

Chapter 25

Stormwater Management

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Part 1**General Provisions****§25-101. Statement of Findings.**

The Board of Supervisors of Richland Township finds that:

A. Inadequate management of accelerated stormwater runoff resulting from development throughout a watershed increases flood flows and velocities, contributes to erosion and sedimentation, overtaxes the carrying capacity of existing streams and storm sewers, greatly increases the cost of public facilities to convey and manage stormwater, undermines floodplain management and flood reduction efforts in upstream and downstream communities, reduces groundwater recharge, and threatens public health and safety.

B. A comprehensive program of stormwater management, including reasonable regulation of development and activities causing accelerated erosion, is fundamental to the public health, safety, welfare, and the protection of the people of the Township and all the people of the Commonwealth, their resources, and the environment.

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

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

E. 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).

F. Nonstormwater discharges to Township separate storm sewer systems can contribute to pollution of waters of the Commonwealth by the Township.

(Ord. 227, 9/11/2006, §101)

§25-102. Purpose.

The purpose of this Chapter is to promote health, safety, and welfare within Richland Township and its watershed by minimizing the potential damages described in §25-101.A of this Chapter through provisions designed to:

A. Manage accelerated runoff and erosion and sedimentation problems at their source by regulating activities that cause these problems.

B. Utilize and preserve the existing natural drainage systems.

C. Encourage recharge of groundwater where appropriate and prevent degradation of groundwater quality.

D. Maintain existing flows and quality of streams and watercourses in the Township and the Commonwealth.

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

F. Provide proper maintenance of all permanent stormwater management and BMP facilities that are constructed in the Township.

G. Provide review procedures, performance standards, and design criteria for watershed-wide stormwater management and planning.

H. Provide a mechanism to identify controls necessary to meet the NPDES permit requirements.

I. Implement an illegal discharge detection and elimination program to address nonstormwater discharges into the Township's separate storm sewer system.

(Ord. 227, 9/11/2006, §102)

§25-103. Statutory Authority.

The Township is empowered to regulate land use activities that affect stormwater runoff by the authority of the Act of October 4, 1978, P.L. 864 (Act 167) 32 P.S. §680.1 *et seq.*, as amended, the Stormwater Management Act; and the Second Class Township Code, 53 P.S. §65101 *et seq.*

(Ord. 227, 9/11/2006, §103)

§25-104. Applicability.

1. Any landowner or any person engaged in the alteration or development of land, which may affect stormwater runoff characteristics, shall implement such measures consistent with the provisions of the Richland Township Stormwater Management Plan.

2. This Chapter shall apply to all areas of the Township as delineated in Appendix 25-D, which is hereby adopted as part of this Chapter.

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

4. This Chapter contains only the stormwater management performance standards and design criteria that are necessary or desirable from a watershed-wide perspective. Stormwater management design criteria (e.g., inlet spacing, inlet type, collection system design and details, outlet structure design, etc.) shall continue to be regulated by applicable ordinances.

5. The following activities are defined as regulated activities and shall be regulated by this Chapter except as exempted by §25-105 of this Chapter.

- A. Land development.
- B. Subdivision.
- C. Construction of new or additional impervious surfaces (driveways, parking lots, etc.), which exceed 1,000 square feet in area.
- D. Construction of new buildings or additions to existing buildings.
- E. Diversion or piping of any natural or man-made stream channel.
- F. Installation of stormwater management facilities or appurtenances

thereto.

G. Temporary storage of impervious or pervious material (rock, soil, etc.) where ground contact exceeds 5% of the lot area or 5,000 square feet (whichever is less), and where the material is placed on slopes exceeding 8%.

(Ord. 227, 9/11/2006, §104)

§25-105. Exemptions.

1. Any regulated activity that meets the following exemption criteria is exempt from the requirements of §25-303.1 of this Chapter, subject to the approval of the Board of Supervisors and the advice from the Township Engineer. This exemption does not relieve the landowner or developer from complying with water quality and groundwater recharge standards under §25-303.15 and the special requirements under §25-304.12 for areas within exceptional value and high quality sub-watersheds. Further, this exemption shall not relieve the applicant from implementing such measures as are necessary to protect health, safety, and property.

Stormwater Management Exemption Criteria¹

Total Parcel Size Exemption (sq. ft.)	Minimum Setback Distance ²	Impervious Area
0 - 0.5 acre	10 ft.	1,000 sq. ft.
> 0.5 - 1 acre	50 ft.	2,500 sq. ft.
> 1 - 2 acres	100 ft.	4,000 sq. ft.
> 2 - 5 acres	250 ft.	5,000 sq. ft.
> 5 acres	500 ft.	7,500 sq. ft.

2. No exemption shall be provided for regulated activities as defined in §§25-104.5.E and 25-104.5.F of this Chapter. See §25-303.8 for the applicability of the “No Harm Option.”

3. The Township, upon request by the applicant, may grant an exemption from the provisions of this Chapter for a project qualifying under §25-105. If an exemption is granted, the Township shall require the developer to pay a fee in an amount established by separate resolution of the Board of Supervisors to the Township Stormwater Management Capital Fund.

¹Exemption is cumulative such that it applies only once to a tract, and if the exemption amount is exceeded, it is not applicable and all previously exempted impervious areas must be managed.

²The minimum setback distance is measured between the proposed impervious area and/or stormwater control/structure/discharge point to the downslope property boundary. In lieu of meeting the inhibition distance criteria, the applicant may provide documentation for Township approval from a qualified professional authorized to perform this work under the Engineer, Land Surveyor, and Geologist Registration Law, May 23, 1945, P.L. 913, No. 367, 63 P.S. §148 *et seq.*, as amended, that the increased flows from the site leaves the site in the same manner as the pre-development condition, and that there will be no adverse effects to the properties along the path of the flow(s) or that increased flow(s) will reach a natural watercourse or an existing stormwater management structure before adversely affecting any property along the path of the flow(s).

(Ord. 227, 9/11/2006, §105)

Part 2**Definitions****§25-201. Definitions.**

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

A. Words used in the present tense include the future tense; the singular number includes the plural and the plural number includes the singular; words of masculine gender include feminine gender; and words of feminine gender include masculine gender.

B. The word “includes” or “including” shall not limit the term to the specific example but is intended to extend its meaning to all other instances of like kind and character.

C. The word “person” includes an individual, firm, association, organization, partnership, trust, company, corporation or any other similar entity.

D. The words “shall” and “must” are mandatory; the words “may” and “should” are permissive.

E. The words “used” or “occupied” include the words “intended,” “designed,” “maintained” or “arranged to be used,” “occupied” or “maintained.”

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

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

Alluvial soils (floodplain soils) - areas subject to periodic flooding and listed in the *Soil Survey of Bucks and Philadelphia Counties, Pennsylvania*, U.S. Department of Agriculture, Soil Conservation Service, as being “on, or in, the floodplain” or subject to flooding. The following soil types are alluvial and/or floodplain soils:

Alluvial land

Alton gravelly loam, flooded

Bowmansville silt loam

Hatboro silt loam

Marsh

Pope loam

Rowland silt loam

Alteration - as applied to land, a change in topography as a result of the moving

of soil and rock from one location or position to another; also the changing of surface conditions by causing the surface to be more or less impervious; land disturbance.

Applicant - a landowner or developer who has filed an application for approval to engage in any regulated activities as defined in §25-104 of this Chapter.

BMP (best management practice) - stormwater structures, facilities and techniques intended to maintain or improve the hydrologic regime, to promote groundwater recharge, to improve the water quality of surface runoff, and to meet the purposes of this Chapter.

Cation exchange capacity (CEC) - a measure of the soil's ability to adsorb exchangeable cations (positively charged ions) and expressed in centimoles per kilogram (cmol/kg) of soil. Centimoles per kilogram is defined as the moles (molecular weight) of positive charge adsorbed per unit mass (kilogram) of soil. Cations in solution may be electrostatic forces. These bonded ions are resistant to movement by water once adsorbed, but can be exchanged by other cations entering the soil. Soils with high clay and organic material content normally have good CECs.

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

Cistern - an underground reservoir or tank for storing rainwater.

Conservation District - the Bucks County Conservation District.

County - Bucks County.

Culvert - a pipe, conduit, or similar structure with appurtenant works, which carries a stream under or through an embankment or fill.

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

DEP - the Pennsylvania Department of Environmental Protection.

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

Designee - the agent of the Board of Supervisors involved with the administration, review, or enforcement of any provisions of this Chapter by contract or memorandum of understanding.

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

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

Developer - a person, partnership, association, corporation, or other entity, or any responsible person therein or agent thereof, with the permission of the landowner that undertakes any regulated activity of this Chapter.

Development - any man-made change to improved or unimproved real estate

including, but not limited to, the construction or placement of buildings or other structures, mobile homes, streets and other paving, utilities, mining, dredging, filling, grading, excavation, or drilling operations, and the subdivision of land.

Development plan - the provisions for development including a planned residential development, a plat of subdivision, all covenants relating to use, location and bulk of buildings and other structures, intensity of use or density of development, streets, ways and parking facilities, common open space and public facilities. The phrase “provisions of development plan” when used in this Chapter shall mean the written and graphic materials referred to in this definition.

Development site - the specific tract of land for which a regulated activity is proposed.

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

Downstream hydraulic capacity analysis - any downstream capacity hydraulic analysis conducted in accordance with this Chapter shall use the following criteria for determining adequacy for accepting increased peak flow rates:

(1) Natural or man-made channels or swales must be able to convey the increased rate of runoff associated with a 2-year return period event within their banks at velocities consistent with protection of the channels from erosion. Acceptable velocities shall be based upon criteria included in the DEP *Erosion and Sediment Pollution Control Program Manual*.

(2) Natural or man-made channels or swales must be able to convey the increased 25-year return period rate of runoff without creating any hazard to persons or property.

(3) Culverts, bridges, storm sewers or any other facilities which must pass or convey flows from the tributary area must be designed in accordance with DEP, Chapter 105 regulations (if applicable) and, at a minimum, pass the increased 25-year return period rate of runoff.

(4) No new channels or conveyance facilities shall be authorized by this language.

Drainage conveyance facility - a stormwater management facility designed to transmit stormwater runoff which shall include streams, channels, swales, pipes, conduits, culverts, storm sewers. etc.

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

Drainage permit - a permit issued by the Board of Supervisors after the drainage plan has been approved. Said permit is issued prior to or with the final Township approval.

Drainage plan - the documentation of the stormwater management system, if any, to be used for a given development site, the contents of which are established in §25-403.

Earth Disturbance - any activity including, but not limited to, construction, mining, timber harvesting and grubbing which alters, disturbs, and exposes the

existing land surface.

Engineer - a licensed professional civil engineer registered in the Commonwealth of Pennsylvania.

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

Erosion and Sediment Pollution Control Plan - a plan which is designed to minimize accelerated erosion and sedimentation.

Existing conditions - the initial condition of a project site prior to the proposed construction. If the initial condition of the site is undeveloped land, farm field or disturbed earth pre-development cover conditions, or existing man-made impervious surfaces, all shall be considered as "meadow" unless the natural land cover is proven to generate lower curve numbers or Rational "C" values than for meadow, such as forested lands.

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

Floodplain - the lands adjoining a river or stream that have been or may be expected to be inundated by flood waters in a 100-year frequency flood, as identified in the Flood Insurance Study (FIS) dated May 18, 1999, and the accompanying maps prepared for the Township by the Federal Emergency Management Agency (FEMA), or most recent revision thereof.

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

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

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

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

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

Groundwater recharge - replenishment of existing natural underground water supplies.

Hydric soils - soils that are categorized as poorly drained that can support hydrophytic plants, but may not do so in many cases. For the purpose of this

Chapter, hydric soils are general wetland indicator soils. The following soils, classified in the *Soil Survey of Bucks and Philadelphia Counties, Pennsylvania*, U.S. Department of Agriculture, Soil Conservation Service, July 1975, are hydric soils:

Bowmansville silt loam

Doylestown silt loam

Fallsington silt loam

Hatboro silt loam

Towhee silt loam

Towhee extremely stony silt loam

Impervious surface - impervious surfaces are those surfaces which do not absorb water. All structures, buildings, parking areas, driveways, roads, sidewalks, and any areas of concrete, asphalt, or packed stone shall be considered impervious surface. In addition, all other areas as determined by the Township Engineer to be impervious within the meaning of this definition shall also be considered as impervious surface.

Impoundment - a retention or detention basin designed to retain stormwater runoff for an extended period of time and release it at a controlled rate.

Infiltration structures - a structure designed to direct runoff into the ground (e.g., french drains, seepage pits, seepage trench, bio-filtration swale).

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

Land development -

(1) The improvement of one or two or more contiguous lots, tracts or parcels of land for any purpose involving:

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

(b) The division or allocation of land or space, whether initially or cumulatively, between or among two or more existing or prospective occupants by means of, or for the purpose of streets, common areas, leaseholds, condominiums, building groups or other features.

(2) A subdivision of land.

(3) The following shall not be considered a land development:

(a) The conversion of an existing single-family detached dwelling or single-family semidetached dwelling into not more than three residential units, unless such units are intended to be a condominium.

(b) The addition of a residential accessory building, including farm building, not greater than 600 square feet in area on a lot or lots subordinate to an existing principal building.

(c) The addition or conversion of buildings or rides within the confines of an enterprise, which would be considered an amusement park. For the purposes of this definition, an amusement park is defined as a tract or area used principally as a location for permanent amusement structures or rides. This exclusion shall not apply to newly acquired acreage by an amusement park until initial plans for the expanded area have been approved by the proper authorities.

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

Main stem (main channel) - any stream segment or other runoff conveyance facility used as a reach in the Township 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 (Township) Engineer - a professional engineer licensed as such in the Commonwealth of Pennsylvania and appointed by the Township pursuant to Article V of the Second Class Township Code.

Municipality - Richland Township, Bucks County, Pennsylvania.

Nonpoint source pollution - pollution that enters a watery body from diffuse origins in the watershed and does not result from discernible, confined, or discrete conveyances.

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

NRCS - Natural Resource Conservation Service (previously SCS).

Open channel - a drainage element in which stormwater flows with an open surface. Open channels include, but shall not be limited to, natural and man-made drainageways, swales, streams, ditches, canals, and pipes flowing partly full.

Outfall - point where water flows from a conduit, stream, or drain.

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

Parking lot storage - involves the use of impervious parking areas as temporary impoundments with controlled release rates during rainstorms.

Peak discharge - the maximum rate of stormwater runoff from a specific storm event.

Penn State runoff model (calibrated) - the computer-based hydrologic modeling technique. The model has been "calibrated" to reflect actual recorded flow values of the Tohickon Creek by adjoining key model input parameters.

Person - an individual, partnership, public or private association or corporation, or a governmental unit, public utility or any other legal entity whatsoever which is recognized by law as the subject of rights and duties.

Pipe - a culvert, closed conduit, or similar structure (including appurtenances)

that conveys stormwater.

Planning Commission - the Planning Commission of Richland Township.

PMF (probable maximum flood) - the flood that may be expected from the most severe combination of critical meteorological and hydrologic conditions that are reasonably possible in any area. The PMF is derived from the probable maximum precipitation (PMP) as determined on the basis of data obtained from the National Oceanographic and Atmospheric Administration (NOAA).

Point 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.

Rational formula - a rainfall-runoff relation used to estimate peak flow.

Recharge volume - a calculated volume of stormwater runoff from impervious areas, which is required to be infiltrated at a site and may be achieved through use of structural or nonstructural BMPs.

Redevelopment - earth disturbance activities on land, which has previously been disturbed or developed.

Regulated activities - any activity to which this Chapter is applicable pursuant to §25-104 of this Chapter.

Regulated earth disturbance activity - earth disturbance activity of 1 acre or more with a point source discharge to surface waters or the Township's storm sewer system or of 5 acres or more regardless of the planned runoff. This includes earth disturbance on any portion of, part, or during any stage of, a larger common plan of development. This only includes road maintenance activities involving 25 acres or more or earth disturbance.

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

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

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

Riser - a vertical pipe extending from the bottom of a pond that is used to control the discharge rate from the pond for a specified design storm.

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

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

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

Sediment pollution - the placement, discharge or any other introduction of sediment into the waters of the Commonwealth occurring from the failure to design, construct, implement or maintain control measures and control facilities

in accordance with the requirements of this Chapter.

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

Seepage pit / seepage trench - an area of excavated earth filled with loose stone or similar coarse material, into which surface water is directed for infiltration into the ground.

