

MIDDLESEX TOWNSHIP
CUMBERLAND COUNTY, PENNSYLVANIA

ORDINANCE NO. 6 - 2011

AN ORDINANCE OF THE BOARD OF SUPERVISORS OF MIDDLESEX TOWNSHIP, CUMBERLAND COUNTY, PENNSYLVANIA, AMENDING THE MIDDLESEX TOWNSHIP SUBDIVISION AND LAND DEVELOPMENT ORDINANCE AND ADOPTING A STORMWATER MANAGEMENT ORDINANCE.

BE IT HEREBY ENACTED AND ORDAINED and it is hereby enacted and ordained by the Board of Township Supervisors for Middlesex Township, Cumberland County, Pennsylvania, as follows:

SECTION 1: Article X, Storm Water Management Plan and Design Criteria, of the Middlesex Township Subdivision and Land Development Ordinance is hereby amended as follows:

Sections 1001 through 1103, inclusive, are hereby deleted in their entirety and the following Section is hereby added in the place thereof:

Section 1001. Requirements.

All subdivision and land development in Middlesex Township or subject to the laws, ordinances, codes, regulations and/or resolutions of Middlesex Township shall comply with all requirements of the Middlesex Township Stormwater Ordinance adopted August 3, 2011, as subsequently amended and reenacted. Any reference in the Middlesex Township Subdivision and Land Development Ordinance, the Middlesex Township Zoning Ordinance or any other law, ordinance, code, regulation or resolution of Middlesex Township that requires compliance with any stormwater requirements of Middlesex Township formerly contained within the Middlesex Township Subdivision and Land Development Ordinance or elsewhere, shall be and is considered a reference to those requirement contained in the Middlesex Township Stormwater Management Ordinance adopted August 3, 2011, as subsequently amended and reenacted.

SECTION 2: In accordance with the authority and requirements of the Storm Water Management Act (Act of October 4, 1978, P. L. 864, Act 167 (32 P.S. Section 680.1, et seq.)), as

amended, Middlesex Township hereby adopts the Middlesex Township Stormwater Management Ordinance attached hereto and incorporated by reference herein as "Exhibit A".

SECTION 3: If any section, sub-section, provisions, regulations, limitation, restriction, sentence, clause, phrase or word in this Ordinance, the Middlesex Township Subdivision and Land Development Ordinance or the Middlesex Township Stormwater Management Ordinance is declared by any reason to be illegal, unconstitutional, or invalid by any court of competent jurisdiction, such decision shall not affect or impair the validity of this Ordinance as a whole or any other section, sub-section, provisions, regulations, limitation, restriction, sentence, clause, phrase, word or remaining portion of this Ordinance, the Middlesex Township Subdivision and Land Development Ordinance or the Middlesex Township Stormwater Management Ordinance.

SECTION 4: This Ordinance, including the Middlesex Township Stormwater Management Ordinance, shall become effective upon enactment in accordance with applicable law.

DULY ENACTED AND ORDAINED this 3rd day of August, 2011 by the Board of Township Supervisors in public session duly assembled.

MIDDLESEX TOWNSHIP

By: 
Chairman, Board of Supervisors

ATTEST:


Township Secretary

(Township Seal)

STORMWATER MANAGEMENT ORDINANCE

MIDDLESEX TOWNSHIP
CUMBERLAND COUNTY, PENNSYLVANIA

Exhibit A

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ARTICLE I - GENERAL PROVISIONS

Section 101. Short Title

This Ordinance shall be known and may be cited as the "Middlesex Township Stormwater Management Ordinance."

Section 102. Statement of Findings

The Board of Supervisors of Middlesex Township finds that:

- A. Inadequate management of stormwater runoff resulting from development throughout a watershed increases flows and velocities, contributes to erosion and sedimentation, taxes the carrying capacity of streams and storm sewers, increases the cost of public facilities to carry and control stormwater, undermines flood plain management and flood control efforts in downstream communities, reduces groundwater recharge, threatens public health and safety, and increases non-point source pollution of water resources.
- B. A comprehensive program of stormwater management, including reasonable regulation of development and activities which could cause accelerated runoff, is fundamental to public health, and the safety, welfare, and protection of people, their resources, and the environment.
- C. Stormwater is an important water resource, which can provide groundwater recharge for water supplies and baseflow of streams.
- D. The volume and quality of the Township's groundwater resource zones consisting of carbonate bedrock formations mandate protection from land development patterns that could not only inhibit recharge capability through excessive impervious surface areas, but could also threaten its quality by intake of polluted stormwater runoff.

Section 103. Purpose

The purpose of this Ordinance is to promote health, safety, and welfare within Middlesex Township and its watershed by:

- A. Meeting legal water quality requirements under state law, including regulations at *25 Pa. Code Chapter 93*, to protect, reclaim, restore and maintain existing and designated uses of the Waters of this Commonwealth, and protecting and maintaining water quality in "special protection" streams.
- B. Preserving existing natural drainageways, patterns, and systems as much as possible and encouraging the design and construction of natural systems for new development projects.

- C. Reducing and minimizing the volume of stormwater generated by new and redevelopment projects.
- D. Treating and releasing stormwater as close to the source of runoff using a minimum of structures and maximizing reliance on natural processes.
- E. Providing procedures and performance standards for stormwater planning and management.
- F. Protecting and maintaining groundwater recharge and natural infiltration rates in order to sustain groundwater supplies and stream baseflows.
- G. Protecting and maintaining groundwater quality and other water resources by preventing degradation of surface water by removing and/or treating pollutants prior to discharge to ground and surface waters throughout Middlesex Township.
- H. Preventing scour and erosion of stream banks and streambeds.
- I. Providing proper operation and maintenance of all permanent Stormwater Management (SWM) Best Management Practices (BMPs) designs that are implemented within Middlesex Township.
- J. Providing designs and standards to meet NPDES (National Pollutant Discharge Elimination System) permit requirements.
- K. Protecting lands adjacent to proposed development and/or redevelopment from adverse impacts of direct stormwater discharges.
- L. Meeting general water quality and soil disturbance goals by implementing measures to:
 - 1. Minimize disturbance to floodplains, wetlands, natural slopes over 15%, and existing native vegetation.
 - 2. Preserve and maintain trees and woodlands. Maintain or extend riparian buffers and protect existing forested buffer. Provide trees and woodlands adjacent to impervious areas whenever feasible.
 - 3. Establish and maintain non-erosive flow conditions in natural flow pathways.
 - 4. Minimize soil disturbance and soil compaction.
 - 5. Disconnect impervious surfaces by directing runoff to pervious areas wherever possible.
 - 6. Incorporate the techniques for Low Impact Development Practices described in *The Pennsylvania Stormwater Best Management Practices Manual* (December 30, 2006) as amended and updated.

7. Minimize thermal impacts to Waters of the Commonwealth.

Section 104. Statutory Authority

A. Primary Authority:

Middlesex Township is empowered to regulate these activities by the authority of the *Act of October 4, 1978, P.L. 864 (Act 167), 32 P.S. Section 680.1, et seq.*, as amended, the *Storm Water Management Act*, and the *Second Class Township Code*.

Hereafter, all earthmoving activities and land development within this Township, including without limitation, the location, design and construction within the watershed of storm water management systems, obstructions, flood control projects, subdivisions and major land developments, highways and transportation facilities, facilities for the provision of public utility services and facilities owned or financed in whole or in part by funds from the Commonwealth, shall be in full compliance with the requirements of the Cumberland County Storm Water Management Plan and this Ordinance and shall be conducted in a manner consistent therewith. Any violation of the Cumberland County Storm Water Management Plan shall be considered a violation of this Ordinance.

B. Secondary Authority:

Middlesex Township also is empowered to regulate land use activities that affect runoff by the authority of the *Act of July 31, 1968, P.L. 805, No. 247, the Pennsylvania Municipalities Planning Code*, as amended.

Section 105. Applicability

The standards contained herein shall apply to all areas of Middlesex Township. All regulated activities and all activities that may affect stormwater runoff, including land development and earth disturbance activity, are subject to regulation by this Ordinance as is reasonably necessary to prevent injury to health, safety or other property. The following activities shall be subject to the provisions of this Ordinance and are defined as "regulated activities", except as otherwise provided in *Section 106* of this Ordinance.

- A. Land development and/or redevelopment
- B. Subdivision
- C. Construction of new or additional impervious or semi-pervious surfaces, including but not limited to driveways, parking lots, etc.
- D. Construction of structures or additions to existing structures as determined by Middlesex Township

- E. Diversion or piping of any natural or man-made stream channel
- F. Installation of stormwater management facilities or appurtenances thereto
- G. Placement of fill material over four (4) inches in depth.
- H. Forest management and timber operations that include logging road operations or timber harvesting.
- I. Earth disturbance activities.

Section 106. Exemptions

- A. Regulated Activities resulting in less than or equal to 1,000 square feet of new impervious surface are exempt from peak rate control, Volume Control and Stormwater Management Plan preparation requirements in Article III, including Sections 301 and 302 of this Ordinance.
- B. Regulated Activities that create new Disconnected Impervious Areas greater than 1,000 square feet and less than 5,000 square feet that are proven to meet the 75-foot minimum pervious flow path requirement outlined in *Appendix C* herein are exempt from peak rate control, Volume Control and Stormwater Management Plan preparation requirements in Article III, including Sections 301 and 302 of this Ordinance.
- C. Regulated Activities meeting the following parcel size and square footage requirements are exempt from the peak rate control requirements, but not the Volume Control or SWM Site Plan preparation requirements of this Ordinance. These criteria shall apply to the total proposed development even if development is to take place in phases. The date of the municipal ordinance adoption shall be the starting point from which to consider tracts as "parent tracts" in which future subdivisions and respective impervious area computations shall be cumulatively considered. This exemption shall not relieve the applicant from implementing such measures as are necessary to protect health, safety and property.

