brush-brush-weed-grass mixture with brush the major element	Good	30	48	65	73
Fallow bare soil	—	77	86	91	94
Crop residue cover (CR)	Poor	76	85	90	93
	Good	74	83	88	90
Woods – grass combination (orchard or tree farm)	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79

LAND USE DESCRIPTION	Hydrologic Condition	HYDROLOGIC SOIL GROUP A	B	C	D
Woods	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Commercial	(85% impervious)	89	92	94	95
Industrial	(72% impervious)	81	88	91	93
Institutional	(50% impervious)	71	82	88	90
Residential districts by average lot size:					
	% Impervious				
1/8 acre or less* (townhouses)	65%	77	85	90	92
1/4 acre	38%	61	75	83	87
1/3 acre	30%	57	72	81	86
1/2 acre	25%	54	70	80	85
1 acre	20%	51	68	79	84
2 acres	12%	46	65	77	82
Farmstead		59	74	82	86
Smooth surfaces (concrete, asphalt, gravel or bare compacted soil)		98	98	98	98
Water		98	98	98	98
Mining/newly graded areas (pervious areas only)		77	86	91	94

* Includes multifamily 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

LAND USE DESCRIPTION		HYDROLOGIC SOIL GROUP A	B	C	D
Cultivated land					
Without conservation treatment		.49	.67	.81	.88
With conservation treatment		.27	.43	.61	.67
Pasture or range land					
Poor condition		.38	.63	.78	.84
Good condition		—*	.25	.51	.65
Meadow: good condition		—*	—*	.44	.61
Wood or forest land					
Thin stand, poor cover, no mulch		—*	.34	.59	.70
Good cover		—*	—*	.45	.59
Open spaces, lawns, parks, golf courses, cemeteries					
Good condition: grass cover on 75% or more of the area		—*	.25	.51	.65
Fair condition: grass cover on 50% to 75% of the area		—*	.45	.63	.74
Commercial and business areas (85% impervious)		.84	.90	.93	.96
Industrial districts (72% impervious)		.67	.81	.88	.92
Residential:					
Average Lot Size	Average % Impervious				
1/8 acre or less	65	.59	.76	.86	.90
1/4 acre	38	.25	.49	.67	.78
1/3 acre	30	—*	.49	.67	.78
1/2 acre	25	—*	.45	.65	.76
1 acre	20	—*	.41	.63	.74
Paved parking lots, roofs, driveways, etc.		.99	.99	.99	.99
Streets and roads					
Paved with curbs and storm sewers		.99	.99	.99	.99

	HYDROLOGIC SOIL GROUP			
LAND USE DESCRIPTION	**A**	**B**	**C**	**D**
Gravel	.57	.76	.84	.88
Dirt	.49	.69	.80	.84

Notes:

Values are based on SCS definitions and are average values.

Values indicated by "—" should be determined by the design engineer based on site characteristics.

Source: New Jersey Department of Environmental Protection, Technical Manual for Stream Encroachment, August, 1984.

TABLE B-4

MANNING'S ROUGHNESS COEFFICIENTS

Roughness Coefficients (Manning's "n") for Overland Flow

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)

Notes:

(1) Depending upon type, coating and diameter.

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

Source: U.S. Army Corps of Engineers, HEC-1 Users Manual.

TABLE B-5
Nonstructural Stormwater Management Measures

Nonstructural Stormwater Measure	Description
Natural area conservation	Conservation of natural areas such as forest, wetlands, or other sensitive areas in a protected easement thereby retaining their existing hydrologic and water quality characteristics.
Disconnection of rooftop runoff	Rooftop runoff is disconnected and then directed over a pervious area where it may either infiltrate into the soil or filter over it. This is typically obtained by grading the site to promote overland flow or by providing bioretention on single-family residential lots.
Disconnection of non-rooftop runoff	Disconnect surface impervious cover by directing it to pervious areas where it is either infiltrated or filtered though the soil.
Buffers	Buffers effectively treat stormwater runoff. Effective treatment constitutes capturing runoff from pervious and impervious areas adjacent to the buffer and treating the runoff through overland flow across a grass or forested area.
Grass channel (open section roads)	Open grass channels are used to reduce the volume of runoff and pollutants during smaller storms.
Environmentally sensitive rural development	Environmental site design techniques are applied to low-density or rural residential development.

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

26 Attachment 3

Township of New Britain

APPENDIX C

WEST NILE VIRUS GUIDANCE

(This source is from the Monroe County, Pennsylvania, Conservation District that researched the potential of West Nile Virus problems from BMPs 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 2/23/2004

The Monroe 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 Pennsylvania 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 (BMPs) 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 BMPs 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, municipalities 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 Pennsylvania 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 com-

munity amenity. Aeration fountains and stocked fish should be added to keep larval mosquito populations in check.

Publications from the Pennsylvania 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 municipalities when dealing with multifaceted issues such as stormwater management and encourages the incorporation of water quality management techniques into stormwater designs. As Monroe 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 outweigh their potential to become breeding grounds for mosquitoes.

26 Attachment 4

Township of New Britain

APPENDIX D

LOW-IMPACT DEVELOPMENT (LID) PRACTICES

ALTERNATIVE APPROACH FOR MANAGING STORMWATER RUNOFF

Natural hydrologic conditions can be altered radically by poorly planned development practices, such as introducing unnecessary 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 proposed condition's runoff rates and volumes, which will minimize needs for artificial conveyance and storage facilities. To simulate predevelopment 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 are typically 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 minimize the amount of grading on site.

- Protecting Natural Depression Storage Areas. Depressional storage areas either 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 backyards, the potential for accelerating runoff from the development can be greatly reduced. The practice requires greater use of swales and may not be practical for some development sites, especially if there are concerns for areas that do not drain in a "reasonable" time. The practice requires educating local citizens and public works officials, who expect runoff to disappear shortly after a rainfall event.

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

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

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

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

- Reducing Building Setbacks. Reducing building setbacks reduces impervious cover associated with 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 occurs with 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. Benefits include reduced potential of downstream flooding, water quality degradation of receiving streams/water bodies and enhancement of aesthetics and reduction of development costs. Other benefits include more stable base flows in receiving streams, improved groundwater recharge, reduced flood flows, reduced pollutant loads, and reduced costs for conveyance and storage.