Separate storm sewer system - a conveyance or system of conveyances (including road with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels or storm drains) primarily used for collecting and conveying stormwater runoff.

Sheet flow - runoff that flows over the ground surface as a thin, even layer, not concentrated in a channel.

Soil-cover complex method - a method of runoff computation developed by the NRCS that is based on relating soil type and land use/cover to a runoff parameter called curve number (CN).

Soil group, hydrologic - a classification of soils by the 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.

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

State water quality requirements - as defined under State regulations-protection of designated and existing uses (See [25] Pa.Code, Chapters 93 and 96) including:

(1) Each stream segment in Pennsylvania has a “designated use,” such as “cold water fishery” or “potable water supply,” which are listed in Chapter 93. These uses must be protected and maintained, under State regulations.

(2) “Existing uses” are those attained as of November 1975, regardless whether they have been designated in Chapter 93. Regulated earth disturbance activities must be designed to protect and maintain existing uses and maintain the level of water quality necessary to protect those uses in all streams, and to protect and maintain water quality in special protection streams.

(3) Water quality involves the chemical, biological and physical characteristics of surface water bodies. After regulated earth disturbances activities are complete, these characteristics can be impacted by addition of pollutants such as sediment, and changes in habitat through increased flow volumes and/or rates as a result of changes in land surface area from those activities. Therefore, permanent discharges to surface waters must be managed to protect the stream bank, streambed and structural integrity of the waterway, to prevent these impacts.

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

Storm frequency - the number of times that a given storm “event” occurs or is exceeded on the average in a stated period of years. See “return period.”

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

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

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

Stormwater Management Plan - the plan for managing stormwater runoff in the Township.

Stormwater management site plan - the plan prepared by the developer or his representative indicating how stormwater runoff will be managed at the particular site of interest according to this Chapter.

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

Subarea - 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 the devisees, transfer of ownership, or building or lot development, provided, however, that the subdivision by lease of land for agricultural purposes into parcels of more than 10 acres, not involving any new street or easement of access or any residential dwellings, shall be exempt.

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

Timber operations - see “forest management.”

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

Volumetric runoff coefficient - a variable indicative of stormwater runoff volume and dependent on the impervious coverage for a site.

Water quality volume - a calculated volume of stormwater runoff from impervious areas which is required to be captured and treated at a site and may be achieved through use of structural or nonstructural BMPs. Numerically, the water quality volume is a product of the volumetric runoff coefficient, the site area, and a depth of rainfall of 1 inch.

Watercourse - any channel or conveyance of surface waters 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 this Commonwealth.

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

Wetland delineation - the process by which wetland limits are determined. Wetlands must be delineated by a qualified specialist according to the 1989 *Federal Manuals* (as amended) *for the Delineation of Jurisdictional Wetlands* (whichever is greater) or according to any subsequent Federal or State regulation. Qualified specialist shall include those persons being certified professional soil scientists as registered with Registry of Certified Professionals in Agronomy Crops and Soils (ARCPACS); or as contained on consultant's list of Pennsylvania Association of Professional Soil Scientists (PAPSS); or as registered with the National Society of Consulting Soil Scientists (NSCSS), or as certified by State and/or Federal certification programs; or by a qualified biologist/ecologist.

Wetland - those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, ferns, and similar areas.

(Ord. 227, 9/11/2006, Part 2)

Part 3**Stormwater Management****§25-301. General Requirements.**

1. All regulated activities in the Township which do not fall under the exemption criteria shown in §25-105 this Chapter shall submit a stormwater management site plan consistent with the Stormwater Management Plan to the Township for review. These criteria shall apply to the total proposed development even if development is to take place in stages. Impervious cover shall include, but not be limited to, any roof, parking or driveway areas and any new streets and sidewalks. Any areas designed to initially be gravel or crushed stone shall be assumed to be impervious for the purposes of comparison to the waiver criteria.

2. Stormwater drainage systems shall be provided in order to permit unimpeded flow along natural watercourses, except as modified by stormwater management facilities or open channels consistent with this Chapter.

3. The existing points of concentrated drainage that discharge onto adjacent property shall not be altered without permission of the affected property owner(s) and shall be subject to any applicable discharge criteria specified in this Chapter.

4. Areas of existing diffused drainage discharge shall be subject to any applicable discharge criteria in the general direction of existing discharge, whether proposed to be concentrated or maintained as diffused drainage areas, except as otherwise provided by this Chapter. If diffused flow is proposed to be concentrated and discharged onto adjacent property, the developer must document that adequate downstream conveyance facilities exist to safely transport the concentrated discharge, or otherwise prove that no erosion, sedimentation, flooding or other harm will result from the concentrated discharge.

5. Where a development site is traversed by watercourses, drainage easements shall be provided conforming to the line of such watercourses. The width of the easement shall be adequate to provide for the unimpeded flow of stormwater runoff from the 100-year storm event. The terms of the easement shall prohibit excavation, the placing of fill or structures, and any alterations that may adversely affect the flow of stormwater within any portion of the easement. Also, maintenance, including mowing of vegetation within the easement shall be required, except as approved by the appropriate governing authority.

6. When it can be shown that, due to topographic conditions, natural drainage-ways on the site cannot adequately provide for drainage, open channels may be constructed conforming substantially to the line and grade of such natural drainage-ways. Work within natural drainage-ways shall be subject to approval by PA DEP through the joint permit application process, or, where deemed appropriate by PA DEP, through the general permit process.

7. Any stormwater management facilities regulated by this Chapter that would be located in or adjacent to waters of the Commonwealth or wetlands shall be subject to approval by PA DEP through the joint permit application process, or, where deemed appropriate by PA DEP, the general permit process. When there is a question whether

wetlands may be involved, it is the responsibility of the developer or his agent to show that the land in question cannot be classified as wetlands, otherwise approval to work in the area must be obtained from PA DEP.

8. Any stormwater management facilities regulated by this Chapter that would be located on State highway rights-of-way shall be subject to approval by the Pennsylvania Department of Transportation (PennDOT).

9. The minimization of impervious surfaces and the infiltration of runoff through seepage beds, infiltration trenches, etc., are encouraged, where soil conditions permit, to reduce the size or eliminate the need for detention facilities.

10. Roof drains must not be connected to streets, sanitary or storm sewers, or roadside ditches to promote overland flow and infiltration/percolation of stormwater where advantageous to do so. When it is more advantageous to connect directly to streets or storm sewers, then it shall be permitted on a case-by-case basis by the Township.

11. *Permit Requirements by Other Government Entities.* The following permit requirements may apply to certain regulated earth disturbances activities, as applicable:

A. All regulated earth disturbances activities subject to permit requirements by DEP under regulations at 25 Pa.Code, Chapter 102.

B. Work within natural drainageways subject to permit by DEP under 25 Pa.Code, Chapter 105.

C. Any stormwater management facility that would be located in or adjacent to surface waters of the Commonwealth, including wetlands, subject to permit by DEP under 25 Pa.Code, Chapter 105.

D. Any stormwater management facility that would be located on a State highway right-of-way, or require access from a State highway, shall be subject to approval by the Pennsylvania Department of Transportation (PennDOT).

E. Culverts, bridges, storm sewers or any other facilities which must pass or convey flows from the tributary area and any facility which may constitute a dam subject to permit by DEP under 25 Pa.Code, Chapter 105.

(Ord. 227, 9/11/2006, §301)

§25-302. Stormwater Management Districts.

1. *Mapping of Stormwater Runoff Peak Rate Districts.* In order to implement the provisions of this Township Stormwater Management Plan, Richland Township is hereby divided into stormwater runoff peak rate districts consistent with the plan. The boundaries of the districts are indicated on the stormwater management release rate map that is available for inspection at the Richland Township building. A reduced scale release rate map is included as Appendix 25-D for reference.

2. The exact location of the stormwater runoff peak rate district boundary as it applies to a given development site shall be determined by mapping the boundaries using the 2-foot or 5-foot topographic contours provided as part of the stormwater management plan developed for the site in accordance with the Richland Township Subdivision and Land Development [Chapter 22] regulations. The district boundaries as originally drawn coincide with topographic divides or, in certain instances, are drawn

from the intersection of the watercourse or a potential flow obstruction to the topographic divide consistent with topography. The locations determined on the stormwater management plan shall be reviewed and verified by the Township Engineer.

3. *Description of the Tohickon Creek Watershed Stormwater Runoff Hydrologic Peak Rate Districts.*

A. *Conditional No Detention Districts.* Subareas included in this district are 2, 3, 8-10, 18, 20, 21, 42, 43, 52, 54, 56, 57, 59, 61, 62, 67, 70-73, 76, 77, 81-83. These subareas may discharge post-development runoff without detention facilities without adversely affecting the total watershed peak flow. In certain instances, the conveyance capabilities of the local receiving facilities may not be adequate to safely transport the increased peak flows from undetained runoff. In these cases, the developer shall assure that 100% release rate control is applied to the particular receiving stream(s), and/or the developer may provide increased capacity of those receiving facilities in order to insure safe passage of any undetained runoff. Also, portions of §§25-303.8 and 25-303.10 may be applicable. (Note: None of these subareas are located within Richland Township).

B. *100% Release Rate District.* Subareas included in this district are 4-7, 11-17, 19, 22-28, 31-34, 41, 44-51, 53, 55, 58, 60, 63, 64, 66, 68, 69, 74, 75, 84-91, 92*, 93*, 94, 95*-98*, 101*, 109*, 111*-114*, 116*, 118*, 119*, 121*-126*. These subareas are not expected to incur a great deal of development growth due to location, topography, soils, or a combination of all three factors. Also, the location in the watershed of these subareas is of minor importance in supporting the overall watershed level runoff control. Therefore, these areas are allowed to release development runoff at a rate that does not exceed the existing rates of runoff. (Note: Subareas located within Richland Township are noted by an asterisk).

C. *90% Release Rate District.* Subareas included in this district are 30, 35-40, 226. These areas are located in developing areas that have adequate drainage capacity in the receiving waterways. A slight amount of reduction is necessary to preserve this integrity of the receiving waterways and increase water quality of the receiving waterways, at the request of the local Township. (Note: None of these subareas are located within Richland Township).

D. *The 75% Release Rate District.* Subareas included in this district are 78-80, 99*, 100*, 102*-108*, 110*, 115*, 117*, 120*. Certain subareas require the control of stormwater runoff to a portion of the existing runoff equal to 75%. These areas are located in the upper reaches of the watershed, specifically, areas around Quakertown Borough and Richland Township, which are projected to incur significant development, impacts and have existing inadequate storm conveyance facilities. Some of these areas are expected to incur a relatively major increase in development pressure, while some areas may not see much development at all. In order to assure uniform watershed-level runoff control; the assignment of this release rate on a widespread basis will uniformly restrict the future runoff in a fashion that favors no particular sub-watershed. (Note: Subareas located with Richland Township are noted by an asterisk).

4. *Description of Delaware River (North) Watershed Stormwater Runoff Hydrologic Peak Rate Districts.*

A. *Conditional No Detention Districts.* Subareas included in this district are 1, 2, 6-11, 20, 61-68, 70, 71, 89-91, 93. These subareas may discharge post-development runoff without detention facilities without adversely affecting the total watershed peak flow. These areas are located adjacent to the Delaware River, which is capable of absorbing undetained runoff without affecting the watershed level control. In certain instances, the conveyance capabilities of the local receiving facilities may not be adequate to safely transport the increased peak flows from undetained runoff. In these cases, the developer shall ensure that 100% release rate control is applied to the particular receiving stream(s), and/or the developer may provide increased capacity of those receiving facilities in order to insure safe passage of any undetained runoff.

B. *100% Release Rate District.* Subareas included in this district are 3-5, 12-19, 21-40, 40-60, 69, 73, 79, 82, 88, 92, 94-103, 112-131. These subareas are not expected to incur a great deal of development growth due to location, topography, soils, or a combination of all three factors. Also, the location in the watershed of these subareas is of minor importance in supporting the overall watershed level runoff control. Therefore, these areas are allowed to release development runoff at a rate that does not exceed the existing rates of runoff.

C. *75% Release Rate District.* Subareas included in this district are 104-111. Certain subareas require the control of stormwater runoff to a portion of the existing runoff equal to 75%. These areas are located in upper reaches of the watershed, specifically, areas around Quakertown Borough and Richland Township, which are projected to incur significant development, impacts and have existing inadequate storm conveyance facilities. Some of these areas are expected to incur a relatively major increase in development pressure, while some areas may not see much development at all. In order to ensure uniform watershed-level runoff control; the assignment of this release rate on a widespread basis will uniformly restrict the future runoff in a fashion that favors no particular sub-watershed.

5. *Unstudied Watersheds.* These areas shall be subject to all criteria of this Chapter and have a 100% release rate.

(Ord. 227, 9/11/2006, §302)

§25-303. Stormwater Management District Implementation Provisions (Performance Standards and Best Management Practices).

1. *General.* Post-development rates of runoff from any regulated activity shall not exceed the specified hydrologic district peak release rates of runoff for the design storms specified on the Stormwater Management Release Rate Map, Appendix 25-D and §25-302, of this Chapter. Calculations must be provided to ensure that post-development runoff peak rates from storms including the 2-, 5-, 10-, 25-, 50-, and 100-year frequency storm do not exceed pre-development peak rates, or the hydrologic district peak release rate for that district, for similar frequency storms.

A. *General Standards.* Post-development stormwater runoff volume being discharged from any regulated activity shall not exceed pre-development stormwater runoff volume being discharged for up to the 2-year frequency rainfall. If the applicant's professional engineer can demonstrate to the satisfaction of the Township that due to existing soil, bedrock, water table or other conditions on the

parcel, that such a standard is not achievable on the site (all or in part), the standard contained in subsection .3 shall apply.

B. Post-development rates of runoff from any regulated activity shall not exceed the peak release rate of runoff prior to development for the design storms specified in Watershed Stormwater Management Plan, §25-303 of this Chapter and using rainfall depths given in Table 25-1 below:

Table 25-1 Rainfall Depths

Frequency of Storm Event (Years)	Rainfall Depth(Inches)
1	2.4
2	3.1
5	3.7
10	4.5
25	5.5
50	7.0
100	7.5

(Source: PennDOT Intensity-Duration-Frequency Tables for Region 4)

C. It is determined to the satisfaction of the Township that the volume standard set forth in §25-303.1.A cannot be achieved, then the peak rate standards are modified so that the post-development peak rate discharges from the site for all storms up to the 10-year storm must be equal to or less than 75% of the design peak rates permitted within §25-302.

2. *Groundwater Recharge.*

A. Developed areas shall maintain groundwater recharge consistent with pre-development conditions, dependent on hydrologic soil groups and impervious cover. A minimum of 1 inch of runoff shall be infiltrated unless the developer can prove the inability of the site to achieve this specific volume based on existing site conditions. The maximum available recharge shall be calculated based on utilizing the most capable recharge areas of the site. This volume of runoff is termed the “recharge volume” and is calculated in accordance with §25-305.K.

B. Design of the stormwater management facilities shall provide for ground water recharge to compensate for the reduction in the percolation that occurs when the ground surface runoff characteristics have been altered. A detailed geologic evaluation of the project site shall be performed to determine the suitability of recharge facilities. The evaluation shall be performed by a qualified geologist and/or soil scientist, and shall, at a minimum, address soil permeability, depth to bedrock, susceptibility to sinkhole formation, and subgrade stability. Where pervious pavement is permitted for parking lots, recreational facilities, nondedicated streets, or other areas, these special pavement construction specifications shall be noted on the plan.

C. Whenever a stormwater facility will be located in an area underlain by limestone, a geological evaluation of the proposed location shall be conducted to

determine susceptibility to sinkhole formations. The design of all facilities over limestone formations shall include measures to prevent ground water contamination and, where necessary, sinkhole formation. Soils used for the construction of basins shall have low-erodibility factors ("K" factors). The Township may require the installation of an impermeable liner in detention basins. If the developer can prove through analysis that the site is in an area underlain by limestone, and such geologic conditions may result in sinkhole formations, then the site is exempt from recharge requirements. However, the site shall still be required to meet all other hydrologic and water quality management standards as found in this Chapter.

D. It shall be the developer's responsibility to verify if the site is underlain by limestone. The following note shall be attached to all stormwater management site plans and signed and sealed by the developer's engineer/surveyor/landscape architect/architect "I, _____, certify that the proposed detention basin (circle one) is/is not underlain by limestone."