New Impervious Area Exemption Criteria-Peak Rate Control

Total Parcel Size square feet (acre)	New Impervious Area Exemption (square feet)
<10,890 (0.25)	1,500
10,890 - 21,780 (0.25 – 0.50)	2,500
>21,780 (0.50)	5,000

- D. Agricultural plowing and tilling are exempt from the SWM requirements of this Ordinance provided the activities are performed according to the requirements of *25 Pa. Code Chapter 102*.
- E. Gardening.
- F. Forest management and timber operations are exempt from the rate control and SWM Site Plan preparation requirements of this ordinance provided the activities are performed according to the requirements of *25 Pa. Code Chapter 102* and which are consistent with a sound forest management plan which follows the Pennsylvania Department of Environmental Protection's management practices contained in its publication *Soil Erosion and Sedimentation Control Guidelines for Forestry*. Said forest management plan must be filed with the Middlesex Township Zoning Officer. All forest management and timber operations are required to have an erosion and sedimentation control plan approved by the Cumberland County Conservation District prior to commencement of work.
- G. Emergency Exemption: Emergency maintenance work performed for the protection of public health, safety and welfare. A written description of the scope and extent of any emergency work performed shall be submitted to Middlesex Township within two (2) calendar days of the commencement of the activity. If the Middlesex Township finds that the work is not an emergency, then the work shall cease immediately and the requirements of this Ordinance shall be addressed as applicable.
- H. Maintenance Exemption: Any maintenance to an existing stormwater management system made in accordance with plans and specifications approved by the Township engineer or Middlesex Township.
- I. Middlesex Township has, at its discretion, the ability to deny any exemption from the SWM requirements of this Ordinance if site conditions warrant the implementation of SWM provisions in order to protect public health and safety.

Section 107. Repealer

Any other ordinance provision(s) or regulation of Middlesex Township inconsistent with any of the provisions of this Ordinance is hereby repealed to the extent of the inconsistency only.

Section 108. Severability

In the event that a court of competent jurisdiction declares any section or provision of this Ordinance invalid, such decision shall not affect the validity of any of the remaining provisions of this Ordinance.

- D. Agricultural plowing and tilling are exempt from the SWM requirements of this Ordinance provided the activities are performed according to the requirements of *25 Pa. Code Chapter 102*.
- E. Gardening.
- F. Forest management and timber operations are exempt from the rate control and SWM Site Plan preparation requirements of this ordinance provided the activities are performed according to the requirements of *25 Pa. Code Chapter 102* and which are consistent with a sound forest management plan which follows the Pennsylvania Department of Environmental Protection's management practices contained in its publication *Soil Erosion and Sedimentation Control Guidelines for Forestry*. Said forest management plan must be filed with the Middlesex Township Zoning Officer. All forest management and timber operations are required to have an erosion and sedimentation control plan approved by the Cumberland County Conservation District prior to commencement of work.
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- H. Maintenance Exemption: Any maintenance to an existing stormwater management system made in accordance with plans and specifications approved by the Township engineer or Middlesex Township.
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Section 107. Repealer

Any other ordinance provision(s) or regulation of Middlesex Township inconsistent with any of the provisions of this Ordinance is hereby repealed to the extent of the inconsistency only.

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In the event that a court of competent jurisdiction declares any section or provision of this Ordinance invalid, such decision shall not affect the validity of any of the remaining provisions of this Ordinance.

Section 109. Compatibility with Other Requirements

Permits and approvals issued pursuant to this Ordinance shall not relieve the Applicant of the responsibility to comply with or to secure all other required permits or approvals for activities regulated by any other applicable code, rule, act, statute or ordinance. This Ordinance shall not preclude the inclusion in such other permit of more stringent requirements concerning regulation of stormwater and erosion. Where a conflict exists between a provision within this Ordinance and that of the *PADEP Phase II NPDES Regulations*, as amended, the PADEP requirements shall govern. To the extent that this Ordinance imposes more rigorous or stringent requirements for stormwater management, the specific requirements contained in this Ordinance shall prevail and be followed.

Section 110 Waiver Procedure

The provisions of this Ordinance are intended as minimum standards for the protection of the public health, safety and welfare. The Middlesex Township Board of Supervisors may waive any mandatory provisions of these regulations to the benefit of the applicant provided the waiver:

- A. Is consistent with the purpose of this Ordinance as described in Section 103;
- B. Will remove or reduce an unreasonable standard or undue hardship as it applies to the particular property, which is grossly disproportionate to any benefit derived from the standard, or when an alternative standard provides equal or better results; and
- C. Is consistent with Section 301 F. with respect to water quality requirements.

It shall be the burden of the applicant to demonstrate compliance with the above requirements.

Section 111. Subsequent or Amended Publications, Standards, Laws, Codes and Regulations.

Any reference in this Ordinance to any publication, manual, standard, law, code or regulation shall include any and all subsequent amendments, supplements and successor publications, standards, laws, codes and regulations thereto without the need to amend this Ordinance to make specific reference thereto.

ARTICLE II – DEFINITIONS

Section 201. Rules of Interpretation

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

- A. Words used in the present tense include the future tense; the singular number includes the plural, and the plural number includes the singular; words of masculine gender include feminine gender; and words of feminine gender include masculine gender.
- B. The word “includes” or “including” shall not limit the term to the specific example but is intended to extend its meaning to all other instances of like kind and character.
- C. The words “shall” and “must” are mandatory; the words “may” and “should” are permissive.
- D. The word “person” includes an individual, firm, association, partnership, trust company, corporation, or any other entity.

Section 202. Terms Defined

Agricultural Activity - The work of producing crops, including tillage, land clearing, plowing, disking, harrowing, planting, harvesting crops, pasturing and raising of livestock, and/or installation of conservation measures. Construction of new buildings or impervious area is not considered an Agricultural Activity.

Applicant - A landowner, developer, or other person who has filed an application to Middlesex Township for approval to engage in any Regulated Activity at a project site in Middlesex Township.

Attenuate - To reduce the magnitude of the flow rate by increasing the time it takes to release a specified volume of runoff (for example the 1 year, 24 hour storm event). Attenuation is a method of reducing the peak flow rates for post development compared to the peak flow rates in predevelopment.

Aquifer - A geologic formation, group of formations, or part of a formation that contains sufficient saturated, permeable material to yield useful quantities of ground water to wells and springs.

Balanced Water Budget - Water modeling used to balance pre and post development stormwater impacts to the hydrologic cycle of the area of land being modeled by using a summation of inputs,

outputs, and net changes to the particular water resource system within that area of land over a fixed period of time.

Baseflow - Portion of stream discharge derived from ground water; the sustained discharge that does not result from direct runoff or from water diversions, reservoir releases, piped discharges, or other human activities.

Best Management Practices (BMPs) - Activities, facilities, designs, measures or procedures used to manage stormwater impacts from Regulated Activities to meet State Water Quality Requirements, to promote groundwater recharge, and to otherwise meet the purposes of this Ordinance. BMPs are commonly grouped into one of two broad categories or measures: “structural” or “non-structural”. In this ordinance, non-structural BMPs or measures refer to operational and/or behavior related practices that attempt to minimize the contact of pollutants with stormwater runoff whereas structural BMPs or measures are those that consist of a physical device or practice that is installed to capture and treat stormwater runoff. Structural BMPs include, but are not limited to, a wide variety of practices and devices, from large-scale retention ponds and constructed wetlands, to small-scale underground treatment systems, infiltration facilities, filter strips, low impact design, bioretention, wet ponds, permeable paving, grassed swales, riparian or forested buffers, sand filters, detention basins, and manufactured devices. Structural BMPs are permanent appurtenances to the project site.

Board of Supervisors – The Board of Supervisors of Middlesex Township.

Carbonate Rock - Limestone or dolomite rock formations formed by carbonate deposition.

Channel - A natural or artificial watercourse that conveys, continuously or periodically, flowing water.

Conservation Design - land development design practices that maximize protection of key land and environmental resources, preserve significant concentrations of open space and greenways, evaluate and maintain site hydrology, and ensure flexibility in development design to meet community needs for a complementary and aesthetically pleasing development. Conservation Design encompasses the following objectives: conservation/enhancement of natural resources, wildlife habitat, biodiversity corridors, and greenways (interconnected open space); minimization of environmental impact resulting from a change in land use (minimum disturbance, minimum maintenance); maintenance of a balanced water budget by making use of site characteristics and infiltration; preservation of the integral characteristics of the site as viewed from adjoining roads; and reduction in maintenance required for stormwater management practices. Such objectives can be met on a site through an integrated development process that respects natural site conditions and attempts, to the maximum extent possible, to replicate or improve the natural hydrology of a site.

Conservation District - The Cumberland County Conservation District.

Concentrated Storm Runoff - Surface runoff from rainfall events, which converges and flows primarily through water conveyance features such as swales, gullies, waterways, channels or storm sewers and which exceeds the maximum specified flow rates of filters or perimeter controls intended to control sheet flow.

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. Also see Return Period.

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

Detention Volume - The volume of runoff that is captured and then infiltrated, evaporated, reused, or released into the waters of this Commonwealth at a controlled rate.

DEP - The Pennsylvania Department of Environmental Protection.

Development Site (Site) - See Project Site.

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

Ditch - An artificial waterway for irrigation or stormwater conveyance.

Drainage Area - That land area contributing runoff to a single point and that is enclosed by a ridge line.

Drainage System - All facilities and natural features used for the movement of stormwater through and from a drainage area, including, but not limited to, any and all of the following; conduits, pipes and appurtenant features: channels, ditches, flumes, culverts, streets, swales, gutters as well as all watercourses, water bodies, and wetlands.

Disconnected Impervious Area (DIA) - An impervious or impermeable surface which has its stormwater runoff disconnected from any stormwater drainage or conveyance system and is redirected or directed to a pervious area which allows for infiltration, filtration, and increased time of concentration as specified in *Appendix C* herein, Disconnected Impervious Area.

Disturbed Area - An unstabilized land area where an Earth Disturbance Activity is occurring or has occurred.