3. *Water Quality.* Developed areas will provide adequate storage and treatment facilities necessary to capture and treat the water quality volume (WQ_v) consistent with Parts 3 and 4 of this Chapter. The "water quality volume" is calculated in accordance with §25-305.J. The recharge volume may be a component of the water quality volume. If the recharge volume is less than the water quality volume, the remaining water quality volume may be captured and treated by methods other than recharge/infiltration BMPs.

4. *District Boundaries.* The boundaries of the stormwater management districts are shown on an official map, which is available for inspection at the Township office. A copy of the official map at a reduced scale is included in this Chapter in Appendix 25-D. The exact location of the stormwater management district boundaries as they apply to a given development site shall be determined by mapping the boundaries using topographic contours at an appropriate level of detail, but in no case less than 2-foot intervals. The Township may determine a more frequent contour interval is necessary to adequately delineate the district boundary. This information will be provided as part of the stormwater management site plan.

5. *Sites Located in More than One District.* For a proposed development site located within two or more release category subareas, the peak discharge rate from any subarea shall be the pre-development peak discharge for that subarea multiplied by the applicable release rate. The calculated peak discharges shall apply regardless of whether the grading plan changes the drainage area by subarea. An exception to the above may be granted if discharges from multiple subareas recombine in proximity to the site. In this case, peak discharge in any direction may be a 100% release rate provided that the overall site discharge meets the weighted average release rate.

6. *Off-Site Areas.* Off-site areas that drain through a proposed development site are not subject to release rate criteria when determining allowable peak runoff rates. However, on-site drainage facilities shall be designed to safely convey off-site flows through the development site.

7. *Site Areas.* Where the site area to be impacted by a proposed development activity differs significantly from the total site area, only the proposed impact area shall be subject to the release rate criteria.

8. *No Harm Option.* For any proposed development site not located in a

conditional direct discharge district, the Township, upon request by the applicant, may, but is not required to, permit a less restrictive runoff control (including no detention) if the developer can prove that no harm would be caused by discharging at a higher runoff rate than that specified by the plan. The no harm option is used when a developer can prove that the post-development hydrographs can match pre-development hydrographs, or if it can be proved that the post-development conditions will not cause increases in peaks at all points downstream. Proof of no harm would have to be shown based upon the following downstream impact evaluation which shall include a downstream hydraulic capacity analysis to be consistent with §25-303.J. to determine if adequate hydraulic capacity exists. The applicant's professional engineer shall submit to the Township this evaluation of the impacts due to increased downstream stormwater flows in the watershed.

A. The downstream impact evaluation shall include hydrologic and hydraulic calculations necessary to determine the impact of hydrograph timing modifications due to the proposed development upon a dam, highway, structure, natural point of restricted streamflow or any watercourse, established with the concurrence of the Township.

B. The evaluation shall continue downstream until the increase in flow diminishes due to additional flow from tributaries and/or stream attenuation.

C. The peak flow values to be used for downstream areas for the design return period storms (2-, 10-, 25- and 100-year) shall be the values from the calibrated model for the watershed. These flow values can be obtained from the watershed plan.

D. Developer-proposed runoff facilities which would generate increased peak flow rates at storm drainage problem areas would, by definition, be precluded from successful attempts to prove no-harm, except in conjunction with proposed capacity improvements for the problem areas consistent with subsection .8.

E. A financial distress shall not constitute grounds for granting a no-harm exemption.

F. Capacity improvements may be required by the developer as determined necessary by the Township to implement the no harm option which proposes specific capacity improvements to provide that a less stringent discharge control would not create any harm downstream.

G. Any no harm justifications shall be submitted by the developer as part of the stormwater plan submission.

9. *Stormwater Conveyance Corridor Protection (Riparian Corridor Preservation and Vegetation)*. Runoff from developed areas of the site including, but not limited to, areas of impervious surface, shall be managed through a series of riparian corridor vegetation facilities whenever possible. This will be accomplished in a manner satisfactory to the Township, utilizing the *Pennsylvania Handbook of Best Management Practices for Developing Areas*, 1998, as amended, Riparian Forested Buffer, and the priority goal of the riparian vegetation will be the reduction of thermal impacts on stormwater runoff associated with impervious areas, with a secondary goal being the protection of capacity of existing stormwater conveyance channels. These goals will be achieved through the use of design criteria in §25-304.10 of this Chapter, and shall be in addition to any other Township ordinance provisions.

10. *Downstream Hydraulic Capacity Analysis.* A downstream hydraulic capacity analysis will be required, unless waived by the Township, to verify stormwater management routing, timing, combined peak effects, etc., associated with unanticipated impervious cover and development, such as may result from changes in zoning or conditional uses which exceed projected growth for a particular watershed. Such analysis shall be conducted in accordance with this Chapter and is subject to the review and approval of the Township Engineer. Any downstream capacity hydraulic analysis conducted in accordance with this Chapter shall use the following criteria for determining adequacy for accepting increased peak flow rates:

A. Natural or man-made channels or swales must be able to convey the increased runoff associated with a 2-year return period event within their banks at velocities consistent with protection of the channels from erosion. Acceptable velocities shall be based upon criteria included in the DEP *Erosion and Sediment Pollution Control Program Manual*.

B. Natural or man-made channels or swales must be able to convey the increases 25-year return period runoff without creating any hazard to persons or property.

C. Culverts, bridges, storm sewers or any other facilities which pass or convey flows from the tributary area must be designed in accordance with DEP, Chapter 105 regulations (if applicable) and, at a minimum, pass the increased 25-year return period runoff.

11. *Regional Detention Alternatives.* For certain areas within the study area, it may be more cost-effective to provide one control facility for more than one development site than to provide an individual control facility for each development site. The initiative and funding for any regional runoff control alternatives are the responsibility of prospective developers. The design of any regional control basins must incorporate reasonable development of the entire upstream watershed. The peak outflow of a regional basin would be determined on a case-by-case basis using the hydrologic model of the watershed consistent with protection of the downstream watershed areas. "Hydrologic model" refers to the calibrated model as developed for the Stormwater Management Plan.

(Ord. 227, 9/11/2006, §303)

§25-304. Design Criteria for Stormwater Management Facilities and Best Management.

1. Increased stormwater runoff, which may result from regulated activities listed in §25-104, shall be controlled by permanent stormwater runoff control measures that will provide the required standards within Part 3. The methods of stormwater control or best management practices (BMP's), which may be used to meet the required standards, are described in this Chapter and are the preferred methods of controlling stormwater runoff. Additional design criteria are included in these descriptions. The choice of BMP's is not limited to the ones appearing in this Chapter; however, any selected BMP must meet or exceed the runoff peak rate requirements of this Chapter for the applicable hydrologic district.

2. Any stormwater facility located on State highway rights-of-way shall be subject to approval by the Pennsylvania Department of Transportation.

3. Any stormwater management facility (i.e., detention basin) designed to store runoff and requiring a berm or earthen embankment required or regulated by this Chapter shall be designed to provide an emergency spillway to handle flow up to and including the 100-year post-development conditions. The height of embankment must be set as to provide a minimum 1 foot of freeboard above the maximum pool elevation computed when the facility functions for the 100-year post-development inflow. Should any stormwater management facility require a dam safety permit under PA DEP Chapter 105, the facility shall be designed in accordance with Chapter 105 and meet the regulations of Chapter 105 concerning dam safety which may be required to pass storms larger than the 100-year event.

4. Any facilities that constitute water obstructions (e.g., culverts, bridges, outfalls, or stream enclosures), and any work involving wetlands as directed in PA DEP Chapter 105 regulations (as amended or replaced from time to time by PA DEP), shall be designed in accordance with Chapter 105 and will require a permit from PA DEP. Any other drainage conveyance facility that doesn't fall under Chapter 105 regulations must be able to convey, without damage to the drainage structure or roadway, runoff from the 25-year design storm with a minimum 1 foot of freeboard measured below the lowest point along the top of the roadway. Roadway crossings located within designated floodplain areas must be able to convey runoff from a 100-year design storm with a minimum 1 foot of freeboard measured below the lowest point along the top of roadway. Any facility that constitutes a dam as defined in PA DEP Chapter 105 regulations may require a permit under dam safety regulations. Any facility located within a PennDOT right of way must meet PennDOT minimum design standards and permit submission requirements.

5. Any drainage conveyance facility and/or channel that does not fall under Chapter 105 regulations, must be able to convey, without damage to the drainage structure or roadway, runoff from the 25-year design storm. Conveyance facilities to or exiting from stormwater management facilities (i.e., detention basins) shall be designed to convey the design flow to or from that structure. Roadway crossings located within designated floodplain areas must be able to convey runoff from a 100-year design storm. Any facility located within a PennDOT right-of-way must meet PennDOT minimum design standards and permit submission requirements.

6. Storm sewers must be able to convey post-development runoff from a 25-year design storm without surcharging inlets, where appropriate.

7. Adequate erosion protection shall be provided along all open channels, and at all points of discharge.

8. The design of all stormwater management facilities shall incorporate sound engineering principles and practices. Guidelines established by the *Pennsylvania Handbook of Best Management Practices for Developing Areas*, 1998, as amended, shall be utilized in determining stormwater management facility design. The Township shall reserve the right to disapprove any design that would result in the occupancy or continuation of an adverse hydrologic or hydraulic condition within the watershed. In selecting the appropriate BMPs or combinations thereof, the land developer shall take into account the following:

- A. Total contributing area.
- B. Permeability and infiltration rate of the site soils.

- C. Slope and depth to bedrock.
- D. Seasonal high water table.
- E. Proximity to building foundations and wellheads.
- F. Erodibility of soils.
- G. Land availability and configuration of the topography.

The following additional factors should be considered when evaluating the suitability of BMPs used to control water quality at a given development site:

- A. Peak discharge and required volume control.
- B. Streambank erosion.
- C. Efficiency of the BMPs to mitigate potential water quality problems.
- D. The volume of runoff that will be effectively treated.
- E. The nature of the pollutant being removed.
- F. Maintenance requirements.
- G. Creation/protection of aquatic and wildlife habitat.
- H. Recreational value.
- I. Enhancement of aesthetic and property value.

9. Pipe or artificial swale discharge shall be set back 75 feet from a receiving waterway, and the pipe discharge shall be immediately diffused or spread out to reduce and eliminate high-velocity discharges to the impacted ground surface. The conveyance mechanism shall minimize disturbance and minimize velocity of discharge.

10. All infiltration devices and groundwater recharge facilities shall be designed to completely drain all water in 3 days subsequent to any storm event.

11. *Riparian Corridor Preservation.* The area up to 50 feet from top of streambank on either side of a stream shall be planted in accordance with Zone 1 and Zone II buffer planting requirements as depicted in the *Pennsylvania Handbook of Best Management Practices for Developing Areas*, 1998, as amended, riparian forested buffer. Zone I will comprise, at a minimum, the first 15 feet from top of bank, with Zone II comprising the remaining 35 feet. This replanting may be waived by the local municipalities along streambank areas, which receive overland or shallow flow from upstream, undisturbed, meadow or other existing pervious surfaces.

12. All developments which create impervious surface shall provide capacity for and treatment of the "water quality volume" and "recharge volume," unless exempt from applicability under §25-105.

13. Special requirements for areas falling within defined exceptional value and high-quality sub-watersheds. The temperature and quality of water and streams that have been declared as exceptional value or high quality is to be maintained as defined in Chapter 93, "Water Quality Standards," Title 25 of Pennsylvania Department of Environmental Protection Rules and Regulations. Temperature sensitive BMPs and stormwater conveyance systems are to be used and designed with storage pool areas and supply outflow channels and should be shaded with trees. This will require the modification of berms for permanent ponds and the relaxation of restrictions on planting vegetation within the facilities, provided that capacity for volume and rate controls is maintained. At a minimum, the southern half of pond shorelines shall be

planted with shade or canopy trees within 10 feet of the pond shoreline. In conjunction with this requirement, the maximum slope allowed on the berm area to be planted is 10 to 1. This will lessen the de-stabilization of berm soils due to root growth. A long term maintenance schedule and management plan for the thermal control BMPs is to be established and recorded for all development sites.

14. A quality control program is critical for fills; therefore, whenever load bearing fill material is to be used, each layer of compacted fill shall be tested to determine its dry density per ASTM D1556. The maximum layer depth shall be 8 inches. The density of each layer shall not be less than 95% of the maximum dry density as determined per ASTM D1557. These tests shall be required for all fills and stormwater or sediment basins within the Township.

15. No stone gabion baskets may be used in the construction of stormwater management.

16. All stormwater control facility designs shall conform to the applicable standards and specifications of the following governmental and institutional agencies:

- A.. American Society of Testing and Materials (ASTM)
- B. Asphalt Institute (AI)
- C. Bucks Conservation District (BCD)
- D. Federal Highway Administration (FHWA)
- E. National Crushed Stone Association (NCSA)
- F. National Sand and Gravel Association (NSGA)
- G. Pennsylvania Department of Environmental Protection (PA DEP)
- H. Pennsylvania Department of Transportation (PennDOT)
- I. U.S. Department of Agriculture, Natural Resources Conservation Service, PA (USDA, NRCS, PA)

17. If special geological hazards or soil conditions, such as carbonate derived soils, are identified on the site, the developer's professional engineer shall consider the effect of proposed stormwater management measures on these conditions. In such cases, the Township may require an in-depth report by a competent soils engineer and/or registered professional geologist.

(*Ord. 227, 9/11/2006, §304*)

§25-305. Calculation Methodology.

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

A. Any stormwater runoff calculations involving drainage areas greater than 200 acres, including on- and off-site areas, shall use generally accepted calculation technique that is based on the NRCS soil cover complex method. Table 25-2 summarizes acceptable computation methods. It is assumed that all methods will be selected by the design professional based on the individual limitations and suitability of each method for a particular site. The Township and Township Engineer may approve the use of the rational method to estimate peak discharges from drainage areas that contain less than 200 acres.

B. All calculations consistent with this Chapter using the soil cover complex

method shall use the appropriate design rainfall depths for the various return period storms presented in Table 25-A-I in Appendix 25-A of this Chapter. If a hydrologic computer model such as PSRM or HEC-I is used for stormwater runoff calculations, then the duration of rainfall shall be 24 hours. The NRCS “S” curve shown in Figure 25-A-1, Appendix 25-A of this Chapter shall be used for the rainfall distribution.

C. For the purposes of pre-development flow rate determination, developed land and undeveloped land shall be considered as “meadow” in good condition, unless the natural ground cover generates a lower curve number or rational “C” value (i.e., forest).

D. All calculations using the rational method shall use rainfall intensities consistent with appropriate times of concentration for overland flow and return periods from the Design Storm Curves from PA Department of Transportation *Design Rainfall Curves* (1986) (Figure A-2). Times of concentration for overland flow and concentrated flow shall be calculated using the methodology presented in Chapter 3 of *Urban Hydrology for Small Watersheds*, NRCS, TR-55 (as amended or replaced from time to time by NRCS). Times of concentration for channel and pipe flow shall be computed using Manning's equation.

**Table 25-2
Acceptable Computation Methodologies for Stormwater Management Plan**

METHOD	METHOD DEVELOPED BY	APPLICABILITY
TR-20 or commercial package based on TR-20	USDA - NRCS	When use of full model is desirable or necessary
TR-55 or commercial package based on TR-55	USDA - NRCS	Applicable for plans within the models limitations
HEC - 1	U.S. Army Corps of Eng.	When full model is desirable or necessary
PSRM	Penn State Univ.	When full model is desirable or necessary
Rational method or commercial package based on rational method	Emil Kuiching (1889)	For sites less than 200 acres
Other methods	Various	As approved by the Township Engineer

E. Runoff curve numbers (CN) values for both existing and proposed conditions to be used in the soil cover complex method shall be obtained from Table 25-A-2 in Appendix 25-A of this Chapter.

F. Runoff coefficient (c) values for both existing and proposed conditions for use in the rational method shall be obtained from Table 25-A-3 in Appendix 25-A of this Chapter.

G. Where uniform flow is anticipated, the Manning equation shall be used for hydraulic computations, and to determine the capacity of open channels, pipes, and storm sewers. Values for Manning's roughness coefficient (n) shall be consistent with Table 25-A-4 in Appendix 25-A of this Chapter.

Outlet structures for stormwater management facilities shall be designed to

meet the performance standards of this Chapter using any generally accepted hydraulic analysis technique or method.

H. The design of any stormwater detention facilities intended to meet the performance standards of this Chapter shall be verified by routing the design storm hydrograph through these facilities using the storage-indication method. For drainage areas greater than 20 acres in size, the design storm hydrograph shall be computed using a calculation method that produces a full hydrograph. The Township may approve the use of any generally accepted full hydrograph approximation technique that shall use a total runoff volume that is consistent with the volume from a method that produces a full hydrograph.

I. If the designer can substantiate through actual physical calibration that more appropriate runoff and time-of-concentration values should be utilized at a particular site, then appropriate variations may be made upon review and recommendations of the Township Engineer, provided that the Township has the authority to require that computed existing runoff rates be reconciled with field observations and conditions. Calibration shall require detailed gauge and rainfall data, and other hydrologic information deemed relevant for the particular site in question.

J. *Calculation of Water Quality Volume.* The water quality volume (WQ_v) is the storage capacity needed to treat 90% of the average annual stormwater rainfall from the developed areas of the site. The following calculation is used to determine the storage volume, WQ_v , in acre-feet of storage:

$$WQ_v = \frac{(1.95)(R_v)(A)}{12}$$

WQ_v = Water Quality Volume

A = Area in acres

$R_v = 0.05 + 0.009(I)$ where I is the percent impervious cover (example: I= 50 for 50% impervious cover)

1.95 = is a coefficient representing the 90% annual rainfall (*Pennsylvania Handbook of Best Management Practices for Developing Areas*)

The water quality volume (WQ_v) shall be designed as part of a stormwater management facility which incorporates water quality BMPs as a primary benefit of using that facility, in accordance with design specifications contained in *Pennsylvania Handbook of Best Management Practices for Developing Areas*, 1998, as amended.

K. *Calculation of Recharge Volume.* The recharge volume (Re_v) is the volume of stormwater runoff from a developed site, which shall be required to maintain existing pre-development groundwater recharge at development sites. It may be part of the water quality volume, and is calculated on the basis of treatment and recharge by structural stormwater management practices, as follows:

$$Re_v = \frac{(S)(Re_v)(A)}{12}$$

Re_v = Recharge Volume

A = Area in acres

R_v = 0.05 + 0.009(I) where I is the percent impervious cover (example: I = 50 for 50% impervious cover)

S is the Soil Specific Recharge factor and varies according to soil type, as follows:

Hydrologic Soil Groups	Soil Specific Recharge Factor (S)
A	0.38
B	0.26
C	0.14
D	0.07

Structural stormwater management facilities, which provide treatment and recharge of the required Recharge Volume, will be designed as part of a stormwater management facility, which incorporates groundwater recharge BMPs as a primary benefit of using that facility, in accordance with design specifications contained in the *Pennsylvania Handbook of Best Management Practices for Developing Areas*, 1998, as amended.

L. All stormwater runoff calculations, reports, and design of stormwater management facilities shall be prepared by a registered professional engineer licensed in the Commonwealth of Pennsylvania.

(Ord. 227, 9/11/2006, §305)

§25-306. Erosion and Sedimentation Control Requirements During Regulated Earth Disturbance Activities.

1. Whenever the vegetation and topography are to be disturbed, such activity must be in conformance with Chapter 102, Title 25, Rules and Regulations, Chapter 1, Commonwealth of Pennsylvania, Department of Environmental Protection, subpart C, "Protection of Natural Resources," Article II, "Water Resources," Chapter 102, "Erosion Control," and in accordance with the Bucks Conservation District and the requirements of the Township outlined in Chapter 9, "Grading, Excavating, Erosion and Sediment Control," of the Code of Ordinances.

2. Additional erosion and sedimentation control design standards and criteria that must be or are recommended to be applied where infiltration BMPs are proposed and include the following:

A. Areas proposed for infiltration BMPs shall be protected from sedimentation and compaction during the construction phase, so as to maintain their maximum infiltration capacity.

- B. Infiltration BMPs shall not be constructed nor receive runoff until the entire contributory drainage area to the infiltration BMP has received final stabilization.
3. Peak discharge and discharge volumes from the site shall comply with the appropriate Sections above, with the following additions:
- A. For purposes of calculating required detention storage during land disturbance, peak discharges and discharge volumes shall be calculated based upon the runoff coefficients for bare soils during the maximum period and extent of disturbance which shall be clearly indicated on the development plan. Controls shall ensure that the difference in the rate of peak discharge before disturbance and during shall not exceed those peak discharges required in §25-303 of this Chapter. Detention storage during the period of land disturbance and prior to establishment of permanent cover may require additional facilities on a temporary basis. Such measures shall be located so as to preserve the natural soil infiltration capacities of the planned infiltration bed areas.
- B. Wherever soils, topography, cut and fill or grading requirements or other conditions suggest substantial erosion potential during land disturbance, the Township may require that the entire volume of all storms up to a 2-year storm from the disturbed areas be retained on site and that special sediment trapping facilities (such as check dams, etc.) be installed.
4. Areas of the site to remain undisturbed shall be protected from the encroachment of construction equipment, construction vehicles, etc., by using proper fencing to maintain the existing infiltration characteristics of the soil.
5. No regulated earth disturbance activities within the Township shall commence until approval by the Bucks County Conservation District of an erosion and sediment control plan for construction activities.
6. DEP has regulations that require an erosion and sediment control plan for any earth disturbance activity of 5,000 square feet or more, under 25 Pa.Code §102.4(b).
7. In addition, under 25 Pa.Code, Chapter 92, a DEP "NPDES construction activities" permit is required for regulated earth disturbance activities.
8. Evidence of any necessary permit(s) for regulated earth disturbance activities from the appropriate DEP regional office or County Conservation District must be provided to the Township. The issuance of an NPDES construction permit (or permit coverage under the Statewide general permit (PA2) satisfies the requirements subsection .5.
9. A copy of the erosion and sediment control plan and any required permit, as required by DEP regulations, shall be available at the project site at all times.
- (Ord. 227, 9/11/2006, §306)

§25-307. Retention /Detention Basin Requirements.

1. Detention basins shall be designed to utilize the natural contours of the land whenever possible. When such design is not practical, the construction of the basin shall utilize slopes as flat as possible to blend the structure into the terrain. Detention basins shall be designed to facilitate regular maintenance, mowing, and periodic desilting of all structures.

2. The use of regional detention basins to combine and eliminate numerous smaller basins is encouraged. Within subdivisions, basins shall be located in open space, on an individual lot, or common area with easements for access to the basin.

3. A pipe outlet from the basin outlet control structure shall permit complete drainage of all detained water, unless the stormwater management facility is designed as a retention basin/pond or provides for stormwater renovation with constructed wetlands.

4. When a detention basin is not designed as a stormwater management constructed wetland, the stormwater management facility shall be planted with low maintenance grass or substitute satisfactory to the Township.

5. To minimize the visual impact of detention basins, the detention basin shall be designed to avoid the need for safety fencing. To meet this requirement, basins shall be designed to the following specifications:

A. Maximum depth of detained runoff shall be 24 inches for a 10-year storm event.

B. Maximum depth of detained runoff shall be 36 inches for a 100-year storm event.

C. Poned water shall never exceed a depth of 24 inches for more than 4 hours.

D. Depths and slopes may be exceeded by permission of the Township on a case-by-case basis if lot runoff, topography and/or existing downstream systems make the required pond area unreasonably large. In such case, fence and landscape screens will be required and the maximum difference between the top of berm elevation of the outlet structure shall be 7 feet.

6. All basin berms, including the emergency spillway, shall have a maximum interior and exterior side slope of 3 horizontal to 1 vertical. The toe of any slope shall be located a minimum of 10 feet from any property line, street right-of-way, wetland boundary, and 100-year floodway elevation.

7. An access ramp of 10:1, 10 feet wide, shall be provided to allow maintenance equipment to reach the basin floor. The ramp shall coincide with the required gate if fencing is needed.

8. All retention basins shall be fenced. Fencing for retention basins and where required, fencing for detention basins, shall provide a suitable barrier at least 4 feet in height of material approved by the Township, such as split rail fencing with wire backing. Access to the basin shall be provided by a gate or gates having a total opening of at least 10 feet at such location as to permit ready access to the detention basin with maintenance equipment.

9. *Berms.*

A. The minimum basin berm width at the top design elevation shall be 10 feet.

B. A cutoff trench (keyway) of impervious material shall be provided under all embankments that require fill material. The cut-off trench shall be a minimum of 6 feet wide and 3 feet deep.

C. The top of the berm shall be at a minimum 1 foot higher than the highest

spillway elevation to ensure 1 foot of freeboard.

10. *Spillways.*

A. The minimum capacity of the emergency spillway shall be equivalent or greater than the 100-year peak runoff flow rate for the post development design storm.

B. Emergency spillways discharging over embankment fill shall be constructed of reinforced concrete checker blocks to protect the berm against erosion. The checker block lining shall extend to the toe of the fill slope on the outside of the berm and shall extend to an elevation 3 feet below the spillway crest on the inside of the berm.

C. Vegetated spillways may be utilized for spillways constructed entirely on undisturbed ground (i.e., not discharging over fill) if the designer can demonstrate that flow velocities through the spillways will not cause erosion of the spillway. A dense cover of vegetation shall be rapidly established in such spillways by sodding or seeding with a geotextile anchor. Such a vegetated spillway must be stabilized before runoff is directed to the basin.

D. The maximum spillway length shall not exceed 40 feet for any given area along the berm and adequate energy dissipating devices shall be provided at all discharge locations.

11. *Outlet Piping/Anti-Seep Collars.*

A. Stormwater management facility outlet piping shall be Class III reinforced O-ring concrete pipe. A minimum of one concrete anti-seep collar shall be required. Pre-cast collars shall have a minimum thickness of 8 inches; Field poured collars shall have a minimum thickness of 12 inches. Collars may not be installed within 2 feet of pipe joints. Collars must be designed to project a minimum of 2 feet around the perimeter of the pipe. Maximum collar spacing is 14 times the design projection around the perimeter.

B. Pipe outlet shall permit complete drainage of all detained water, unless the stormwater management facility is designed as a retention basin/pond or provides for stormwater renovation with constructed wetland.

12. *Minimum First Flush Detention/Dual Purpose BMPS.* Minimum first flush detention/dual purpose detention basin BMPs shall be designed to meet the following requirements:

A. Post-development runoff from a water quality storm (as calculated in §25-305.J) shall be released over a minimum period of 24 hours.

B. Two stage basins shall be utilized where first flush detention will be employed for water quality and conventional detention used for peak rate control of storms exceeding the water quality storm event.

C. Two stage basins shall be constructed so that the lower part of the basin is graded to detain stormwater from the water quality storm, and the remainder of the basin graded as a flat over bank area to provide storage only for the larger, less frequent storm events. The overbank area is encouraged to be developed as an active or passive recreational area.

D. The area inundated by the water quality storm is encouraged to be maintained as a wetland environment, which will increase the water quality

benefits of the first flush/dual purpose detention basin and will prevent the need for mowing of a frequently saturated area.

13. Retention basins, if used, shall be designed to protect and provide public health, safety and welfare. At a minimum the retention basin shall be properly lined with cutoff trench, fountain aerator, and can satisfy all other related requirements for detention basins.

14. Underground basins may be utilized for stormwater management, when approved by the Township. The basins shall be designed in accordance with the following criteria:

A. Basins shall be located at least 20 feet outside any existing or ultimate public right-of-way.

B. Basins shall be designed by an engineer and all piping and structures shall be designed to withstand all anticipated weight loads under all extreme conditions.

C. Basins shall incorporate "water quality" measures to protect the groundwater.

D. Basins designated as Class V wells shall provide evidence of compliance with State and Federal reporting requirements.

E. Access structures with steps for maintenance of underground conduits shall be provided at all corners of the basins and at all locations within the basins to provide adequate maintenance.

F. The basin bottom infiltration surface shall be a minimum 48 inches above the high groundwater elevation or any other limiting factor as determined by a qualified professional.

G. An emergency overflow structure shall be provided to ensure that all water entering the basin can safely by-pass the basin. All down stream conveyance facilities from the emergency overflow shall be capable of handling the by-pass flow.

H. All down stream property along the emergency overflow route shall be secured by easement or in fee.

15. *Landscaping.*

A. The perimeter berms and embankments of all detention and retention basins including wet ponds and artificial wetland stormwater management facilities shall be designed to create a natural appearance and reduce future maintenance requirements. Landscaping shall include a mixture of tall grasses and perennial plants, ground cover, shrubs, and trees to eliminate the necessity of periodic mowing.

B. *Detention Basin Landscaping.* Within any detention basin, one of the following seed mixtures shall be used:

(1) Birdsfoot Trefoil Establishment (legume).

- (a) Birdsfoot trefoil, plus 8 lbs/acre.
- (b) Tall fescue, plus 25 lbs/acre.
- (c) Nurse grass (use one) 30 lbs/acre.
- (d) Annual ryegrass or 30 lbs/acre.

- (e) Perennial ryegrass 30 lbs/acre.
- (2) Deertongue Grass Establishment (legume).
 - (a) Deertongue grass, plus 10 lbs/acre.
Companion, (use one)
 - (b) Tall fescue, 25 lbs/acre.
 - (c) Birdsfoot trefoil, plus 6 lbs/acre.
Nurse grass, (use one) or
 - (d) Annual ryegrass 30 lbs/acre.
- (3) Crownvetch Establishment (legume).
 - (a) Crownvetch, plus 20 lbs/acre.
 - (b) Tall fescue, plus nurse 25 lbs/acre.
grass (use one)
 - (c) Annual ryegrass, or 30 lbs/acre.
 - (d) Perennial ryegrass 30 lbs/acre.

NOTE: Deertongue grass establishment may be maintained as a turf grass and used for recreational purposes. Crownvetch shall be permitted for use in nonresidential developments only.

Since other seed varieties may be equally suited to perform the purpose of the mixture stated in this Chapter, other seed varieties of equal quality will be acceptable upon approval by the Township.

C. The perimeter of the retention/detention basin shall be landscaped with a mixture of deciduous trees, evergreens and shrubs arranged in an informal manner. Retention basin (wet ponds) and artificial wetland basin landscaping shall be designed to create a natural appearance. Minimum plant material shall include the following per 100 linear feet of basin perimeter measured at the 100-year reoccurrence stormwater elevation:

- (1) Three evergreen trees (minimum height 4 feet).
- (2) Two deciduous trees (minimum caliper 22 inches).
- (3) Five shrubs (minimum height 3 feet).

Retention/detention basin landscaping design is subject to approval by the Township.

16. Retaining walls shall not be specified for use within the 100-year water surface elevation area of any detention/retention facility or as part of any embankment or cut slope that is appurtenant.

17. As an alternate to the above subsection, the Township may, at its own option, assume responsibility of the basin and may accept dedication of the basin by the developer. If the retention/detention basin is dedicated or offered to the Township for long-term maintenance, the following regulations shall apply:

A. The dedicated area shall include the entire ponded area for the 100-year storm event and the outside slope at the berm.

B. The dedicated area shall not be considered part of the open space and recreation requirements as required elsewhere in the Subdivision and Land

Development Ordinance [Chapter 22] and Zoning Ordinance [Chapter 27].

C. If fencing is necessary, the basin design shall provide a level area (2% slope) 5 feet in width on both the inside and outside of the fence, along the entire length of the fence for proper access by Township maintenance equipment. The total width of this generally level area shall be at least 10 feet.

(Ord. 227, 9/11/2006, §307)

§25-308. Infiltration BMP Requirements.

Infiltration BMPs shall be utilized wherever possible. Vegetated swales, wetlands or artificial wetlands may be utilized wherever possible if infiltration BMPs are deemed unfeasible. BMP techniques can and should be used in conjunction with each other (e.g., vegetated swales with infiltration or retention facilities).

A. Infiltration devices shall be selected based upon suitability of soils and site conditions. Soil infiltration tests shall be performed on all sites to determine suitability of the site for infiltration BMPs. Testing shall include evaluation of selected soil horizons by soil probes, deep pits and/or percolation measurements. The soil infiltration rate of discharge from the infiltration area being used in the proposed design shall be based on these measurements. Infiltration BMPs shall be designed in accordance with the design criteria and specifications in §5 of the *Pennsylvania Handbook of Best Management Practices for Developing Areas*, 1998, as amended and shall meet the following minimum requirements:

(1) Infiltration BMPs intended to receive runoff from residential uses shall be constructed on soils, which have the following characteristics:

(a) A minimum depth of 48 inches between the intended bottom of the facility and the seasonal high water table and/or bedrock (limiting zones). The 48-inch minimum depth to a limiting zone requirement may be reduced to 24 inches as long as the soil has a cation exchange capacity (CEC) of greater than ten and/or does not have a sandy loam or loam sand texture.