Easement - A right of use of a specified portion of land of another for a specified purpose.

Earth Disturbance Activity - Construction or other human activity which disturbs or exposes the underlying soil, including, but not limited to, clearing and grubbing; grading; excavations; embankments; road maintenance; building construction; the moving, depositing, stockpiling, or storing of soil, rock, or earth materials.

Engineer - For the purpose of this ordinance; a professional engineer licensed by the Commonwealth of Pennsylvania, with proficiency by reason of education and experience in the branch of civil engineering practice.

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

Existing Condition - The initial condition of a project site prior to the proposed construction.

FEMA - Federal Emergency Management Agency.

Floodplain - The lowland and relatively flat areas adjoining inland and coastal waters including, at a minimum, that area subject to a one percent or greater chance of flooding in any given year.

Floodway - The channel of the watercourse and those portions of the adjoining floodplains that are reasonably required to carry and discharge the 100-year 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 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 and Timber Operations - Planning and activities necessary for the management of forestland. These include conducting a timber inventory, preparation of forest management plans, silvicultural treatment, cutting budgets, logging road design and construction, timber harvesting, site preparation, and reforestation.

Gardening - Use of land for gardening for home consumption.

Groundwater - Water that occurs in the subsurface and fills or saturates the porous openings, fractures and fissures of underground soils and rock units.

Hazardous Material - A product or waste, or combination of substances, that because of their quantity, concentration, physical, chemical, or infectious characteristics, if not properly treated, stored, transported, used or disposed of or otherwise managed, would create a potential threat to the public health through direct or indirect introduction onto the groundwater resources and the subsurface environment, which includes the soil and all subsequent materials located below. Such hazardous materials include, but are not limited to, materials that may be included on one or more of the following lists:

- *Occupational Safety and Health Act, 29 CFR, Part 1910, Subpart Z – Extremely Hazardous Substance List.*
- *American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment* (current addition).
- *National Toxicology Program, Annual Report on Carcinogens* (current edition).
- *International Agency for research on Cancer Monographs.*
- *Commonwealth of Pennsylvania, Department of Labor and Industry, Hazardous Substance List* (current edition).
- “Hazardous Substances” defined pursuant to *Section 311 of the Federal Clean Water Act.*
- “Toxic Materials” defined pursuant to *Section 307 of the Federal Clean Water Act.*
- “Hazardous Wastes” defined pursuant to *25 PA Code, Chapter 261.a.3.*
- “Hazardous Wastes” defined pursuant to *Section 101 of the Federal Resource Conservation and Recovery Act.*

Hotspot - An area where land use or activities generate highly contaminated runoff with concentrations of pollutants in excess of those typically found in stormwater.

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

Hydrologic Cycle - the cyclic transfer of water vapor from the Earth's surface via evapotranspiration into the atmosphere, from the atmosphere via precipitation back to earth, and through runoff into streams, rivers, and lakes, and ultimately into the oceans.

Hydrologic Soil Group (HSG) - Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. Infiltration rates of soils vary widely and are affected by subsurface permeability as well as surface intake rates. Soils are classified into four HSGs (A, B, C, and D) according to their minimum infiltration rate, which are obtained for bare soil after prolonged wetting. The NRCS (Natural Resources Conservation Service) defines the four groups and provides a list of most of the soils in the United States and their group classification. The soils in the area of the development site may be identified from a soil survey report that can be obtained from local NRCS offices or conservation district offices. Soils become less pervious as the HSG varies from A to D. (Reference: *National Engineering Handbook*, Part 630, Chapter 7 (NRCS, May 2007))

Hydrology - The study of the properties, distribution, circulation, and effects of water on the earth's surface, soil, and atmosphere

Impervious Surface (Impervious Area) - A surface (or area) that prevents the infiltration of water into the ground. Impervious surfaces (or areas) shall include, but are not limited to, roofs used to cover indoor living spaces, garages, storage sheds and similar structures, and any new streets or sidewalks. Surfaces (or areas) such as, but not limited to, decks, patios, parking areas, and driveway areas are not counted as impervious surfaces (or areas) if they allow for infiltration.

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

Intensity - The depth of accumulated rainfall per unit of time.

Intermittent Stream - A defined channel in which surface water is absent during a portion of the year as groundwater levels drop below the channel bottom.

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

Land Development (Development) - Inclusive of any of the following activities: (i) the improvement of one lot or two or more contiguous lots, tracts, or parcels of land for any purpose involving (a) a group of two or more buildings, whether proposed initially or cumulatively, or a single nonresidential building on a lot or lots regardless of the number of occupants or tenure, or (b) the division or allocation of land or space, whether initially or cumulatively, between or among two or more existing or prospective occupants by means of, or for the purpose of streets, common areas, leaseholds, condominiums, building groups, or other features; (ii) any subdivision of land; (iii) development in accordance with *Section 503(1.1) of the Pennsylvania Municipalities Planning Code*.

Maintenance - Actions taken to restore or preserve the as-built functional design of any stormwater management facility, including but not limited to, items detailed in a Stormwater Best Management Practices Operation and Maintenance Agreement.

Municipality or Middlesex Township or Township - Middlesex Township, Cumberland County, Pennsylvania. Any reference to the Township or Middlesex Township making any decision or taking action under this Ordinance shall be a reference to a decision made or action taken or to be made or taken by the Board of Supervisors of Middlesex Township unless the context clearly indicates otherwise.

NOAA - National Oceanic and Atmospheric Administration.

Non-structural Stormwater Management Practice(s) - Passive site design approaches or regulatory approaches that positively impact water quality and reduce or minimize the generation of stormwater runoff without requiring the construction of specific or discrete stormwater management control structures.

NRCS - USDA Natural Resources Conservation Service (previously SCS).

National Pollution Discharge Elimination System (NPDES) - Created in 1972 under the *Clean Water Act* to authorize discharges to local receiving waters only pursuant to governmental permits, in an effort to reduce point source and non-point source pollutants.

New Development - Any activity regulated by this ordinance that is not considered a redevelopment as defined in this ordinance.

PADEP - Pennsylvania Department of Environmental Protection.

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

Percolation Rate - The rate of movement of water under hydrostatic pressure through interstices of rock or soil. For stormwater analysis, it is typically measured as a distance per unit of time (e.g., inches per hour).

Pervious Surface (Pervious Area) – A surface (or area) that allows the full or partial infiltration of water into the ground. Pervious surfaces (or areas) shall include, but are not limited to, semi-pervious surfaces (or areas) and any surfaces (or areas) not defined as impervious surfaces (or areas).

Project Site - The specific area of land where any Regulated Activities in Middlesex Township are planned, conducted, or maintained.

Qualified Professional - Any person licensed by the Pennsylvania Department of State or otherwise qualified by law to perform the work required by the Ordinance.

Rainfall Intensity -The depth of accumulated rainfall per unit of time.

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

Redevelopment - An existing, developed property and/or a graded, altered and compacted site (as of or after the date of adoption of this Ordinance) that is proposed for additional construction or reconstruction.

Regulated Activities - Shall include, but not be limited to, any Earth Disturbance Activities or any activities that involve the alteration or development of land in a manner that may affect stormwater runoff as specified in *Section 105* herein.

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

Retention Basin - An impoundment designed to collect and retard stormwater runoff by temporarily storing the runoff and releasing it at a predetermined rate.. Retention basins are designed to permanently retain a pool of runoff water during dry weather.

Retention Volume/Removed Runoff - The volume of runoff that is captured and not released directly into the surface waters of this Commonwealth during or after a storm event.

Return Period - The average interval, in years, within which a storm event of a given magnitude can be expected to occur one time. For example, the 25-year return period rainfall would be expected to occur on average once every 25 years; or stated in another way, the probability of a 25-year storm occurring in any one year is 0.04 (i.e. a 4% chance).

Riparian - Pertaining to anything connected with, or immediately adjacent, to the banks of a stream or other body of water.

Riparian Buffer - An area of land adjacent to a body of water which is managed to maintain the integrity of stream channels and shorelines in order to 1) reduce the impact of upland sources of pollution by trapping, filtering, and converting sediments, nutrients, and other chemicals. 2) supply food, cover, and thermal protection to fish and other wildlife.

Runoff - Any part of precipitation that flows over land.

SCS - Soil Conservation Service. This has been replaced by the USDA Natural Resources Conservation Service (NRCS).

Sediment - Soils or other materials transported by surface water as a product of erosion.

Sedimentation - Occurs when sediment particles that have been suspended within flowing water are deposited on the stream bottom or floodplain.

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

Special Flood Hazard Area - Those areas identified by the Federal Emergency Management Agency (FEMA), Federal Insurance Administration (FIA) as floodway area (FW), flood fringe area (FF), and general floodplain area (FA).

Stabilization - The proper placing, grading, constructing, reinforcing, lining, and covering of soil, rock or earth to ensure their resistance to erosion, sliding or other movement.

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

Storm Event - A storm of a specific duration, intensity, and frequency.

Stormwater Management Best Management Practices - See "Best Management Practices". This term is the same as, and also abbreviated as "BMPs" or "SWM BMPs" throughout this Ordinance.

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 facilities.

Stormwater Management Plan (SWMP) (also "SWM Site Plan")- The plan prepared by a developer or owner of land or other legal entity indicating how stormwater runoff will be managed at the development site in accordance with this Ordinance. Said plan includes, but is not limited to, a detailed analysis, design, and calculations and drawings of the proposed stormwater management system.

Stormwater Runoff - The flow of water overland and/or in water bodies that result from and occurs during and immediately after a rainfall event.

Subdivision - As defined in the *Pennsylvania Municipalities Planning Code, Act of July 31, 1968, P.L. 805, No. 247as reenacted and subsequently amended*.

Structural Stormwater Management Practices - Any measures that require the design and construction of a facility to help reduce or eliminate a non-point source of pollution and control stormwater.

Swale - An artificial or natural waterway which may contain contiguous areas of standing or flowing water only following a rainfall event or that is planted with, or has stabilized vegetation suitable for soil stabilization, stormwater treatment, and nutrient uptake, or that is designed to take into account the soil erodibility, soil percolation, slope, slope length, and contributing drainage area so as to prevent erosion and reduce the pollutant concentration of any discharge.

Township Engineer - A professional engineer licensed by the Commonwealth of Pennsylvania, duly appointed by Middlesex Township Board of Supervisors as the Township Engineer.

Unstabilized Land Area – An area of land without proper placing, grading, constructing, reinforcing, lining, and covering of soil, rock or earth to ensure their resistance to erosion, sliding or other movement.

USDA - United States Department of Agriculture.

Watercourse - A permanent or intermittent stream or other body of water, whether natural or man-made, which gathers or carries surface water.

Waters of the Commonwealth - Rivers, streams, creeks, rivulets, impoundments, ditches, watercourses, storm sewers, lakes, dammed water, wetlands, ponds, springs, and other bodies or channels of conveyance of surface and underground water, or parts thereof, whether natural or artificial, within or on the boundaries of the Commonwealth of Pennsylvania.

Watershed - Region or area drained by a river, watercourse, or other surface water of this Commonwealth.

Water Table - The upper most level of saturation of pore space or fractures by subsurface water in an aquifer. Seasonal High Water Table refers to a water table that rises and falls with the seasons due either to natural or man-made causes.

Wetlands - Land areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (wetlands generally include swamps, marshes, bogs, and similar areas); or areas that are defined and delineated in accordance with the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (January 10, 1989), and as may be amended from time to time; or as further defined and delineated by the United States Army Corps of Engineers, the United States Environmental Protection Agency, or the Pennsylvania Department of Environmental Protection.

ARTICLE III – STORMWATER MANAGEMENT PLAN REQUIREMENTS

Section 301. General Requirements

- A. A Stormwater Management Plan (SWMP) is required for all Regulated Activities, unless specifically exempted in *Section 106* herein:
 - 1. Regulated Activities shall not commence until Middlesex Township issues written approval of an SWMP which demonstrates compliance with the requirements of this Ordinance.
 - 2. SWMPs approved by Middlesex Township shall be on site throughout the duration of the Regulated Activity.
- B. Middlesex Township shall not approve any SWMP that is deficient in meeting the requirements of this Ordinance. At its sole discretion and in accordance with this Article, when a SWMP is found to be deficient, Middlesex Township may either disapprove the submission or require a resubmission, or in the case of minor deficiencies, Middlesex Township may accept submission of modifications.
- C. The management of stormwater on site, both during and upon completion of the disturbances associated with Regulated Activities, shall be accomplished in accordance with the standards and criteria of this Ordinance.
- D. The intent of these requirements is to encourage environmentally sound stormwater management practices that provide necessary drainage facilities while protecting the hydrologic characteristics and water quality of the site and watershed. Developments shall be required to incorporate infiltration and stormwater management controls. Stormwater management design shall blend into the natural environment and be aesthetically integrated into the site design.
- E. For all Regulated Activities, Applicants shall refer to the latest edition of the *Pennsylvania Stormwater Best Management Practices Manual* (December 30, 2006), as amended and updated, for guidance in the design of stormwater management facilities most appropriate to individual site conditions. Objectives for design are to reduce the volume of stormwater generated, infiltrate runoff at its source to the maximum extent possible, achieve water quality improvement at the source or during conveyance, and provide for peak flow attenuation. Applicants shall examine design alternatives by viewing them in a series. In addition, applicants are strongly encouraged to use structural and nonstructural BMPs that reduce or eliminate the need for detention basins.

- F. After consultation with DEP, Middlesex Township may approve measures for meeting the water quality requirements of the State of Pennsylvania other than those in this Ordinance, provided that they meet the minimum requirements of, and do not conflict with, Pennsylvania law, including but not limited to, the *Clean Streams Law*.
- G. For all Regulated Earth Disturbance Activities, erosion and sediment control BMPs shall be designed, implemented, operated, and maintained during these activities (e.g., during construction) to meet the purposes and requirements of this Ordinance and to meet all requirements under the *Pennsylvania Code Title 25* and the *Clean Streams Law*. Various BMPs and their design standards are listed in the *Erosion and Sediment Pollution Control Program Manual* (E&S Manual), Commonwealth of Pennsylvania, Department of Environmental Protection, No. 363-2134-008 (April 2000), as amended and updated.
- H. For all new development projects, the measurement of impervious areas shall include all of the impervious areas in the total proposed development even if development is to take place in stages. Similarly, for new development projects taking place in stages, the entire proposed new development plan for that particular stage or phase must be used in determining conformance with this Ordinance.
- I. Stormwater flows/direct discharges onto adjacent property shall not be created, increased, decreased, relocated, or otherwise altered without written notification to the adjacent property owner(s). Such stormwater flows shall be subject to the requirements of this Ordinance.
- J. The stormwater management system shall not create an adverse impact on stormwater quantity or quality in either upstream or downstream areas. Offsite areas which discharge to or across a site proposed for development shall be addressed in the stormwater management plan prepared for the development. No stormwater management plan shall be approved until it is demonstrated that the runoff from the project shall not adversely impact downstream areas.
- K. An Environmental Impact Assessment Report (EIAR) shall be prepared for any development or redevelopment project in Middlesex Township. No EIAR is required for any regulated activities that are exempt from this Ordinance through Section 106. Said EIAR shall demonstrate to the Township that the Applicant's proposed use or action poses no threat to the public's health, safety and welfare, and to ground water quantity and quality. The EIAR shall be prepared in accordance with *Article VII, Section 718* of the *Middlesex Township Subdivision and Land Development Ordinance*. For those development or subdivision projects located in Karst regions of Middlesex Township, the EIAR must include content described in Section 302.C.1 of this Ordinance. No preliminary plan approval shall be granted or building permit shall be issued until the EIAR has been approved by the Township.

- L. The design of all facilities over Karst shall include an evaluation of measures to minimize adverse effects in accordance with the procedures outlined in *Section 7.4* of the *Pennsylvania Stormwater Best Management Practices Manual*.
- M. Design of stormwater management facilities shall adhere to the principles, procedures and guidelines set forth in *Section 7.6* of the *Pennsylvania Stormwater Best Management Practices Manual* for regulated activities that are within one-half (½) mile of an existing or planned public water supply well.
- N. All development activity within a Special Flood Hazard Area designated by the Federal Emergency Management Agency (FEMA) shall comply with the Middlesex Township Zoning Ordinance and this paragraph. All development shall be designed to maintain the flood carrying capacity of the floodway such that the base flood elevations are not increased, either upstream or downstream. The natural conveyance characteristics of the site and the receiving floodplain shall be incorporated into the stormwater management practices proposed for the site.
- O. Existing wetlands shall not be used to meet the minimum design requirements for stormwater management or stormwater runoff quality treatment, except when used as part of a stormwater management facility that incorporates a portion of the outer zone (filter strip) of the wetland's riparian buffer as a stormwater outfall.
- P. Where watercourses traverse a development site, drainage easements shall be provided conforming to the line of such watercourses. The terms of the easements shall prohibit excavation, the placing of fill or structures and any alterations that may adversely affect the flow of stormwater within any portions of the easement, and shall require the establishment and protection of riparian buffers.
- Q. Any stormwater management facilities regulated by this Ordinance that would be located in or adjacent to Waters of the Commonwealth shall be subject to approval by the PADEP through the Joint Permit Application process, or the General Permit Process, as required by PADEP regulations. When there is a question as to whether an area of land is a wetland, it is the responsibility of the Applicant or his agent to demonstrate that the land in question is not classified a wetland.
- R. Any stormwater management facility or part thereof regulated by this Ordinance that will be located in State highway rights-of-way shall be subject to approval by the Pennsylvania Department of Transportation (PennDOT).
- S. At the time of application for a building permit for any approved lot created by a subdivision and/or improved as a land development project, issuance of the permit shall be

conditioned upon compliance with the terms of this Ordinance. A note indicating the same shall be placed on all plans involved in the plan approval process.

- T. Stormwater discharges to critical areas with sensitive resources (e.g., special protection waters, cold-water fisheries, recharge areas, water supply reservoirs, etc.) may be subject to additional performance criteria or may need to utilize or restrict certain stormwater management practices.
- U. Any field changes to the approved SWMP designs must be addressed by the project design engineer and then submitted to the Township Engineer for review and approval. The Township Engineer shall have the discretion to determine if said changes shall go before the Township Board of Supervisors for review and comment prior to any decision as to approval or denial of said change.

Section 302 Plan Content

The Stormwater Management Plan (SWMP) shall be composed of (1) Narratives that explain and discuss the existing and proposed conditions, conclusions, and recommendations (2) Hydrologic and Hydraulic design calculations, and (3) Drawings and or maps drawn at a commonly used scale (no smaller than 1"=100') that result in a map that is clear and legible, and (4) a site assessment in accordance with *Chapter 4* of the *Pennsylvania Stormwater Best Management Practices Manual* and *Section 718* of the *Middlesex Township Subdivision and Land Development Ordinance*. The individual components of the SWMP and their required contents shall contain, but not limited to, the following:

A. Maps and Drawings

1. A north arrow, submission date, scale, and revision dates as applicable shall be included on each page of all maps/drawings submitted.
2. A watershed location map showing its entire boundary within Middlesex Township and illustrating the location of the proposed development site.
3. A map(s) or drawing(s) showing all existing conditions including natural and existing constructed drainage facilities affecting the subject property including areas of existing standing water, heavy seepage, springs, wetlands, streams, and hydrologically sensitive areas.
4. An existing conditions ground cover map delineated by shading. This can be included in the existing conditions map if clearly discernable. The total area and percent thereof of each of the cover types shall be noted on the map.
5. A map showing in detail all hydrologic (watershed) boundaries, including all areas flowing to the proposed project, existing streams (including first order and intermittent streams), springs, lakes, ponds, or other bodies of water within the project area.
6. A map showing sufficient topographical information with elevations to verify the location of all ridges, streams, etc. (two-foot contour intervals within the project's boundaries and for proposed offsite improvements; for slopes greater than fifteen percent (15%), five (5)-foot contours are acceptable).
7. A map showing the type of soils with Hydrologic Soil Group, noted estimated permeabilities in inches per hour, and location and results of all soil tests and borings.