(b) Infiltration rate and percolation rate of greater than 0.2 inches/hour.

(2) Infiltration BMPs intended to receive runoff from nonresidential uses shall be constructed on soils that have the following characteristics:

(a) A minimum depth of 48 inches between the intended bottom of the facility and the seasonal high water table and/or bedrock (limiting zones).

(b) Infiltration rate and percolation rate of greater than 0.2 inches/hour.

(3) Infiltration BMPs intended to receive rooftop runoff shall be constructed on soils that have a minimum depth of 24 inches between the intended bottom of the facility and the seasonal high water table and/or bedrock (limiting zones) and have an infiltration rate and percolation rate of greater than 0.2 inches/hour. Appropriate measures such as leaf traps and cleanouts shall be required to prevent clogging by vegetation.

(4) Where direct discharge is permitted under the requirements of §25-

302, infiltration BMPs shall be designed to provide adequate storage to accommodate the post-development first flush design storm (1-year 24-hour storm) volume with outlet and overflow controls to convey runoff larger than the first flush design storm volume safely to a natural outfall.

(5) In areas where runoff release rates are specified under the requirements of §25-302, regardless of the specified release rate percentage, if infiltration BMPs are intended, they shall be designed to, as a minimum:

(a) Provide adequate storage to accommodate the volume of runoff calculated as the difference between the pre-development runoff volume and post-development runoff volume based on the 100-year design storm.

(b) Control the post-development peak rate of runoff to the pre-development peak rate of runoff for all design storms identified in §25-303.1.B of this Chapter.

(c) Provide an overflow or spillway that safely permits the passing of runoff greater than that occurring during the 100-year design storm.

B. *Noninfiltration Facilities Used as Best Management Practices (BMPs)*. All facilities shall be designed in accordance to the design criteria and specifications in the *Pennsylvania Handbook of Best Management Practices for Developing Areas*, 1998, as amended. This design shall be in particular coordination with §8, "Descriptions of Selected Best Management Practices."

(Ord. 227, 9/11/2006, §308)

§25-309. Wet Ponds and Artificial Wetlands Requirements.

1. Wet pond BMPs shall meet the following requirements:

A. Wet ponds shall be constructed on hydric or wet soils and/or soils which have an infiltration rate of less than 0.2 inches/hour.

B. A minimum drainage area of 10 acres shall be directed to the pond unless a source of recharge is utilized such as a natural spring or well.

C. Must be located a minimum of 200 feet from any proposed or possible future dwellings.

D. The length of the pond between the inflow and outlet points shall be maximized. In addition, an irregular shoreline shall be provided. By maximizing the flow length through the pond and providing an irregular shoreline, the greatest water quality benefit will be achieved by minimizing short-circuiting of runoff flowing through the pond.

E. A shallow forebay shall be provided adjacent to all inflow areas. The forebay shall be planted as a marsh with emergent wetland vegetation. The forebay serves to enhance sediment trapping and pollutant removal, as well as concentrating accumulated sediment in an area where it can be readily removed.

F. All wet ponds shall be designed with public safety as a primary concern. An aquatic safety bench shall be provided around the perimeter of the permanent pool. The depth of the bench shall be a maximum of 1 foot for a width to at least 10 feet. A 4:1 slope shall lead from the edge of the safety bench toward the deep-water portion of the pond. At least 15 feet of 4:1 slope shall be provided from the edge of the safety bench. Slopes in the remainder of the pond below the permanent pool

elevation shall be a maximum of 4:1.

G. The perimeter slope above the permanent pool shall have a maximum slope of 5:1 for a distance of at least 20 feet. The remaining areas above the permanent pool shall have a maximum slope of 4:1.

H. An access ramp with a maximum slope of 10:1 shall be provided to the permanent pool elevation.

I. Wet ponds shall have a deep-water zone to encourage gravity settling of suspended fines, and prevent stagnation and possible eutrophication.

J. Wet ponds shall be capable of being substantially drained by gravity flow. Where possible, wet ponds shall be equipped with a manually operated drain that can be secured against unauthorized operation.

K. A planting plan shall be developed for the wet pond, showing all proposed aquatic, emergent and upland plantings.

L. Wet ponds shall be designed to discourage use by Canadian geese. Techniques employed shall include the following:

- (1) Elimination of straight shorelines, islands and peninsulas.
- (2) Placement of walking paths (where applicable) along the shoreline.
- (3) Placement of grassed areas (i.e., playing fields) at least 450 feet from the water surface.
- (4) Vegetative barriers.
- (5) Rock barriers.
- (6) Installation of tall trees.
- (7) Use of ground covers not palatable to Canadian geese.

2. Artificial wetland BMPs shall meet the following requirements:

A. Artificial wetlands shall be constructed on hydric or wet soils and/or soils which have an infiltration rate of less than 0.2 inches/hour.

B. Runoff entering artificial wetlands shall be filtered through a sediment removal device before entering the wetland.

C. A planting plan shall be developed for the artificial wetland showing all proposed aquatic, emergent and upland plantings. The planting plan shall be developed to provide a diversity of species resulting in a dense stand of wetland vegetation.

D. At least 75% of the surface area of the wetland shall be developed as a shallow water emergent wetland, with a water depth of less than 12 inches. The remainder shall be constructed as open water with depths between 2 feet and 4 feet.

E. Must be located a minimum of 200 feet from any proposed or possible future dwellings and all recreational areas.

(Ord. 227, 9/11/2006, §309)

§25-310. Ground Water Recharge.

1. The ability to retain and maximize the ground water recharge capacity of the area being developed is encouraged. Design of the stormwater management facilities

shall give consideration to providing ground water recharge to compensate for the reduction in the percolation that occurs when ground surface is covered with impervious surface material. A detailed geologic evaluation of the project site shall be performed to determine the suitability of recharge facilities. The evaluation shall be performed by a qualified geologists and/or soil scientist, and as a minimum, address soil permeability, depth to bedrock, susceptibility to sinkhole formation, and subgrade stability. Where pervious pavement is permitted for parking lots, recreational facilities, nondedicated street, or other areas, special pavement construction specifications shall be noted on the plan.

2. Whenever a basin will be located in an area underlain by limestone, a geological evaluation of the proposed location shall be conducted to determine susceptibility to sinkhole formations. The design of all facilities over limestone formations shall include measures to prevent ground water contamination and, where necessary, sinkhole formation. Soils used for the construction of basins shall have low-erodibility factors ("K" factors). The Township may require the installation of an impermeable liner in detention basins.

It shall be the developer's responsibility to verify if the site is underlain by limestone. The following note shall be attached to all stormwater management site plans and signed and sealed by the developer's professional engineer.

"I, _____, certify that the proposed detention basin is/is not (circle one) underlain by limestone."

(Ord. 227, 9/11/2006, §310)

§25-311. Water Quality Requirements.

1. In addition to the performance standards and design criteria requirements of this Part, the land developer shall comply with the following water quality requirements of this Section unless otherwise exempted by provisions of this Chapter.

2. Detain the 1-year, 24-hour design storm using the NRCS Type II distribution. Provisions shall be made so that the 1-year storm takes a minimum of 24 hours to drain from the facility from a point where the maximum volume of water from the 1-year storm is captured (i.e., the maximum water surface elevation is achieved in the facility). Release of water can begin at the start of the storm (i.e., the invert of the water quality orifice is at the invert of the facility). The design of the facility shall consider and minimize the changes of clogging and sedimentation potential.

3. To accomplish subsections. 1 and .2 above, the design engineer may submit original and innovative designs to the Township Engineer for review and approval. Such designs may achieve the water quality objectives through combination of BMPs (best management practices). Guidelines established by the *Pennsylvania Handbook of Best Management Practices for Developing Areas*, 1998, as amended, shall be utilized in determining stormwater management facility design.

4. In selecting the appropriate BMPs or combination thereof, the land developer shall consider the following:

- A. Total contributing area.
- B. Permeability and infiltration rate of the site soils.
- C. Slope and depth to bedrock.

- D. Seasonal high water table.
- E. Proximity to building foundations and wellheads.
- F. Erodibility of soils.
- G. Land availability and configuration of the topography.

5. The following additional factors should be considered when evaluating the suitability of BMPs used to control water quality at a given development site:

- A. Peak discharge and required volume control.
- B. Streambank erosion.
- C. Efficiency of the BMPs to mitigate potential water quality problems.
- D. The volume of runoff that will be effectively treated.
- E. The nature of the pollutant being removed.
- F. Maintenance requirements.
- G. Creation/protection of aquatic and wildlife habitat.
- H. Recreational value.
- I. Enhancement of aesthetic and property value.

(*Ord. 227, 9/11/2006, §311*)

§25-312. Water Quality Requirements after Regulated Earth Disturbance Activities Are Complete.

1. No regulated earth disturbance activities within the Township shall commence until approval by the Township of a plan, which demonstrates compliance with State water quality requirements after construction, is complete.

2. The BMPs must be designed, implemented and maintained to meet State water quality requirements, and any other more stringent requirements as determined by the Township.

3. To control post-construction stormwater impacts from regulated earth disturbance activities, State water quality requirements can be met by BMP's, including site design, which provide for replication of pre-construction stormwater infiltration and runoff conditions, so that post-construction stormwater discharges do not degrade the physical, chemical or biological characteristics of the receiving water. As described in the DEP Comprehensive Stormwater Management Policy (# 392-0300-002, September 28, 2002), this may be achieved by the following:

A. Infiltration: replication of pre-construction stormwater infiltration conditions,

B. Treatment: use of water quality treatment BMPs to ensure filtering out of the chemical and physical pollutants from the stormwater runoff, and

C. Streambank and streambed protection: management of volume and rate of post-construction stormwater discharges to prevent physical degradation of receiving waters (e.g., from scouring).

4. DEP has regulations that require municipalities to ensure design, implementation and maintenance of best management practices ("BMPs") that control runoff from new development and redeveloped after regulated earth disturbances activities are

complete. These requirements include the need to implement post-construction stormwater BMPs with assurance of long-term operations and maintenance of those BMPs.

5. Evidence of any necessary permit(s) for regulated earth disturbance activities from the appropriate DEP regional office must be provided to the Township. The issuance of an NPDES construction permit (or permit coverage under the Statewide General Permit (PA2) satisfies the requirements of §25-304.1.

6. BMP operations and maintenance requirements are described in Part 4 of this Chapter.

(Ord. 227, 9/11/2006, §312)

§25-313. Prohibition Against Nonstormwater Discharges.

1. No person in the Township shall allow, or cause to allow, stormwater discharges into the Township separate storm sewer systems which are not composed entirely of stormwater, except (A) as provided in the subsection below, and (B) discharges allowed under a State or Federal permit.

2. Discharges which may be allowed, based on a finding by the Township that the discharges do not significantly contribute to pollution to surface waters of the Commonwealth are:

- A. Discharges from firefighting activities.
- B. Potable water sources, including dechlorinated water line and fire hydrant flushes.
- C. Irrigation drainage.
- D. Routine external building washdown (which do not use detergents or other compounds).
- E. Air conditioning condensate.
- F. Water from individual residential car washing.
- G. Springs.
- H. Water from crawl space pumps.
- I. Uncontaminated water from foundation or from footing drains.
- J. Flows from riparian habitats and wetlands.
- K. Lawn watering.
- L. Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spill materials has been removed) and where detergents are not used.
 - (1) Dechlorinated swimming pool discharges.
 - (2) Uncontaminated groundwater.

3. In the event that the Township determines that any of the discharges identified in subsection .2 above significantly contribute to pollution of waters of the Commonwealth, or is notified of the same by DEP, the Township will notify the responsible person to cease the discharge consistent with the degree of pollution by the discharge.

4. Upon notice provided by the Township under subsection .3, the discharger will

have a reasonable time, as determined by the Township, to cease the discharge consistent with the degree of pollution caused by the discharge.

5. Nothing in this Section shall affect a discharger's responsibilities under State law.

6. The following connections are prohibited, except as provided in subsection .2 above:

A. Any drain or conveyance, whether on the surface or subsurface, which allows any nonstormwater discharge including sewage, process wastewater, and wash water to enter the separate storm sewer system, and any connection to the storm drain system from indoor drains and sinks.

B. Any drain or conveyance connected from a commercial or industrial land use to the separate storm sewer system, which has not been documented in plan, maps, or equivalent records, and approved by the Township.

(Ord. 227, 9/11/2006, §313)

§25-314. Miscellaneous Requirements.

1. Bridges and Culverts.

A. All bridges and culverts shall be designed to convey the 100-year peak flow rate without increasing the extent and depth of the 100-year floodplain.

B. All bridges and culverts shall be designed and constructed to meet current PennDOT construction and loading standards for HS-25 loads.

C. When pipe capacity and/or limited grade elevations warrant the utilization of multiple pipes, a box culvert shall be used.

D. All road culverts larger than a 24 inch inside diameter or equivalent size shall have both a headwall and endwall conforming to the latest design PennDOT design and construction standards (Pub 408 and 72).

2. Drainage Swales.

A. All drainage swales shall be designed to convey the 100-year peak flow rate.

B. The maximum velocity, as determined by Manning's equation, shall not exceed the allowable velocities as found in PA DEP, *Erosion and Sediment Control Program Manual*, as amended.

C. All vegetated channels shall have a maximum side slope of 3 horizontal to 1 vertical and a minimum centerline slope of 2%.

3. Access Drive and Driveway Culverts.

A. Culverts shall be designed to convey the 25-year peak flow rate from the contributing drainage area.

B. The minimum culvert shall be 15 inches inside diameter.

C. All culverts shall have flared end sections or head/end walls.

D. The pipe length shall allow a minimum of 3 feet from the edge of the traveled surface to the start of the end section or wall.

E. All access drive or driveway culverts larger than a 24-inch inside diameter or equivalent size shall have both a headwall and endwall conforming to the latest

design PennDOT design and construction standards (Pub 408 and 72).

4. *Storm Manholes and Inlets.*

A. All manholes and inlets shall conform to the design standards of the most current PennDOT Publications 408 and 72.

B. Spacing of manholes and inlets shall not exceed 300 feet.

C. Inlets to be utilized within a right-of-way shall be Type "C" or Type "M" with "bicycle safe" grate.

D. All storm sewer manholes shall have the word "STORM" cast in the cover.

(*Ord. 227, 9/11/2006, §314*)

Part 4**Stormwater Management Site Plan Requirements****§25-401. General Requirements.**

For any of the activities regulated by this Chapter, the final approval of subdivision and/or land development plans, the issuance of any building or occupancy permit, or the commencement of any land disturbance activity may not proceed until the property owner or developer or his/her agent has received written approval of a stormwater management site plan, and thereby approval of a BMP operations and maintenance plan from the Township.

(Ord. 227, 9/11/2006, §401)

§25-402. Stormwater Management Site Plan Contents.

1. All activities regulated by §25-104 of this Chapter and governed by the Stormwater Management Plan shall require a stormwater management site plan. The stormwater management site plan shall consist of all applicable calculations, maps, and plans. A note on the maps shall refer to the associated computations and erosion and sedimentation control plan by title and date. The cover sheet of the stormwater related computations and the erosion and sedimentation control plan shall refer to the associated maps by title and date. All stormwater management site plan materials shall be submitted to the Township in a format that is clear, concise, legible, neat, and well organized; otherwise, the stormwater management site plan may be disapproved and returned to the applicant.

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

A. *General.*

(1) General description of project.

(2) General description of all permanent stormwater management techniques, including construction specifications of the materials to be used for stormwater management facilities.

(3) Complete hydrologic, hydraulic, and structural computations for all stormwater management facilities.

B. Map(s) of the project area shall be submitted on 24-inch x 36-inch sheets and shall be prepared in a form that meets the requirements for recording in the offices of the Recorder of Deeds of Bucks County. The contents of the maps(s) shall include, but not be limited to:

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

(2) Existing contours at intervals of 2 feet. In areas of steep slopes (greater than 15%), 5-foot contour intervals may be used.

(3) Existing streams, lakes, ponds, or other bodies of water within the project area.

(4) Other physical features including flood hazard boundaries, sinkholes, streams, existing drainage courses, areas of natural vegetation to be preserved,

and the total extent of the upstream area draining through the site.

(5) The locations of all the existing and proposed utilities, sanitary sewers, and water lines located on the site and within 50 feet of property lines.

(6) An overlay showing soil names and boundaries. This overlay shall include a table on the map showing the recharge capabilities of each soil represented on-site in inches per hour and describe their recharge or infiltration capabilities.