8. A Flood Hazard map showing limits of 100-year flood elevations for any FEMA Special Flood Hazard Areas on or within one hundred (100) feet of the property.
9. A proposed conditions map showing the location and description of proposed ground cover and land use shall be submitted. The total area and percent thereof of each of the cover types shall be noted on the maps.
10. A comprehensive drawing of the entire proposed stormwater drainage and management system attributable to the activity proposed.
11. The locations of existing (existing conditions map) and proposed (proposed conditions map) on-lot wastewater facilities and water supply wells.
12. Plan and profile drawings of all BMPs including drainage structures, pipes, open channels, and swales.
13. A drawing or drawings containing construction details sufficient to completely express the intended stormwater design components consistent with this Ordinance.
14. Drainage channel drainage area map.
15. Culvert drainage area map.
16. Inlet drainage area map.
17. A map showing complete delineation of drainage areas, the flow paths, and the segments within the flow paths used for calculating the time of concentration for the pre-developed and post-developed conditions. These shall be separate maps unless indicated otherwise by the Township Engineer.
18. A grading plan including all areas of disturbance; the total area of disturbance shall be noted in square feet and acres. This can be included on the proposed conditions map if clearly discernable.
19. Any other map or drawing as deemed necessary by the Township Engineer in order to aid in the review and/or clarify the proposed SWMP.

B. Narrative

At a minimum, the report narrative shall explain or discuss the following:

1. The purpose of the SWMP.

2. The name of the development, the name and address of the property owner and Applicant, and the name and address of the individual or firm preparing the plan.
3. The methodology used for hydrologic calculations and for design of drainage facilities such as storm sewers, culverts, inlet size and location, and channels, etc.
4. The goals and objectives of the SWMP.
5. The overall stormwater management concept for the project.
6. The stormwater management practices to be applied both during and after development.
7. A written description of the existing site conditions and any areas of special interest or sensitivity.
8. A written description of the proposed conditions and how areas of special interest or sensitivity have been addressed.
9. The effect of the project (in terms of runoff volumes and peak flows) on adjacent properties and on any other stormwater collection system that may receive runoff from the project site and specifics of how erosion and flooding impacts to adjacent properties will be avoided or otherwise mitigated.
10. Summarized results of pre-development and post-development runoff calculations.
11. Conclusions and Recommendations.

C. A determination of Site Conditions in accordance with the Site Assessment procedures outlined in *Chapter 4* of the *Pennsylvania Stormwater Best Management Practices Manual*. Information contained in a report addressing the site conditions shall include, but not be limited to:

1. Special attention shall be paid to projects proposed in areas of carbonate geology or Karst topography. The applicant shall make sure the site assessment includes a the detailed site evaluation of said features and contains at least the following information:
 - a. Karst Features Map: Shall be drawn to scale and show the presence and location of carbonate features on the subject site. Such information shall be based on a field survey, aerial photogrammetry and/or published data, but in

any case, it shall be supported by an explanation of its source and include the qualifications of the professional(s) directly responsible for preparing such information. Upon review of said information, the Township Engineer may require that other features be located by field survey. The map shall show, at least but not limited to, the following information:

- closed depressions
- open sinkholes
- outcrops of bedrock
- surface drainage into ground
- "ghost lakes" after rainfall
- lineaments, fissures, faults and fracture traces
- limonite excavations and quarries
- caverns
- disappearing lakes
- disappearing streams

- b. Potential Adverse Environmental Impacts and the Proposed Measures to Mitigate: This section shall describe potential environmental impacts if the subject site were to be developed and what measures are proposed to mitigate them.
- c. List of Preparers and their Qualifications: The name(s), address(es) (including e-mail address(es)), and telephone number(s) of the preparer(s) and his, her, or their qualifications.
- d. Appendices: Any additional information which the applicant wishes to provide may be included in one or more appendices to the report.
- e. Required Additional Information: The Township reserves the right to require additional information provided the Township Engineer concludes that such information would be instrumental in assessing the environmental impacts of the development proposal.

D. Hydrologic and Hydraulic design calculations. The report shall contain all calculations (hydrologic and hydraulic) performed in preparing the SWMP including but not limited to pre and post-development runoff rates and volumes, drainage systems, including storm-sewer pipes, inlets, gutter spread, culverts, runoff control measures, drainage channels, stormwater management facilities, and other features.

E. A soil erosion and sediment control plan, where applicable, as prepared for and submitted to the appropriate authority, such as the Conservation District.

F. An operation and maintenance plan consistent with the requirements of *Article V* herein. Such plan should clearly explain how the proposed facilities operate and how they shall be maintained.

Section 303. Permanent Stormwater Management Design

A. Design Goals:

The objective of permanent stormwater management design in part is to achieve post-development hydrologic conditions that are consistent with the pre-development ground cover assumptions for new development and improve the runoff conditions for redevelopment, as appropriate. Applicants shall adhere to a holistic design process incorporating the goals listed below:

1. Minimize the volume of runoff that must be collected, conveyed, treated, and released by stormwater management facilities.
2. Preserve the natural infiltration process, natural infiltration rate and infiltrate runoff at its source.
3. Remove and/or treat pollutants at the source or during conveyance.
4. Provide for peak flow attenuation as needed.
5. Attenuate runoff to pre-development levels and protect the in-stream channel of the receiving stream.

B. Design Principles. The following design principles shall be observed:

1. Incorporate Conservation Design Practices to minimize the amount of stormwater generated on a site, encourage the disconnection of impervious land cover, and maximize the use of pervious areas for stormwater treatment and on-site rainfall infiltration.
2. Infiltration of surface water runoff at its source is to be the primary mechanism for stormwater management. Soil infiltration testing will be used to verify infiltration rates. Infiltration practices include, but are not limited to those referenced elsewhere in this Ordinance and as outlined in the publications referred to by this Ordinance.
 - a. Water quality improvement shall be achieved in conjunction with or as part of infiltration practices. Water quality improvements shall also be provided for

drainage areas not otherwise addressed by infiltration practices either at the source of runoff and/or during conveyance away from the source of runoff.

- b. To reduce the need for large detention basins designed to satisfy the peak flow attenuation requirements, other innovative stormwater management practices located close to the source of runoff generation shall be considered, including a combination of practices (e.g., rooftop storage, open vegetated channels, bioretention and infiltration trenches).
 - c. Site hydrology and natural infiltration patterns shall guide site design. All existing channels, drainage ways, swales, natural streams, and other surface water concentrations shall be maintained and incorporated into design decisions unless changes can be justified to enhance natural runoff and/or infiltration patterns on the basis of other design objectives of this Ordinance.
3. Although Middlesex Township recognizes the standard practice of balancing “cuts” and “fills” (earthwork), when it comes to residential development designs, priority shall be given to minimization of earth disturbance in order to maintain as much of the natural drainageways, draws, swales, etc. as practical. As such, the Township Engineer may question the grading plan and require alternative grading designs be investigated if in his or her opinion these natural features are put in jeopardy by the proposed grading plan.

C. Minimum Performance Standards:

The following minimum performance standards shall apply to all applicable activities whether they are new development or redevelopment. Middlesex Township will approve or disapprove SWMPs based on the Applicant’s adherence to these minimum standards:

1. SWMPs shall primarily consider structural and non-structural BMPs that provide, promote, or otherwise make the best possible use of infiltration on-site.
2. In Karst regions of the Township, SWMPs shall provide infiltration only where the design, supporting calculations, and soils and geologic investigations are provided which determine that the potential or likelihood of subsidence or sinkhole creation is minimal.
3. Appropriate on-site testing and evaluation should support any design of infiltration practices in carbonate geology. Relevant guidance and practices are discussed in *Technical Best Management Practice Manual & Feasibility Report: Infiltration of Stormwater in Areas Underlain by Carbonate Bedrock within the Little Lehigh Creek Watershed (LVPC, 2002)*. Although this document specifically addresses carbonate

rock conditions of the Lehigh Valley, the site evaluation design guidance can be applied in Middlesex Township.

4. In Karst regions of the Township, the SWMP shall not provide for concentrated flows and points of discharge. Measures should be taken to convert such flows to uniform, shallow sheet flow.
5. SWMPs shall include water quality treatment of stormwater runoff. Structural and/or non-structural BMPs shall be designed to reduce or eliminate solids, sediment, nutrients, and other potential pollutants from leaving the site.
6. SWMPs involving discharges from land uses or activities with higher potential for pollutant loadings (hotspots) may require the use of specific structural stormwater management and pollution prevention practices in order to preclude pollutant loading in stormwater discharging the site. In addition, stormwater from a hotspot land use shall be subject to proper pretreatment prior to infiltration. For the purpose of this Ordinance, the sites/facilities listed in *Section 303.C.7* below, are considered hotspots.
7. SWMPs prepared for certain use sites shall be required to prepare and call for implementation of a stormwater pollution prevention plan, which if applicable, shall include a spill prevention plan. For purposes of this Ordinance, the following hotspots or those of a similar nature are placed in this category.
 - a. Vehicle salvage yards and recycling facilities
 - b. Vehicle and equipment cleaning facilities
 - c. Auto Body Shops
 - d. Gas service stations and automobile garages
 - e. Fleet storage areas for buses, trucks etc.;
 - f. Facilities that generate or store regulated quantities of hazardous materials
 - g. Truck and automobile travel plazas
8. The SWMP designs for conveyance structures (pipes, channels, etc.) shall be sized to protect the property receiving runoff from impacts of flooding and erosion.
9. The SWMPs shall have an Operation and Maintenance Plan pursuant to the requirements of *Article V* of this Ordinance. In addition, the SWMP shall have an enforceable Operation and Maintenance Agreement per *Section 502* of this Ordinance to ensure that all management practices and systems function as designed and to provide remedies for system failure.
10. When the proposed development contains existing wetlands the SWMP shall provide for water quality treatment of stormwater runoff by an approved BMP prior to release

into the wetland. Existing wetlands shall not be used to meet the minimum design requirements for stormwater management or stormwater runoff quality treatment.