(7) Proposed changes to the land surface and vegetative cover, including the type, location, and amount of impervious area that would be added.

(8) Proposed structures, roads, paved areas, and buildings.

(9) Final contours at intervals of 2 feet. In areas of steep slopes (greater than 15%), 5-foot contour intervals may be used.

(10) The name of the development, the name and address of the owner of the property, and the name of the individual or firm preparing the plan.

(11) The date of the plan submission.

(12) A graphic and written scale of 1 inch equals no more than 50 feet; for tracts of 20 acres or more, the scale shall be 1 inch equals no more than 100 feet.

(13) A north arrow.

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

(15) Existing and proposed land use(s).

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

(17) Horizontal and vertical profiles of all open channels, including hydraulic capacity.

(18) Overland drainage paths.

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

(20) A note on the plan indicating the location and responsibility for maintenance of stormwater management facilities that would be located off-site. All off-site facilities shall meet the performance standards and design criteria specified in this Chapter.

(21) A construction detail of any improvements made to sinkholes and the location of all notes to be posted, as specified in this Chapter.

(22) A statement signed by the landowner, acknowledging the stormwater management system to be a permanent fixture that can be altered or removed only after approval of a revised plan by the Township.

(23) The following signature block must be added to the stormwater plan for the Township Engineer:

(Township Engineer), on this date (date of signature), have reviewed and hereby certify that the stormwater management site plan meets all

the design standards and criteria of the Stormwater Management Ordinance,” Ordinance No. _____.

(24) The location of all erosion and sedimentation control facilities.

C. *Supplemental Information.*

(1) A written description of the following information shall be submitted:

(a) Overall stormwater management concept for the project.

(b) Stormwater runoff computations as specified in this Chapter.

(c) Stormwater management techniques and best management practices to be applied both during construction and after development.

(d) A description of the proposed operation and maintenance procedures for all permanent stormwater BMP's.

(e) Expected project time schedule.

(2) A soil erosion and sedimentation control plan, where applicable, including all reviews and approvals, as required by PA DEP and/or the Bucks Conservation District. Also, a BMP operations and maintenance plan for the site describing the continuing operation and maintenance of all permanent stormwater BMP's. (See §25-702.)

(3) A geologic assessment of the effects of stormwater runoff and infiltration on sinkholes as specified in this Chapter.

(4) The effect of the project (in terms of runoff volumes and peak flows) on adjacent properties and on any existing Township stormwater collection system that may receive runoff from the project site.

(5) A declaration of adequacy and highway occupancy permit from the PennDOT District Office when utilization of a PennDOT storm drainage system is proposed.

D. *Stormwater Management Facilities.*

(1) All stormwater management facilities must be located on a plan with maps, etc., as needed and described in detail.

(2) Plans and maps for groundwater recharge facilities must show the locations of existing and proposed septic tank infiltration areas and wells. A separation distance of no less than 20 feet shall be used between any septic system and any facility used for stormwater management. A separation distance of no less than 50 feet is required between a wet pond or retention basin and a sanitary disposal field.

(3) All calculations, assumptions, and criteria used in the design of the stormwater management facilities must be shown. If multiple facilities are used in conjunction with each other, such as infiltration best management practices with vegetation based management practices, a summary narrative shall be included describing any sequencing and how the facilities are meant to function with each other to manage stormwater runoff.

(Ord. 227, 9/11/2006, §402)

§25-403. Stormwater Management Site Plan Submission.

For the purpose of complying with this Chapter, the steps below shall be followed for stormwater management site plan submission. For any activities that require a PA DEP joint permit application and regulated under Chapter 105 (Dam Safety and Waterway Management) or Chapter 106 (Floodplain Management) of PA DEP's Rules and Regulations, require a PennDOT highway occupancy permit, or require any other permit under applicable State or Federal regulations, the permit(s) shall be part of the plan.

A. The stormwater management site plan shall be submitted by the developer as part of the preliminary plan submission for the proposed site development activity.

B. A minimum of five copies of the stormwater management site plan shall be submitted.

C. Distribution of the stormwater management site plan will be as follows:

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

(2) Two copies to the Township Engineer.

(3) One copy to the County Planning Commission.

(Ord. 227, 9/11/2006, §403)

§25-404. Stormwater Management Plan Review.

1. The Township shall designate the Township Engineer or other qualified persons to review the stormwater management site plan for consistency with this Chapter and the adopted Stormwater Management Plan. The Township shall require receipt of a complete plan, as specified in §25-402 of this Chapter.

2. The Township Engineer or other qualified persons designated by the Township shall review the stormwater management site plan for any submission for land development against the Township Subdivision and Land Development Ordinance [Chapter 22] provisions not superseded by this Chapter.

3. For activities regulated by this Chapter, the Township Engineer or other qualified persons designated by the Township shall notify the Township, in writing, within 45 calendar days, whether the stormwater management site plan is consistent with this Chapter and the Stormwater Management Plan. Should the stormwater management site plan be determined to be consistent with all the above ordinances and plans, the Township Engineer or other qualified persons designated by the Township will forward an approval letter to the developer with a copy to the Township Secretary.

4. Should the stormwater management site plan be determined to be inconsistent with this Chapter or the Stormwater Management Plan, the reviewer will forward a disapproval letter to the developer with a copy to the Township Secretary citing the reason(s) for the disapproval. Any disapproved stormwater management site plans may be revised by the developer and resubmitted consistent with this Chapter.

5. For activities specified in §25-104 of this Chapter, the reviewer shall notify the Township Building Permit Officer in writing, within a time frame consistent with the Township Building Code [Chapter 5, Part 1] and/or Township Subdivision and Land Development Ordinance [Chapter 22], whether the stormwater management site plan is consistent with the Township ordinances and the Stormwater Management Plan and

forward a copy of the approval/disapproval letter to the developer. Any disapproved stormwater management site plan may be revised by the developer and resubmitted consistent with this Chapter.

6. For activities requiring a PA DEP joint permit application, the reviewer shall notify PA DEP whether the stormwater management site plan is consistent with the Township Stormwater Management Plan and forward a copy of the review letter to the Township and the developer. PA DEP may consider the reviewer's comments in determining whether to issue a permit.

7. The Township shall not approve any subdivision or land development for regulated activities specified in §25-104 of this Chapter if the stormwater management site plan has been found to be inconsistent with the Stormwater Management Plan, as determined by the Township Engineer or other qualified persons designated by the Township. All required permits from PA DEP must be obtained prior to or as a requirement of final approval.

8. The Township Building Permit Office shall not issue a building permit for any activity specified in §25-104 of this Chapter if the stormwater management site plan has been found to be inconsistent with the Township Stormwater Management Plan, as determined by the Township Engineer or other qualified persons designated by the Township, or without considering the comments of the reviewer. All required permits from PA DEP must be obtained prior to issuance of a building permit.

9. The developer shall be responsible for completing an "as-built survey" of all stormwater management facilities included in the approved stormwater management site plan. The as-built survey and an explanation of any discrepancies with the design plans shall be submitted to the Township Engineer or other appointed review agency/person for final approval. In no case shall the Township approve the as-built survey until the Township receives a copy of an approved declaration of adequacy, highway occupancy permit from the PennDOT District Office, and any applicable permits from PA DEP.

10. The Township's approval of a stormwater management site plan shall be valid for a period not to exceed 2 years. This 2-year time period shall commence on the date that the Township signs the approved stormwater management site plan. If stormwater management facilities included in the approved stormwater management site plan have not been constructed, or if an as-built survey of these facilities has not been approved within this 2-year time period, then the Township may consider the stormwater management site plan disapproved and may revoke any and all permits. stormwater management site plans that are considered disapproved by the Township shall be resubmitted in accordance with §25-406 of this Chapter.

(Ord. 227, 9/11/2006, §404)

§25-405. Modification of Plans.

1. A modification to a submitted stormwater management site plan for a development site that involves a change in stormwater management facilities or techniques, or that involves the relocation or redesign of stormwater management facilities, or that is necessary because soil or other conditions are not as stated on the stormwater management site plan as determined by the Township, shall require a resubmission of the modified stormwater management site plan and supporting revised

stormwater calculations consistent with §25-403 of this Chapter and be subject to review as specified in §25-404 of this Chapter.

2. A modification to an already approved or disapproved stormwater management site plan shall be submitted to the Township, accompanied by the applicable review fee. A modification to a stormwater management site plan for which a formal action has not been taken by the Township shall be submitted to the Township, accompanied by the applicable Township review fee.

(Ord. 227, 9/11/2006, §405)

§25-406. Resubmission of Disapproved Stormwater Management Site Plans.

A disapproved stormwater management site plan may be resubmitted, with the revisions addressing the reviewer's concerns documented in writing, to the reviewer in accordance with §25-403 of this Chapter and is subject to review as specified in §25-404 of this Chapter. The applicable Township review fee must accompany a resubmission of a disapproved stormwater management site plan.

(Ord. 227, 9/11/2006, §406)

Part 5**Inspections****§25-501. Schedule of Inspections.**

1. The Township or the Township assignee shall inspect all phases of the installation of the permanent stormwater management facilities, and all permanent BMP's.

2. During any stage of the work specified in this Chapter, if the Township determines that any of the permanent stormwater management facilities and permanent BMP's are not being installed in accordance with the approved Stormwater Management Plan, the Township may revoke any existing permits or other approvals until all deficiencies are corrected or a revised stormwater management site plan is submitted and approved, as specified in this Chapter.

(Ord. 227, 9/11/2006, §501)

Part 6**Fees and Expenses****§25-601. General.**

The fees required by this Chapter are for the Township Engineer or outside review agency review fee and the Township review fee. Fees shall be established by the Township to defray review costs incurred by the Township, any outside review agencies or entities necessary to review submitted plans, and the Township Engineer. The applicant shall pay all fees.

(Ord. 227, 9/11/2006, §601)

§25-602. Township Stormwater Management Site Plan Review Fee.

The Township shall establish a review fee schedule by resolution of the Board of Supervisors based on the size of the activity and based on the Township's costs for reviewing stormwater management site plans. The Township shall periodically update the review fee schedule to ensure that review costs are adequately reimbursed.

(Ord. 227, 9/11/2006, §602)

§25-603. Expenses Covered by Fees.

The fees required by this Chapter shall at a minimum cover:

- A. Administrative costs.
- B. The review of the stormwater management site plan by the Township and the Township Engineer or other qualified persons designated by the Township.
- C. The site inspections, and any site meetings, such as preconstruction meetings.
- D. The inspection of stormwater management facilities and drainage improvements during construction.
- E. The final inspection upon completion of the stormwater management facilities and drainage improvements presented in the stormwater management site plan.
- F. Any additional work required to enforce any permit provisions regulated by this Chapter, correct violations, and ensure proper completion of stipulated remedial actions.

(Ord. 227, 9/11/2006, §603)

Part 7**Maintenance Responsibilities****§25-701. Performance Guarantee.**

The applicant should provide a financial guarantee to the Township for the timely installation and proper construction of all stormwater management controls as required by the approved stormwater plan and this Chapter equal to the full construction cost of the required controls plus construction contingency and construction inspection costs.

(*Ord. 227, 9/11/2006, §701*)

§25-702. Maintenance Responsibilities.

1. The stormwater management site plan for the development site shall contain an operation and maintenance plan prepared by the developer and approved by the Township. The operation and maintenance plan shall outline required routine maintenance actions and schedules necessary to ensure proper operation of the facilities).

2. The stormwater management site plan for the development site shall establish responsibilities for the continuing operating and maintenance of all proposed stormwater control facilities, consistent with the following principles:

A. If a development consists of structures or lots that are to be separately owned and in which streets, sewers, and other public improvements are to be dedicated to the Township, stormwater control facilities may also be dedicated to and maintained by the Township.

B. If a development site is to be maintained in a single ownership or if sewers and other public improvements are to be privately owned and maintained, then the ownership and maintenance of stormwater control facilities shall be the responsibility of the owner or private management entity.

3. The Board of Supervisors, upon recommendation of the Township Engineer, shall make the final determination on the continuing maintenance responsibilities prior to final approval of the stormwater management plan. The Board of Supervisors reserves the right to accept the ownership and operating responsibility for any or all of the stormwater management controls.

(*Ord. 227, 9/11/2006, §702*)

§25-703. Maintenance Agreement for Privately Owned Stormwater Facilities.

1. Prior to final approval of the stormwater management site plan, the property owner shall sign and record an operations and maintenance agreement covering all stormwater control facilities that are to be privately owned. Said agreement, designated as Appendix 25-C, is attached and made part hereto.

2. Other items may be included in the agreement where determined necessary to guarantee the satisfactory maintenance of all facilities. The maintenance agreement shall be subject to the review and approval of the Township Solicitor and the Board of

Supervisors.

(Ord. 227, 9/11/2006, §703)

§25-704. Township Stormwater Maintenance Fund.

1. If stormwater facilities are accepted by the Township for dedication, persons installing stormwater storage facilities shall be required to pay a specified amount to the Township Stormwater Maintenance Fund to help defray costs of periodic inspections and maintenance expenses. The amount of the deposit shall be determined as follows:

A. If the storage facility is to be owned and maintained by the Township, the deposit shall cover the estimated costs for maintenance and inspections for 10 years. The Township Engineer will establish the estimated costs utilizing information submitted by the applicant.

B. The amount of the deposit to the fund shall be converted to present worth of the annual series values. The Township Engineer shall determine the present worth equivalents, which shall be subject to the approval of the Board of Supervisors.

2. If a storage facility is proposed that also serves as a recreation facility (e.g., ball field, lake), the Township may reduce or waive the amount of the maintenance fund deposit based upon the value of the land for public recreation purpose.

3. If at some future time a storage facility (whether publicly or privately owned) is eliminated due to the installation of storm sewers or other storage facility, the unused portion of the maintenance fund deposit will be applied to the cost of abandoning the facility and connecting to the storm sewer system or other facility. Any amount of the deposit remaining after the costs of abandonment are paid will be returned to the depositor.

(Ord. 227, 9/11/2006, §704)

§25-705. Post Construction Maintenance Inspections.

1. Stormwater management facilities should be inspected by the land owner/-developer or responsible entity (including the Township for dedicated facilities) on the following basis:

A. As outlined by the maintenance plan submitted for the facilities in the stormwater management site plan.

B. Annually for the first 5 years.

C. Once every 3 years thereafter.

D. During or immediately after the cessation of a 100-year or greater storm event.

2. The entity conducting the inspection should be required to submit a report to the Township regarding the condition of the facility and recommending necessary repairs, if needed.

(Ord. 227, 9/11/2006, §705)

Part 8**Enforcement and Penalties****§25-801. Right-of-Entry.**

1. Upon presentation of proper credentials, and with the consent of the landowner, duly authorized representatives of the Township may enter at reasonable times upon any property within the Township to inspect the condition of the stormwater structures, facilities, and stormwater BMP's in regard to any aspect regulated by this Chapter.

2. In the event that the landowner refuses admission to the property, duly authorized representatives of the Township may seek an administrative search warrant issued by a district justice to gain access to the property.

(Ord. 227, 9/11/2006, §801)

§25-802. Notification.

In the event that a person fails to comply with the requirements of this Chapter, or fails to conform to the requirements of any permit issued hereunder, the Township shall provide written notification of the violations. Such notification shall set forth the nature of the violation(s) and establish a time limit for correction of these violations(s). Failure to comply within the time specified shall subject such person to the penalty provision of this Chapter. All such penalties shall be deemed cumulative. In addition the Township may pursue any and all other remedies available in law or equity. It shall be the responsibility of the owner of the real property on which any regulated activity is proposed to occur, is occurring, or has occurred, to comply with the terms and conditions of this Chapter.

(Ord. 227, 9/11/2006, §802)

§25-803. Enforcement.

The Township Board of Supervisors is hereby authorized and directed to enforce all of the provisions of this Chapter. All inspections regarding compliance with the stormwater management site plan shall be the responsibility of the Township Engineer or other qualified persons designated by the Township, and as directed by the Board of Supervisors.

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

B. *Adherence to Approved Plan.* It shall be unlawful for any person, firm, or corporation to undertake any activity under §25-104 on any property except as provided for in the approved stormwater management site plan and pursuant to the requirements of this Chapter. It shall be unlawful to alter or remove any control structure required by the stormwater management site plan pursuant to this Chapter or to allow the property to remain in a condition, which does not conform to the approved stormwater management site plan.

C. At the completion of the project, and as a prerequisite for the release of the

performance guarantee, the owner or his representatives shall:

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

(2) Provide two sets of as built drawings, and one reproducible set of drawings if required by the Township.

D. After receipt of the certification of completion by the Township, a final inspection shall be authorized by the Board of Supervisors or its designee to certify compliance with this Chapter.

E. Prior to revocation or suspension of a permit, the Board of Supervisors will schedule a hearing to discuss the noncompliance if there is no immediate danger to life, public health or property.

F. *Suspension and Revocation of Permits.*

(1) Any permit issued under this Chapter may be suspended or revoked by the Board of Supervisors for:

(a) Noncompliance with or failure to implement any provision of the permit.

(b) A violation of any provision of this Chapter or any other applicable law, ordinance, rule, or regulation relating to the project.

(c) The creation of any condition or the commission of any act during construction or development which constitutes or creates a hazard or nuisance, pollution or which endangers the life or property of others, or as outlined in Chapter 9, "Grading, Excavating, Erosion and Sediment Control," of the current Township Code.

(2) A suspended permit shall be reinstated by the Board of Supervisors when:

(a) The Township Engineer or his designee has inspected and approved the corrections to the stormwater management and erosion and sediment pollution control measure(s), or the elimination of the hazard or nuisance.

(b) The Board of Supervisors is satisfied that the violation of the ordinance, law, or rule and regulation has been corrected.

(c) A permit revoked by the Board of Supervisors cannot be reinstated. The applicant may apply for a new permit under the procedures outlined in this Chapter.

G. *Occupancy Permit.* An occupancy permit shall not be issued unless the certification of completion pursuant to paragraph .D has been secured. The occupancy permit shall be required for each lot owner and/or developer for all subdivisions and land development in the Township.

(Ord. 227, 9/11/2006, §808)

§25-804. Public Nuisance.

1. The violation of any provision of this Chapter is hereby deemed a public

nuisance.

2. Each day that a violation continues shall constitute a separate violation.

(*Ord. 227, 9/11/2006, §804*)

§25-805. Penalties.

1. Anyone violating the provisions of this Chapter shall be guilty of a misdemeanor, and upon conviction, shall be subject to a fine of not more than \$1,000 for each violation, recoverable with costs, or imprisonment of not more than 10 days, or both. Each day that the violation continues shall be a separate offense.

2. In addition, the Township, through its Solicitor, may institute injunctive, mandamus or any other appropriate action or proceeding at law or in equity for the enforcement of this Chapter. 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. 227, 9/11/2006, §805*)

§25-806. Appeals.

1. Any person aggrieved by any action of the Township or its designee, relevant the provisions of this Chapter, not related to a land development application under Articles V and VII of the Pennsylvania Municipalities Planning Code, may appeal to the Township Zoning Hearing Board within 30 days of that action.

2. Any person aggrieved by an action of the Township or its designee, relevant to the provisions of this Chapter related to a land development under Articles V and VII of the Pennsylvania Municipalities Planning Code, may appeal to the Board of Supervisors within 30 days of that action.

3. Any person aggrieved by any decision of the municipal Zoning Hearing Board, or Board of Supervisors, relevant to the provisions of this Chapter, may appeal to the county court of common pleas in the county where the activity has taken place within 30 days of the Zoning Hearing Board's decision, or Board of Supervisor's decision.

(*Ord. 227, 9/11/2006, §806*)

Appendix 25-A

Stormwater Management Design Criteria

Table 25-A-1
Design Storm Rainfall Amount (Inches)

Table 25-A-1 Rainfall Depths

Frequency of Storm Event (Years)	Rainfall Depth(Inches)
1	2.4
2	3.1
5	3.7
10	4.5
25	5.5
50	7.0
100	7.5

(Source: PennDOT Intensity-Duration-Frequency Tables for Region 4)

Figure 25-A-1
NRCS (SCS) Type II Rainfall Distribution

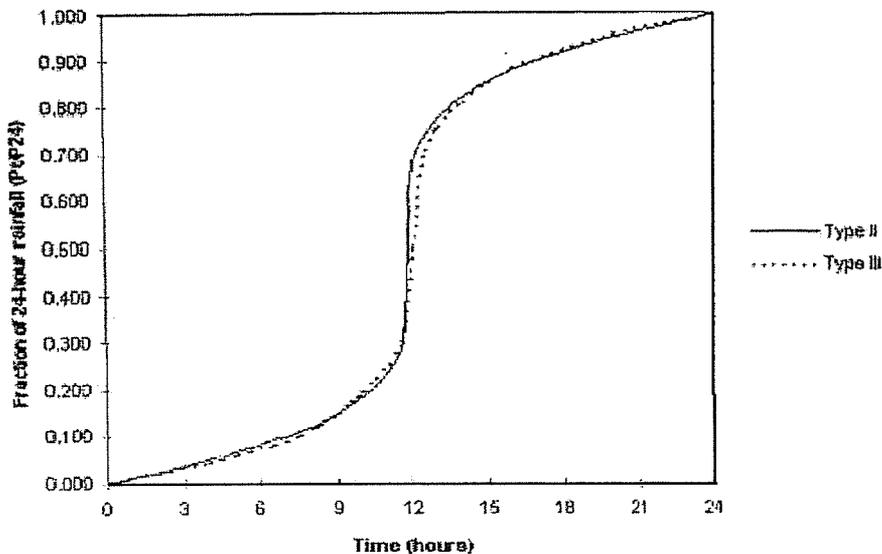


Figure 25-1

Scaled SCS Type II Design Storm by Gert Aron, Penn State University

The SCS Type II storm distribution is widely accepted for the construction of a design storm. A problem in the practical application of the distribution, however, is the steepness of the SCS curve, shown in Figure 25-1, which makes it difficult to read relative rainfall amounts at short time intervals. For the purpose of developing a systematic procedure to generate design storms of any desired time interval, equations were fitted to the SCS Type II storm distribution. A method for constructing a center peak storm is described below. To develop a useful equation, the storm distribution was rearranged to an early peaking pattern, starting with the steepest portion of the SCS curve and progressively decreasing in slope with time. The rearranged distribution is also shown in Figure 25-1, and can be expressed by the equations:

$$P_t = 2.25 P_{24} (t/24)^{0.46} \text{ for } t < \frac{1}{2} \text{ hour} \quad (1)$$

$$P_t = P_{24} (t/24)^{0.25} \text{ for } t > \frac{1}{2} \text{ hour} \quad (2)$$

where P = total precipitation in duration t
 t = storm duration in hours

Design Storm Construction

The design storm construction procedure is best described by an example, as follows:

A 25-year design storm of 2 hours duration, expressed in 15-minute intervals, is needed. From an appropriate source, like TP-40 or similar maps, the corresponding 24-hour rainfall amount is 4.0 inches. A table with five columns is required.

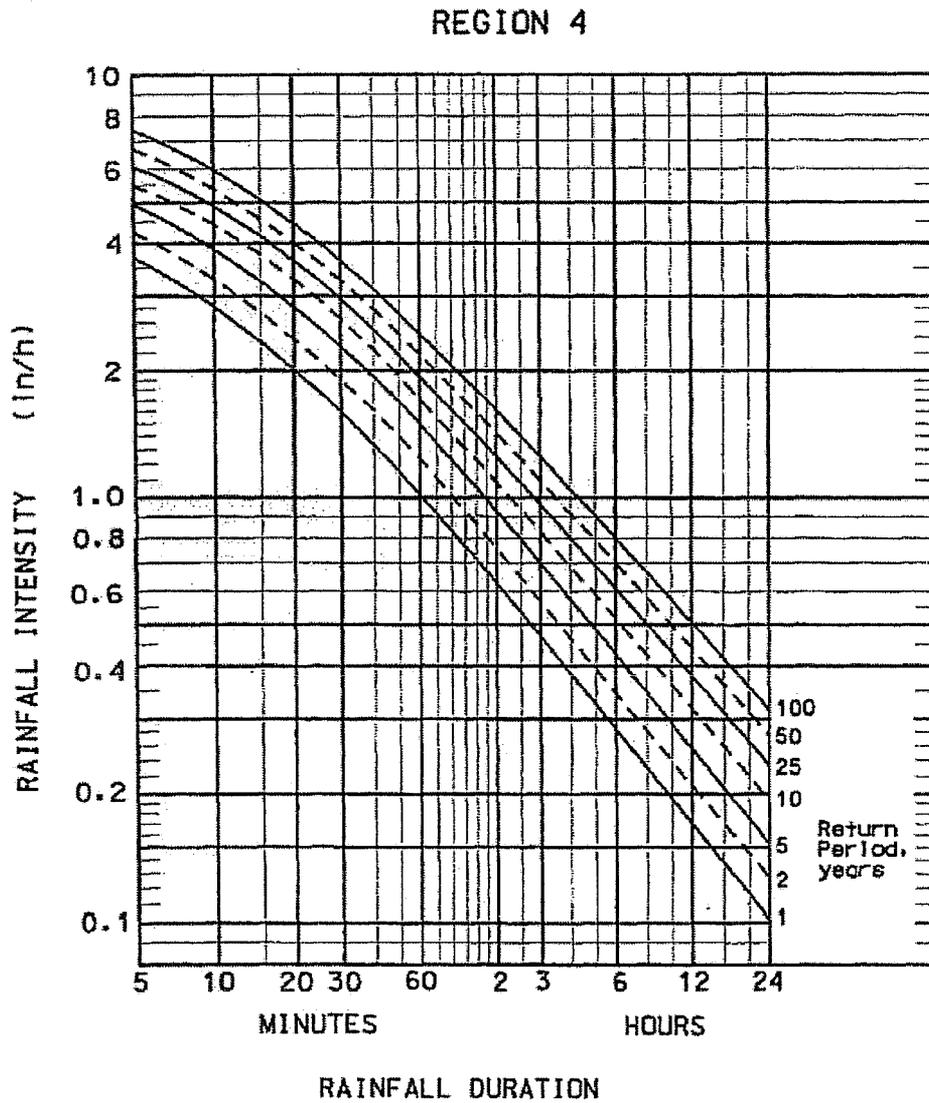
1) Col. 1 is time t in minutes or hours. In column 2 the relative rainfall P/P_{24} is shown as computed by eq.'s 1 or 2 for durations t .

2) In column 3, the relative amounts from column 2 are multiplied by 4.0, the 24-hour rainfall. These values represent the storm amounts from the steepest portions of the SCS curve, of duration t .

3) The rainfall increments between successive durations are computed from column 3 and listed in column 4. These values would constitute the successive rainfall increments, and thus the hyetograph for an early-peaking storm.

4) To generate a center-peaking, roughly symmetrical storm, the increments in column 4 are rearranged in column 5, placing the largest increment of 1.10 inches in the 5th time interval, the second largest in the 4th time interval, the third-largest in the 6th time interval, the fourth-largest in the 3rd time interval, and so forth until a rainfall increment is assigned to each time interval.

Figure 25-A-2



**FIGURE 2.10.4.2(D) (ENGLISH)
STORM INTENSITY - DURATION - FREQUENCY
CURVES FOR REGION 4**

**Table 25-A-2
Runoff Curve Numbers
(From NRCS (SCS) TR-55)**

Land Use	Hydrologic Condition	Runoff Curve Number for Indicated Hydrologic Soil Group			
		A	B	C	D
Open space					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways		98	98	98	98
Streets and roads:					
Paved: w/curbs and storm sewers		98	98	98	98
Paved: w/open ditches		83	89	92	93
Gravel		76	85	89	91
Dirt		72	82	87	89
Urban districts:					
Commercial and business		89	92	94	95
		81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)		77	85	90	92
1/4 acre		61	75	83	87
1/3 acre		57	72	81	86
1/2 acre		54	70	80	85
1 acre		51	68	79	84
2 acres		46	66	77	82
Newly graded areas (pervious area, no vegetation)		81	89	93	95
Agricultural lands:					
Fallow:					
Bare soil		77	86	91	94
Crop residue cover	Poor	76	85	90	93
Crop residue cover	Good	74	83	88	90
Pasture, grassland, or range	Poor	68	79	86	89
Pasture, grassland, or range	Fair	49	69	79	84
Pasture, grassland, or range	Good	39	61	74	80

**Table 25-A-2
Runoff Curve Numbers
(From NRCS (SCS) TR-55)**

Land Use	Hydrologic Condition	Runoff Curve Number for Indicated Hydrologic Soil Group			
		A	B	C	D
Row crops:					
Straight row	Poor	72	81	88	91
Straight row	Good	67	78	85	89
Straight row and crop residue cover	Poor	71	80	87	90
Straight row and crop residue cover	Good	64	75	82	85
Contoured	Poor	70	79	84	88
Contoured	Good	65	75	82	86
Contoured and crop residue cover	Poor	69	78	83	87
Contoured and crop residue cover	Good	64	74	81	85
Contoured and terraced	Poor	66	74	80	82
Contoured and terraced	Good	62	71	78	81
Contoured, terraced and crop residue	Poor	65	73	79	81
Contoured, terraced and crop residue	Good	61	70	77	80
Small grain:					
Straight row	Poor	65	76	84	88
Straight row	Good	63	75	83	87
Straight row and crop residue	Poor	64	75	83	86
Straight row and crop residue	Good	60	72	80	84
Contoured	Poor	63	74	80	85
Contoured	Good	61	73	81	84
Contoured and crop residue cover	Poor	62	73	81	84
Contoured and crop residue cover	Good	60	72	80	83
Contoured and terraced	Poor	61	72	79	82
Contoured and terraced	Good	59	70	78	81
Contoured, terraced and crop residue	Poor	60	71	78	81
Contoured, terraced and crop residue	Good	58	69	77	80

**Table 25-A-2
Runoff Curve Numbers
(From NRCS (SCS) TR-55)**

Land Use	Hydrologic Condition	Runoff Curve Number for Indicated Hydrologic Soil Group			
		A	B	C	D
Meadow or legumes:					
Straight row	Poor	66	77	85	89
Straight row	Good	58	72	81	85
Contoured	Poor	64	75	83	85
Contoured	Good	55	69	78	83
Contoured and terraced	Poor	63	73	80	83
Contoured and terraced	Good	51	67	76	80
Meadow, continuous grass, protected from grazing and mowed for hay		30	58	71	78
Brush - brush/weed mixture	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30	48	65	73
Woods and grass combination (orchard)	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77
Farmsteads - buildings, lanes, driveways, and surrounding lots		59	74	82	86

Source: NRCS, June 1986, *Urban Hydrology for Small Watersheds*, Technical Release 55

**Table 25-A-3
Rational Runoff Coefficients**

Values of Runoff Coefficient (C) for Rational Formula

TYPE OF DRAINAGE AREA	RUNOFF COEFFICIENT
Lawns:	
Sandy soil, flat, <2%	0.05-0.10
Sandy soil, average, 2-7%	0.10-0.15
Sandy soil, steep, >7%	0.15-0.20
Heavy soil, flat, <2%	0.13-0.17
Heavy soil, average, 2-7%	0.18-0.22
Heavy soil, steep, >7%	0.25-0.35
Business:	
Downtown areas	0.70-0.95
Neighborhood areas	0.50-0.70
Residential:	
Single-family areas	0.30-0.50
Multi units, detached	0.40-0.60
Multi units, attached	0.60-0.75
Suburban	0.25-0.40
Apartment dwelling areas	0.50-0.70
Industrial:	
Light areas	0.50-0.80
Heavy areas	0.60-0.90
Parks, cemeteries	0.10-0.25
Playgrounds	0.20-0.35
Railroad yard areas	0.20-0.40
Unimproved areas	0.10-0.30
Streets:	
Asphalt	0.70-0.95
Concrete	0.80-0.95
Brick	0.70-0.85
Drives and walks	0.75-0.85
Roofs	0.75-0.95

SOURCE: Ven Te Chow, 1964. Handbook of Applied Hydrology, McGraw-Hill Book Co.

**Table 25-A-4
Manning Roughness Coefficients**

PIPE MATERIAL OR CHANNEL LINING	ROUGHNESS COEFFICIENT
Cast Iron Pipe	0.013
Concrete Pipe	0.012
Corrugated Metal Pipe*	0.024*
Corrugated Metal Pipe - Paved Invert	0.019
High Density Polyethylene Pipe (HDPE) - Smooth Lined	0.012
High Density Polyethylene Pipe (HDPE) - Corrugated	0.018
Plastic Pipe (PVC, SDR, S&D)	0.011
Earth-lined Channel (few rocks)	0.020
Earth-bottomed Channel with Rock Sides	0.030
Grass-lined Channel	0.050

*Helically corrugated metal pipe coefficients will be less

SOURCE: L. W. Mays, 2001. *Stormwater Collection Systems Design Handbook*, McGraw-Hill Book Co.