11. The SWMP shall contain water quality improvements within post-development drainage areas not otherwise proposing infiltration practices. These improvements shall either be at the source of runoff and/or during conveyance away from the source of runoff. Stormwater quality BMP selection, design, and implementation shall be based upon appropriate reference materials including the latest edition of the *Pennsylvania Stormwater Best Management Practices Manual*, and may include such practices as constructed wetlands, grass channels, dry swales, wet swales, filter strips, and bioretention.
12. The SWMP shall provide for attenuation of the post-development peak discharge rate down to the pre-development peak discharge rate for the 2-year, 10-year, 25-year, 50-year, 100-year, and 24-hour storm events.
13. Infiltration facility and discharge designs called for within the SWMP shall infiltrate and/or discharge within the same drainage area of the stream receiving the runoff from the development site prior to development.
14. Properties or sites that propose redevelopment, which have impervious surface areas in quantities greater than what is allowed in the underlying Zoning District(s), shall comply with all the requirements of this Ordinance and the SWMP shall be designed to accomplish one of the following minimum performance standards. Selection of the performance standard shall be whichever is most appropriate for the given site conditions as determined by Middlesex Township. Models of all three (3) options shall be submitted to Middlesex Township for evaluation prior to making this determination:
 - a. Reduce the total impervious cover on the site by at least twenty percent (20%), based on a comparison of existing impervious cover to proposed impervious cover; or
 - b. Achieve a ten percent (10%) reduction in the total volume of runoff generated and discharged from the site by a 2-year storm event. Runoff calculations shall be based on a comparison of existing site conditions to post-development site conditions; or
 - c. Reduce the post-development peak discharge rates to ninety percent (90%) of the predevelopment peak discharge rates for the 2-year, 10-year, 25-year, 50-year, 100-year, and 24-hour storm events based on a comparison of existing ground cover to post-development site conditions.

D. Hydrology Standards

1. In all plans and designs for stormwater management systems and facilities submitted to the Middlesex Township Engineer for review, stormwater peak discharge and runoff shall be determined through the use of the *NRCS Soil Cover Complex Method* as set forth in *Urban Hydrology for Small Watersheds, Technical Release No. 55* (USDA, 1986), with specific attention given to antecedent moisture conditions, flood routing, and time of concentration. Note that when Technical Release No. 55 (TR-55) is used for natural system-based approaches and practices encouraged herein, calculations must be performed on a detailed small sub-area basis. *Technical Release No. 20* (TR-20) shall be used and, if approved by the Township Engineer, other methods, may be utilized. The design professional's choice of a specific method shall be based on the suitability of the method for the given project site conditions with due consideration to the limitations of the method chosen.
2. The design storm precipitation depth estimates to be used for the NRCS Soil Cover Complex Method in the analysis of discharge peak rates shall be obtained from the *Precipitation-Frequency Atlas of the United States, Atlas 14, Volume 2*, U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Weather Service, Hydro-meteorological Design Studies Center, Silver Spring, Maryland, 20910. NOAA's *Atlas 14* can be accessed at internet address: <http://hdsc.nws.noaa.gov/hdsc/pfds/>.
3. Runoff characteristics of off-site areas that drain through a proposed development shall be based on actual existing conditions.
4. The following assumptions shall be used for runoff calculations:
 - a. The ground cover used as the pre-development for runoff calculations shall be as follows:
 - 1) Wooded sites shall use a ground cover of woodland in good condition.
 - 2) Agricultural sites shall use a ground cover of pasture in good condition.
 - 3) Except for redevelopment projects, all other portions of a site shall use a ground cover of meadow in good condition even if the area is impervious.
 - 4) The amount of impervious ground cover used for redevelopment sites is dependent upon determinations made per *Section 303.C.14* of this Ordinance.
 - 5) The Runoff Curve Numbers referenced in *Urban Hydrology for Small Watersheds Technical Release No. 55* (USDA, 1986) shall be used to develop runoff calculations for ground covers on new development sites that are not in a Karst region of Middlesex Township. If the NRCS Soil Cover Complex Method is not used to calculate runoff then the coefficients

used shall be based on an acceptable reference subject to approval by the Township Engineer during review of the SWMP. For new development sites in Karst regions of the Township, the Township Engineer shall be consulted for modeling techniques to be used to determine realistic pre-development runoff coefficients. Post-development curve numbers shall be obtained as indicated above.

- 6) Average antecedent moisture conditions shall be assumed for use in the NRCS Soil Cover Complex Method.
- 7) A Type II distribution storm shall be used for the NRCS Soil Cover Complex Method.

E. Attenuation of Peak Flow (Rate Controls).

In addition to the infiltration and water quality requirements of this Ordinance, peak flow from those activities resulting in increases in impervious surface and/or re-grading and compaction shall be attenuated to pre-development rates of discharge. The following design storms shall be analyzed for the peak discharge:

1. A one (1) year, twenty-four hour storm of 2.6 inches of rainfall (PADEP, Erosion and Sediment Pollution Control Program Manual, Harrisburg, PA, March 2000);
2. A two (2) year through twenty-five (25) year, twenty-four hour storm (rainfall per *NOAA Atlas 14, Volume 2*); and
3. A one-hundred (100) year, twenty-four-hour storm (rainfall per *NOAA Atlas 14, Volume 2*).

F. The Rational Method utilizing a 5 minute time of concentration (t_c) shall be used for calculations of the peak rate of runoff for the design of storm sewers and drainage channels but not for the design of stormwater management facilities where a full hydrograph is needed.

G. Stormwater Management Design Specifications.

The latest edition of the *Pennsylvania Stormwater Best Management Practices Manual* shall serve as a guide for the design of stormwater management practices. Additional design guidance may also be obtained from other related sources such as:

- *Design of Stormwater Filtering Systems* (Center for Watershed Protection (CWP) 1996), and the
- *American Society of Civil Engineers Manual and Report on Engineering Practice, No. 87, Urban Runoff Quality Management* (ASCE, 1998) for the design of stormwater runoff quality control features for site development.

The following standards shall be adhered to:

1. Groundwater Recharge Volume

The following sizing and hierarchy criteria shall be followed at all sites required to meet the standards of this Ordinance.

- a. To the extent that a site is located in and/or discharges to a stream or water body designated by the Commonwealth of Pennsylvania as High Quality and/or Exceptional Value or Special Protection Watershed and is altered as a result of development, there shall be no net increase in the total volume of stormwater discharged from the site over that which was calculated for the pre-development condition as a result of the runoff generated by the 2-year, 24-hour storm. Compliance with this standard shall also satisfy the Water Quality Volume criteria specified in this Ordinance.
- b. To the extent that a site is not located in and does not discharge to a stream or water body designated by the Commonwealth of Pennsylvania as High Quality and/or Exceptional Value Watershed or Special Protection Watershed or any site where the Applicant can demonstrate through on-site soils evaluations and supporting engineering calculations that site conditions preclude a design complying with *subsection a.* above, then BMPs shall be provided that capture and infiltrate, or otherwise permanently retain on site, the total volume of runoff generated from the one and one-half-inch (1.5"), 24-hour storm or as recommended by the *Pennsylvania Stormwater Best Management Practices Manual*, which ever requires the largest recharge volume, such that this quantity of runoff is not discharged from the site. The calculation of runoff generated shall be based on a summation of the runoff generated by each individual cover type. Impervious and pervious covers shall be calculated separately. The averaging or weighting of a composite curve number (CN) or runoff coefficient (c) is prohibited for volume calculations. Runoff calculations shall include all areas proposed to be disturbed and/or re-graded.
- c. Where the Applicant can demonstrate through on-site soils evaluations and supporting engineering calculations that site conditions (i.e. Karst regions of the Township) preclude a design complying with the specifications above, then BMPs shall be provided that capture and infiltrate, or otherwise permanently retain on site, the largest percentage of the total volume of runoff generated from the one and one-half-inch (1.5"), 24-hour storm that site conditions allow, such that this quantity of runoff is not discharged from the site. The calculation of runoff generated shall be based on a summation of the runoff generated by each individual cover type. Impervious and pervious covers shall be calculated separately. The averaging or weighting of a composite curve number (CN) or runoff coefficient (c) is prohibited for volume calculations.

Runoff calculations shall include all areas proposed to be disturbed and/or re-graded.

2. Recharge Volume Control Calculations

Water volume controls shall be implemented using design calculations and methodology as prescribed in the *Pennsylvania Stormwater Best Management Practices Manual Chapter 8*. As such, the design calculation method shall become part of this Ordinance by reference. There are two methods from which to choose; either the Design Storm Method described in *Subsection 1* below or the Simplified Method in *Subsection 2*. For Regulated Activity areas equal or less than one (1) acre that do not require hydrologic routing to design the stormwater facilities, this Ordinance establishes no preference for either methodology; therefore, the Applicant may select either methodology on the basis of economic considerations, the intrinsic limitations on applicability of the analytical procedures associated with each methodology, and other factors.

- a. The Design Storm Method (see Section 8.7 of the *Pennsylvania Stormwater Best Management Practices Manual*) is applicable to any size of Regulated Activity. This method requires detailed modeling based on site conditions.
- b. The Simplified Method (see Section 8.7 of *Pennsylvania Stormwater Best Management Practices Manual*) provided below is independent of site conditions and should be used if the Design Storm Method is not followed. This method shall not be used for Regulated Activities greater than one (1) acre or for projects that require design of stormwater detention or rate control facilities. For new impervious surfaces:
 - 1) Stormwater facilities shall capture at least the first two (2) inches of runoff from all new impervious surfaces.
 - 2) At least the first one (1) inch of runoff from new impervious surfaces shall be permanently removed from the runoff flow; i.e., it shall not be released into the surface waters of this Commonwealth. Removal options include reuse, evaporation, transpiration, and infiltration.
 - 3) Infiltration facilities should be designed to accommodate infiltration of the entire permanently removed runoff; however, in all cases at least the first one-half (1/2) inch of the permanently removed runoff should be infiltrated.
 - 4) The other one (1) inch of runoff should be detained using structural and non-structural BMPs as described in the *Pennsylvania Stormwater Best Management Practices Manual*.
 - 5) Regulated Activities eligible under this method are exempt from the requirements for Rate Controls.