Appendix 25-B

Stormwater Management Site Plan Application and Fee Schedule

I. Stormwater Management Site Plan Application

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

Application is hereby made for review of the stormwater management and erosion and sedimentation control plan and related data as submitted herewith in accordance with the Richland Township Stormwater Management and Earth Disturbance Ordinance.

_____ Final plan _____ Preliminary plan
_____ Sketch plan

Date of submission _____ Submission No: _____

1. Name of subdivision or development

2. Name of applicant _____ Telephone No. _____

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

Address _____

City _____ Zip Code _____

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

3. Name of property owner _____ Telephone No. _____

Address _____

City _____ Zip Code _____

Name of engineer or surveyor _____

Telephone No. _____

Address _____

City _____ Zip Code _____

4. Type of subdivision or development proposed:

- | | | |
|--|--|---|
| <input type="checkbox"/> Single Family lots | <input type="checkbox"/> Townhouses | <input type="checkbox"/> Commercial (multi lot) |
| <input type="checkbox"/> Two Family lots | <input type="checkbox"/> Garden Apartments | <input type="checkbox"/> Commercial (one lot) |
| <input type="checkbox"/> Cluster lots | <input type="checkbox"/> Campground | <input type="checkbox"/> Industrial (one lot) |
| <input type="checkbox"/> Planned Residential | <input type="checkbox"/> Other | |

5. If other, describe type of development _____

6. Lineal feet of new road proposed? _____ l.f.

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

- a. Existing (to remain) _____ s.f. _____ % of property
- b. Proposed _____ s.f. _____ % of property

8. Stormwater

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

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

- No. of subarea _____

- Watershed name _____

- If other, explain:

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

d. Number of subareas from the *Stormwater Management Release Rate Map*.

e. Type of proposed runoff control _____

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

g. Does the plan meet the requirements of Article III of the Stormwater Ordinance? _____

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

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

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

 - k. Is a construction schedule or staging attached? _____
 - l. Is a recommended maintenance program attached? _____
9. Has an erosion and sediment pollution control (E&S) been submitted to the County Conservation District? _____
- a. Total area of earth disturbance _____ s.f.
10. Wetlands
- a. Have the wetlands been delineated by someone trained in wetland delineation?

 - b. Have the wetland lines been verified by a State or Federal permitting authority? _____
 - c. Have the wetland lines been surveyed? _____
 - d. Total acreage of wetland within the property _____
 - e. Total acreage of wetland disturbed _____
 - f. Supporting documentation _____
11. Filing
- a. Has the required fee been submitted? _____ Amount \$ _____
 - b. Has the proposed schedule of construction inspection to be performed by the applicant's engineer been submitted? _____
 - c. Name of individual who will be making the inspections. _____
 - d. General comments about stormwater management at development site

CERTIFICATE OF OWNERSHIP AND ACKNOWLEDGMENT OF APPLICATION:
COMMONWEALTH OF PENNSYLVANIA COUNTY, OF _____

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

Property Owner(s)

My Commission Expires _____, 20_____

Notary Public

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

SIGNATURE OF APPLICANT _____

This Information To Be Completed By the Municipality
--

Township official submission receipt

Date complete application received _____ plan number _____

Fees _____ date fees paid _____ received by _____

Official submission receipt date _____

Received by _____

II. FEE SCHEDULE

_____ Township

Stormwater Management Site Plan

Schedule of Fees

Subdivision name _____ submittal no. _____

Owner _____ date _____

Engineer _____

(All fees are subject to change)

1. Filing fee	\$75
2. Land use	
2a. Subdivision, campgrounds, mobile home parks, and multi-family dwelling where the units are located in the same local watershed	\$250
2b. Multi-family dwelling where the designated open space is located in a different local watershed from the proposed units.	\$250
2c. Commercial/Industrial	\$400
3. Relative amount of earth disturbance	
3a. Residential	
road <500 l.f.	\$250
road 500-2,640 l.f.	\$500
road >2,640 l.f.	\$750
3b. Commercial/industrial and other impervious area <3,500 s.f.	\$250
impervious area 3,500-43,460 s.f.	\$500
impervious area >43,560 s.f.	\$1000+
	\$250/10,000 s.f. impervious area
4. Relative size of project	
4a. Total tract area <1 ac	\$250
1-5 ac	\$500
5-25 ac	\$1000
25-100 ac	\$1500
100-200 ac	\$2000
>200 ac	\$2000+
	\$5/ac. over 200
5. Stormwater control measures	
5a. Detention basins & other controls which require a review of hydraulic routings (\$ per control)	\$300
5b. Other control facilities which require storage volume calculations but no hydraulic routings (\$ per control)	\$300

6. Site inspection (\$ per inspection)

\$250

Total \$ _____

All subsequent reviews shall be one-fourth the amount of the initial review fee unless a new application is required as per §25-406 of the Stormwater Ordinance. A new fee shall be submitted with each revision in accordance with this schedule.

Appendix 25-C
Stormwater Management Maintenance Agreement
TMP# _____

THIS AGREEMENT, dated this _____ day of _____, 2006, by and between _____ Township, a Township of the Second Class, with its principal place of business located at _____ (hereinafter referred to as "Township")

AND

_____, a Pennsylvania _____, with its principal place of business located at _____; (hereinafter referred to as "Developer/Owner"),

WITNESSETH

WHEREAS, the Developer/Owner is the owner of certain real property as recorded by deed in the Office of Recording of Deed in and for _____ County, _____, Pennsylvania, in Deed Book _____, Page _____, and further described as _____ County Tax Map Parcel No. _____ (hereinafter "Property");

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

WHEREAS, the Final Subdivision Plan for the _____, prepared by _____, dated _____, last revised _____, (the "Plan,") which is made a part hereof, as approved by the Township, provides for detention of stormwater within the confines of the Property; and

WHEREAS, the Township and the Developer/Owner, its successors and assigns agree that the health, safety, and welfare of the residents of the Township require that on-site stormwater management facilities be constructed and maintained on the Property; and

WHEREAS, the Township requires, through the implementation of the Act 167 Watershed Stormwater Management Plan, that stormwater management facilities as shown on the Plan be constructed and adequately maintained by the Developer/Owner, its successors and assigns.

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

1. The on-site stormwater management facilities shall be constructed by the Developer/Owner, its successors and assigns, in accordance with the terms, conditions and specifications identified on the Plan.

2. The Developer/Owner, its successors and assigns, shall maintain the stormwater management facilities in good working condition, acceptable to the

Township so that they are performing their design functions. The maintenance required by this Agreement includes, but is not limited to:

- Keeping outlet structures and spillways functioning.
- Removing sediment and/or accumulated debris.
- Repairing fences (if any).
- Repairing sinkholes.

3. The Developer/Owner, its successors and assigns, hereby grants permission to the Township, its authorized agents and employees, upon presentation of proper identification, to enter upon the Property at reasonable times, and to inspect the stormwater management facilities whenever the Township deems necessary. The purpose of the inspection is to assure safe and proper functioning of the facilities. The inspection shall cover the entire facilities, berms, outlet structures, pond areas, access road, etc. When inspections are conducted, the Township shall give the Developer/Owner, its successors and assigns, copies of the inspection report with findings and evaluations. At a minimum, maintenance inspections shall be performed in accordance with the following schedule:

- Annually for the first 5 years after the construction of the stormwater facilities,
- Once every 2 years thereafter, or
- During or immediately upon the cessation of a 100-year or greater precipitation event.

4. All reasonable costs for said inspections shall be borne by the Developer/Owner and payable to the Township.

5. The owner shall convey to the Township easements and/or rights-of-way to ensure access for periodic inspections by the Township and maintenance, if required.

6. In the event the Developer/Owner, its successors and assigns, fails to maintain the stormwater management facilities in good working condition acceptable to the Township, following the passage of 15 days after written notice by the Township, the Township may enter upon the Property and take such necessary and prudent action to maintain said stormwater management facilities and to charge the costs of the maintenance and/ or repairs to the Developer/Owner, its successors and assigns. The provision shall not be construed as to allow the Township to erect any structure of a permanent nature on the land of the Developer/Owner, outside of any easement belonging to the Township. It is expressly understood and agreed that the Township is under no obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the Township.

7. The Developer/Owner, its successors and assigns, will perform maintenance in accordance with the maintenance schedule for the stormwater management facilities including sediment removal as outlined on the Plan.

8. In the event the Township, pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials and the like on account of the Developer/Owner's or its successors' and assigns' failure to perform such work, the Developer/Owner, its successors and

assigns, shall reimburse the Township upon demand, within 30 days of receipt of invoice thereof, for all costs incurred by the Township hereunder. If not paid within the 30-day period, the Township may enter a lien against the Property in the amount of such costs, or may proceed to recover his costs through proceedings in equity or law as authorized under the provisions of the Second Class Township Code.

9. The Developer/Owner, its successors and assigns, shall indemnify the Township and his agents, employees and/or Township Engineer against any and all damages, accidents, casualties, occurrences or claims which might arise or be asserted against the Township for the construction, presence, existence or maintenance of the stormwater management facilities by the Developer/Owner, its successors and assigns.

10. In the event a claim is asserted against the Township, his agents, employees and/or the Township Engineer, the Township shall promptly notify the Developer/Owner, its successors and assigns, and they shall defend, at their owner expense, any suit based on such claim. If any judgment or claims against the Township, its agents, employees and/or Township Engineer shall be allowed, the Developer/Owner, its successors and assigns shall pay all costs and expenses in connection therewith.

11. In the event of an emergency or the occurrence of special or unusual circumstances or situations, the Township may enter the Property, if the Developer/Owner is not immediately available, without notification or identification to inspect and perform necessary maintenance and repairs, if needed. when the health, safety and welfare of the citizens is at jeopardy. However, the Township shall notify the Developer/Owner of any inspection, maintenance, or repair undertaken within 5 days of the activity. The Developer/Owner shall reimburse the Township for its costs.

12. This agreement shall be recorded among the land records of Bucks County, Doylestown, Pennsylvania and shall constitute a covenant running with the Property and/or equitable servitude, and shall be binding on the Developer/Owner, its successors and assigns, in perpetuity.

IN WITNESS WHEREOF, the parties hereto, intending to be legally bound hereby, have hereunto set their hand and seal the day and year first above written.

ATTEST:

RICHLAND TOWNSHIP
BOARD OF SUPERVISORS

Secretary

(TOWNSHIP SEAL)

ATTEST:

(DEVELOPER NAME)

By: _____

Secretary

By: _____
Authorized Representative

Title: _____

COMMONWEALTH OF PENNSYLVANIA

SS:

COUNTY OF BUCKS

On this _____ day of _____, _____ before me, a Notary Public, personally appeared _____, who acknowledged himself to be an authorized representative of _____ and acknowledged that he executed the same for the purposes herein contained.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

Notary Public

My Commission Expires:

COMMONWEALTH OF PENNSYLVANIA

SS:

COUNTY OF BUCKS

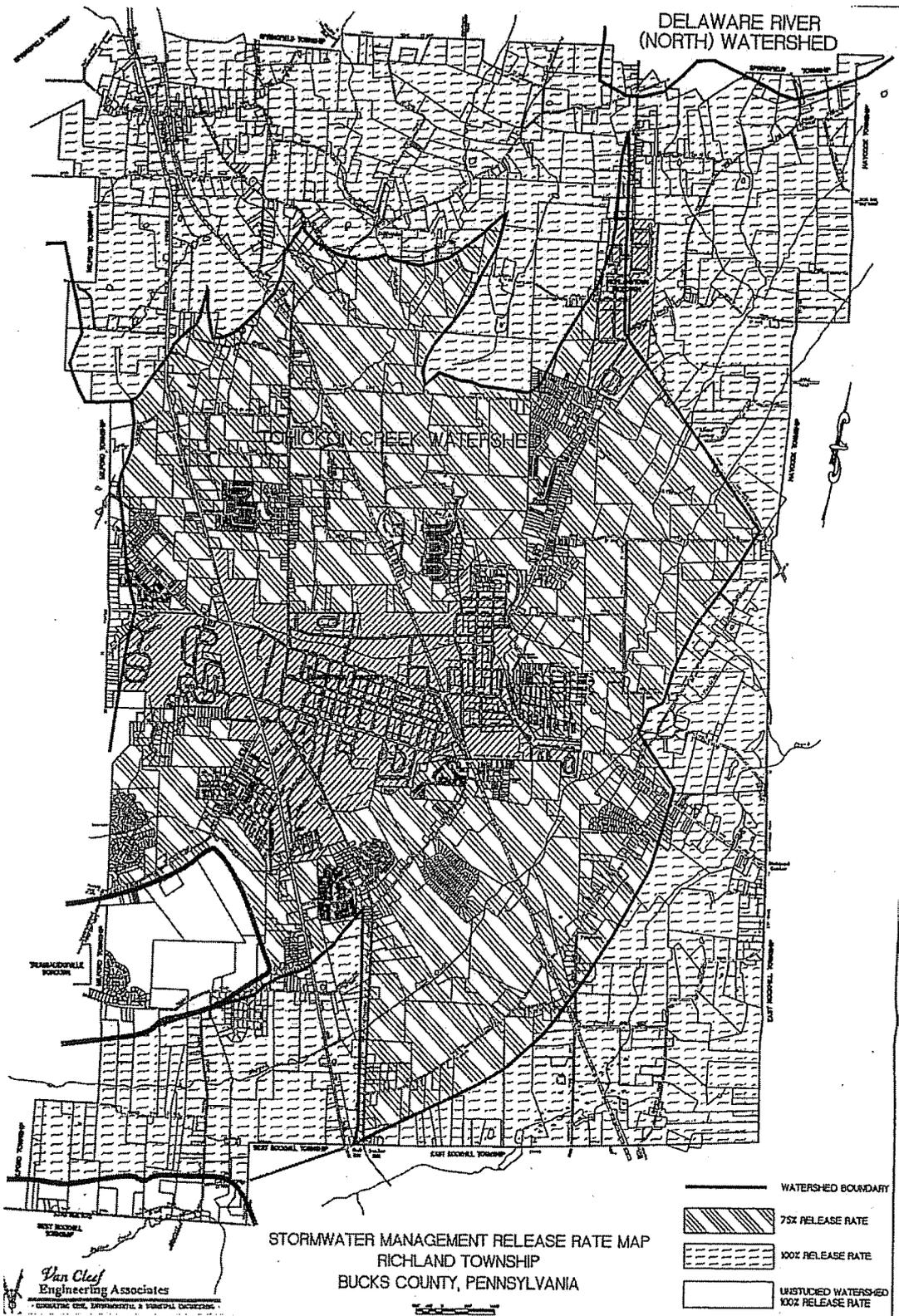
On this _____ day of _____, _____ before me, a Notary Public, personally appeared _____, _____, and _____ who acknowledged themselves to be Supervisors of the TOWNSHIP OF RICHLAND and that they as such officers, being authorized to do so, executed the foregoing instrument for the purposes herein contained by signing for the TOWNSHIP OF RICHLAND by themselves as Supervisors of said Township.

IN WITNESS WHEREOF, I have hereunto set my hand and official seal.

Notary Public

My Commission Expires:

Appendix 25-D Stormwater Management Release Rate Map



Appendix 25-E

Low Impact Development Practices

Alternative Approach for Managing Stormwater Runoff

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

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

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

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

Protecting Natural Depression Storage Areas. Depressional storage areas have no surface outlet, or drain very slowly following a storm event. They can be commonly seen as ponded areas in farm fields during the wet season or after large runoff events. Traditional development practices eliminate these depressions by filling or draining, thereby obliterating their ability to reduce surface runoff volumes and trap pollutants. The volume and release-rate characteristics of depressions should be protected in the design of the development site. The depressions can be protected by simply avoiding the depression or by incorporating its storage as additional capacity in required detention facilities.

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

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

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

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

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

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

Using Permeable Paving Materials. These materials include permeable interlocking concrete paving blocks or porous bituminous concrete. Such materials should be considered as alternatives to conventional pavement surfaces, especially for low use surfaces such as driveways, overflow parking lots, and emergency access roads.

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

Constructing Cluster Developments. Cluster developments can also reduce the amount of impervious area for a given number of lots. The biggest savings is in street length, which also will reduce costs of the development. Cluster development

clusters the construction activity onto less-sensitive areas without substantially affecting the gross density of development.

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