3. Water Quality Volume Calculations and Facility Sizing Criteria

Water quality improvement shall be achieved in conjunction with the standards described in this Ordinance as well as in drainage areas not otherwise provided with stormwater runoff volume management practices. The Water Quality Volume (WQv) shall be calculated in accordance with specifications and procedures described in *Chapter 8* of the *Pennsylvania Stormwater Best Management Practices Manual* and shall meet the following standards:

- a. If the calculated WQv is less than the volume infiltrated and/or retained on site then the WQv requirement is satisfied.
- b. If the calculated WQv is greater than the volume required to be infiltrated and/or retained on site, then the difference between the two volumes shall be treated for water quality by an acceptable stormwater management practice(s).
- c. Multiple Drainage Areas: When a project contains or is divided by multiple drainage areas, the WQv volume shall be addressed for each drainage area.
- d. Offsite Drainage Areas: The WQv shall be based on the impervious cover of the proposed site. Offsite existing impervious areas may be excluded from the calculation of the water quality volume requirements.

H. Stormwater Infiltration Practices

1. The use of multiple infiltration features and facilities that provide for the following are encouraged:
 - a. Discourage concentration of flows.
 - b. Encourage disconnection of flows.
 - c. Infiltrate as close to the source of runoff as possible.
 - d. Reduce visual impact.
2. Where high water tables, subsurface contamination, and/or other site constraints preclude achieving the required infiltration volume, additional Conservation Design practices and alternative stormwater management practices should be implemented to reduce to the maximum extent practical the total volume of stormwater released to streams. The Applicant shall follow the stormwater runoff hierarchy found in *Section 303.G.1*.
3. Infiltration areas should be designed to maintain any broad and even infiltration pattern in existence prior to development. Such facilities should use the natural topography and vegetation in order to blend in with the site. Infiltration designs that do not provide this may be used if the Applicant demonstrates to Middlesex Township's satisfaction that alternative approaches would be more effective, more harmonious with their existing environment,

and as easily maintained.

4. Aboveground stormwater infiltration facilities (basins) should be as shallow (depth of water) as possible while still achieving the requirements of this ordinance. When located in Karst areas of the Township the depth shall not exceed two (2) feet.
5. Stormwater management basins shall not be placed in or over the following features: sinkholes, closed depressions, lineaments, fracture traces, caverns, ghost lakes and disappearing streams.
6. The infiltration practices employed shall be selected based on suitability of soils and site conditions. Initial site evaluation shall include information pertaining to soil(s) suitability for SWM BMP facility siting and infiltration as detailed in the most recent NRCS Soil Survey for Cumberland County. Final design of infiltration facilities must be based on actual field run infiltration tests. Acceptable infiltration practices include, but are not limited to:
 - a. filter strips or stormwater filtering systems (for example bioretention facilities, sand filters),
 - b. open vegetated channels
 - c. infiltration trenches,
 - d. dry wells,
 - e. infiltration basins,
 - f. porous paving systems,
 - g. wet extended detention ponds,
 - h. riparian corridor management,
 - i. riparian forested buffers,
 - j. rooftop runoff management systems,
 - k. sand filters (closed or open), or as otherwise described in the *Pennsylvania Stormwater Best Management Practices Manual*.

7. Where sediment transport in the stormwater runoff is anticipated to reach the infiltration system, appropriate permanent measures to prevent or collect sediment shall be installed prior to discharge to the infiltration system.
8. Soil infiltration tests shall be performed. The soil infiltration rate of discharge from the designed infiltration area shall be based on these measurements.
9. Soil testing and evaluation shall be completed at the preliminary design stage in order to determine the feasibility and extent to which infiltration systems can be used. The evaluation shall be performed by a qualified, licensed geologist, geotechnical/civil engineer or soil scientist and shall at a minimum address:
 - a. soil types,
 - b. soil permeability,
 - c. depth to bedrock,
 - d. limitations of soils,
 - e. presence/absence of carbonate geology, susceptibility to subsidence and/or sinkhole formation and depth to groundwater
10. Infiltration requirements shall be based on the portions of the site that are permeable prior to disturbance and the degree to which development will reduce the permeability of the site. Permeability of the site shall be determined based on the detailed evaluations described above.
11. Use of BMPs to retain stormwater for infiltration should be applied to all areas where the soils evaluation indicates favorable conditions.
12. Soil infiltration tests shall be performed to an equivalent depth or elevation of the bottom of the proposed infiltration areas. These tests shall follow the procedures as described in the *Pennsylvania Stormwater Best Management Practices Manual*. The test hole shall be excavated to a depth so that the presence or absence of bedrock and/or seasonal high water table can be determined. A soil log describing the soils present in each test pit shall be performed. The location and number of tests shall be determined based on the type(s) of stormwater management practices being designed in consultation with and guidance from the Township Engineer.
13. Acceptability of infiltration rates shall be based on sound engineering judgment and recommended design considerations described in the *Pennsylvania Stormwater Best*

Management Practices Manual and/or other source material acceptable to the Township Engineer.

14. All infiltration practices shall be set back at least fifteen (15) feet from all structures with sub-grade elements (e.g., basements, foundation walls).
15. The lowest elevation of the infiltration area shall be at least two (2) feet above the seasonal high water table and bedrock except in the case of areas underlain by Karst and/or carbonate geology in which case the distance shall be determined on a site specific basis and recommendation of a licensed hydrogeologic engineer.
16. Where roof drains are designed to discharge to infiltration practices, they shall have appropriate measures to prevent clogging by unwanted debris (for example, silt, leaves, and vegetation). Such measures shall include but are not limited to leaf traps, gutter guards, and cleanouts.
17. All infiltration practices shall have appropriate positive overflow controls to prevent storage within one (1) foot of the finished surface or grade, unless a specific amount of surface storage away from pedestrian and vehicular traffic is provided and such areas infiltrate the stored volume within forty-eight (48) hours.
18. All infiltration practices shall be designed to infiltrate the stored volume within forty-eight (48) hours.
19. No sand, salt, or other particulate matter may be applied to a porous (pervious) surface for winter ice conditions.
20. During site construction, all infiltration practice components shall be protected from compaction due to heavy equipment operation or storage of fill or construction material. Infiltration areas shall also be protected from sedimentation. Areas that are accidentally compacted or graded shall be remediated to restore soil composition and porosity. Adequate documentation to this effect shall be submitted for review by the Township Engineer. All areas designated for infiltration shall not receive runoff until the contributory drainage area has achieved final stabilization.
21. The following procedures and materials shall be required during the construction of all subsurface facilities:
 - a. Excavation for the infiltration facility shall be performed with equipment that will not compact the bottom of the seepage bed/trench or like facility.
 - b. The bottom of the bed and/or trench shall be scarified prior to the placement

of aggregate.

- c. The tops and sides of all seepage beds, trenches, or like facilities shall be covered with drainage fabric. Fabric shall meet the specifications of *PennDOT Publication 408, Section 735, Construction Class 1*.
 - d. Perforated distribution pipes connected to centralized catch basins and/or manholes with the provision for the collection of debris shall be provided in all facilities unless the Township Engineer agrees that site soils provide superior infiltration (A soils or highly porous B soils). Where perforated pipes are used to distribute stormwater to the infiltration practice, stormwater shall be distributed throughout the entire seepage bed/trench or like facility.
22. All infiltration practices that serve more than one (1) lot and are considered a common facility and shall have a drainage easement. The easement shall provide to Middlesex Township the right of access.
23. In areas underlain by Karst and/or carbonate geology, the viability and specific design standards of infiltration BMPs at a given site must be determined on a site-specific basis to avoid groundwater contamination and formation and/or expansion of solution channels, sinkholes, and other potentially dangerous Karst features. A site evaluation shall be conducted by a qualified professional geologist, geotechnical engineer, or other qualified professional, licensed by the Commonwealth of Pennsylvania, to ascertain the subsurface conditions of soil, rock, and groundwater relevant to formation of Karst features.
- a. Where Karst conditions exist, infiltration BMPs shall be located and designed based on the subsurface conditions identified in the site evaluation, to avoid formation of new Karst features and to protect existing Karst features from accelerated development. Infiltration BMPs shall be located at least 100 feet away from existing Karst features and sited away from buildings, roadways, or other structures where subsidence could damage the structure and create an unsafe condition.
 - b. Groundwater quality of the carbonate aquifer shall be protected from infiltration of pollutants. At a minimum, stormwater runoff from "hotspots" (i.e., sources of significant pollutant runoff) shall first be discharged through a water quality BMP(s) to remove pollutants prior to infiltration. Where soil characteristics are insufficient to provide removal of pollutants from sources other than "hotspots", stormwater runoff shall first be discharged through a water quality BMP(s) to remove pollutants prior to infiltration.

24. Open Vegetated Infiltration Channels/Swales are conveyance systems that when engineered properly also perform as an acceptable water quality treatment/infiltration facility. Such systems can be used for the conveyance, retention, infiltration and filtration of stormwater runoff. Open Vegetated Infiltration Channels shall be designed to meet the following minimum standards:
- a. The infiltration channel/swale shall be designed to safely convey the 25-year frequency storm event with a freeboard of at least six (6) inches. Freeboard is the difference between the elevation of the design flow in the channel and the top elevation of the channel.
 - b. Infiltration channels/swales shall not be located within one hundred (100) feet of the following Karst features: sinkholes, closed depressions, lineaments, fracture traces, caverns, ghost lakes, and disappearing streams.
 - c. The peak velocity of the runoff in infiltration channels/swales from the 25- year storm shall be non-erosive for the soil and ground cover provided in the channel.
 - d. Infiltration channels/swales shall be trapezoidal in cross section. The minimum bottom width shall be two (2) feet. (The maximum bottom width shall be eight (8) feet?)
 - e. Infiltration channels/swales shall be designed with moderate side slopes of four (4) horizontal to one (1) vertical or flatter (4H: 1V).
 - f. The maximum allowable ponding time in infiltration channels/swales shall be forty-eight (48) hours.
 - g. Infiltration channels/swales may require an underdrain in order to function and dewater.
 - h. Landscape specifications for infiltration channels/swales shall address the grass species, wetland plantings (if applicable), soil amendment, and hydric conditions present along the channel.
 - i. Accumulated sediment within the infiltration channel/swale bottom shall be removed when twenty-five percent (25%) of the original WQv volume has been exceeded.
 - j. The bottom of dry infiltration channels/swales shall be situated at least two (2) feet above the seasonal high water table.

- I. Retention Basins are prohibited in Middlesex Township.
- J. Detention basins are generally discouraged as a BMP and should only be used as a last resort where no other management facility is practical. Detention basins typically collect and quickly release runoff from a site in a manner that is contrary to the principles, goals, and standards presented within this Ordinance. If detention basins are proposed they shall be designed to meet the following minimum standards:
 1. Detention basins shall not be placed in, over, or within one hundred (100) feet of the following Karst features: sinkholes, closed depressions, lineaments, fracture traces, caverns, ghost lakes, and disappearing streams.
 2. Detention basins shall completely drain both the volume control and rate control capacities over a period of not less than 24 hours and not more than 72 hours from the end of the design storm, subject to site conditions.
 3. The maximum inside side slopes of Detention Basins shall not be steeper than four (4) horizontal to one (1) vertical (4H: 1V). The minimum required slope for the basin bottom is two percent (2%) unless the designer demonstrates to the Township's satisfaction that the basin bottom will be landscaped with appropriate wetland vegetation pursuant to *Section 303.L* herein.
 4. Pipe inverts into a detention basin shall be a minimum of six (6) inches above the basin floor or lining.
 5. Discharges into and out of detention basins shall be separated by the maximum length possible in order to preclude short-circuiting of flow directly to the basin outlet structure and to maximize the flow path through the basin.
 6. Detention basin low flow channels constructed of concrete or asphalt are not permitted. Where low flow channels are necessary, they shall be composed of a natural or bioengineered material. Low flow channels shall be designed to promote water quality and slow the rate of flow through the basin. Low flow channels may also be designed to infiltrate where practical.
 7. Detention basin outlet structures shall meet the following specifications:
 - a. To minimize clogging and to facilitate cleaning and inspection, detention basin outlet pipes shall have an internal diameter of at least eighteen (18) inches and a minimum grade of one percent (1%).

- b. Anti-seep collars shall be provided on all detention basin outlet pipes within a constructed berm.
 - c. All principal detention basin outlet structures shall be built using reinforced concrete with watertight construction joints.
 - d. The use of architecturally treated concrete, stucco, painted surface, or stone facade treatment shall be considered for enhancing the detention basin outlet structure. Such facilities shall be both functional and harmonious in design with the surrounding environment.
 - e. Detention Basin outlet structures shall have childproof non-clogging trash racks over all design openings exceeding twelve (12) inches in diameter except those openings designed to carry perennial stream flows.
 - f. Detention basin circular risers or stand pipes shall incorporate anti-vortex devices, consisting of a thin vertical plate normal to the basin berm.
 - g. Discharge from detention basin outlet structures shall not empty into or be directed toward sinkholes, closed depressions, lineaments, fracture traces, caverns, ghost lakes, and disappearing streams.
8. Emergency Spillways: The following design standards shall be met:
- a. Detention basin emergency spillways shall be sized and located to permit the safe passage of stormwater flows from a 100-year storm.
 - b. The maximum velocities in vegetated detention basin emergency spillways excavated in otherwise undisturbed soil shall be analyzed based upon the velocity of peak flow in the emergency spillway during an assumed clogged primary outlet condition.
 - c. Where maximum velocities in detention basin emergency spillways exceed design standards contained in *The Engineering Field Manual for Conservation Practices* (USDA, SCS, July 1984) suitable lining shall be provided.
 - d. In general, detention basin emergency spillways should not be located in fill areas; all such practices placed on fill materials shall be lined.
 - e. Lining for detention basin emergency spillways shall incorporate native colors and materials where possible, including mono slab revetments, grass pavers, and native stone.

- f. Detention basin emergency spillways shall have freeboard. Freeboard is the difference between the elevation of the design flow in the emergency spillway and the top elevation of the settled basin embankment (i.e. top of berm). The minimum freeboard shall be one (1) foot.
 9. Energy Dissipaters and Level Spreaders: Energy dissipaters and/or level spreaders shall be installed to prevent erosion and/or initiate sheet flow at points where pipes or drainage ways discharge to or from detention basins. Energy dissipaters shall comply with criteria in *Hydraulic Engineering Circular No. 15- Design for Stable Channels with Flexible Linings* (USDOT, FHWA, 1986) or *The Engineering Field Manual for Conservation Practices* (USDA, SCS, July 1984). Such facilities shall be both functional and attractive; for example, native rock shall be used in construction where practical.
 10. The minimum distance between a proposed detention basin discharge point (including the energy dissipater, etc.) and a downstream property boundary shall in no case be less than twenty-five (25) feet. Where there is discharge onto or through adjacent properties prior to release to a stream, designers shall demonstrate how downstream properties are to be protected. The Township Engineer may require that the setback distance be increased based upon factors such as topography, soil conditions, the size and location of structures, and discharge rates. A drainage easement may also be required.
 11. A sediment forebay with a hardened bottom shall be provided at each inlet into detention basins. The forebay storage capacity shall be at minimum ten (10%) percent of the permanent pool storage. The forebay shall be designed to allow for access by maintenance equipment for periodic cleaning.
 12. All permanent detention basins and/or other stormwater management facilities providing stormwater control for other than a single residential lot shall be located within a defined drainage easement that allows proper legal access and for maintenance vehicle access by Middlesex Township personnel, if necessary. For individual single family lots using rain gardens or similar devices, a blanket easement shall be provided for this purpose and so noted on the Subdivision Plan as an easement/covenant running with the land.
- K. Conveyance Systems (Open Channels, Drainageways, and Storm Sewers)
- Although this section pertains to conveyance of stormwater, applicants are encouraged to design conveyance systems that encourage infiltration and improve water quality wherever practicable. When conveyance systems are proposed, they shall meet the following standards:
1. Wherever conveyance channels are necessary, drainage shall be maintained by an

open channel with landscaped banks designed to carry the 25-year, 24-hour stormwater runoff from upstream contributory areas. The Township Engineer may increase the design storm as conditions require. All open channels shall be designed with one (1) foot of freeboard above the design water surface elevation of the design runoff condition.

2. If a channel or storm sewer is located downstream from a basin with an overflow spillway designed to carry the 100- year design storm, it shall be designed as a flood relief channel. As such, it shall be designed to convey the runoff from the 100-year, 24-hour storm, such that a positive discharge of this runoff to an adequate receiving stream or conveyance system occurs without allowing it to encroach upon other properties.
3. Where the Township Engineer deems necessary, open channels along existing roadways may be required to be enclosed.
4. Storm sewers in Karst regions of the Township shall have watertight connections. Details of the same shall be placed on the Land Development Plan and the SWMP.
5. A note shall be placed on Subdivision and Land Development Plans as applicable indicating that trench excavations in Karst regions of the Township shall be backfilled daily and temporary berms or dikes shall be constructed around all excavations, including those for utility trenches, building foundations, etc., to prevent the entry of surface water.
6. Land Development and Subdivision Plans for projects in Karst regions of the Township shall contain an adequate sinkhole mitigation and remediation plan prepared and placed on the plan for use in the event that sinkholes develop or are encountered during construction activities.
7. Storm sewer manholes shall not be spaced more than three hundred (300) feet apart.
8. Inlet spacing in streets shall be determined by gutter spread. Inlets shall be spaced so as to keep spread of stormwater to no more than one-half (1/2) the width of the travel lane. Calculations shall be submitted for review by the Township Engineer to support inlet spacing design.
9. Where drainage swales are used in lieu of or in addition to storm sewers, they shall be designed to carry the required runoff without erosion and in a manner not detrimental to the properties they cross. Drainage swales shall provide a minimum grade of two percent (2%) but shall not exceed a grade of nine percent (9%).

10. At curbed street intersections, storm inlets shall be placed in the tangent section of the road.
11. When using open channels in lieu of curbing to convey stormwater runoff from roadways inlets shall be placed at the center of the swale draining the street and shall be located no closer than six (6) feet from the edge of the cartway. Inlet capacity design calculations and ponding limit calculations shall be submitted for review by the Township Engineer.
12. Middlesex Township shall be granted a minimum twenty (20) foot wide drainage easement over all storm sewers, drainage swales, channels, etc., that are a component of the stormwater management system when located within undedicated land. In addition, a twenty (20) foot wide access easement shall be provided adjacent to the drainage easement to allow for access to, and maneuvering of, maintenance equipment.
13. All Subdivision and/or Land Development Plans containing streams, channels, drainage swales, storm sewers, or other conveyance systems that cross property boundaries, existing or proposed, or whose discharge crosses such boundaries shall contain a note stating that property owners shall not obstruct or alter the flow, location, or carrying capacity of a stream, channel, or drainage swale to the detriment of any other property owner, whether upstream or downstream.
14. Storm drainage systems that collect runoff from parking areas and/or loading areas exceeding 20,000 square feet of impervious coverage and discharge to stormwater management systems, including surface or subsurface infiltration systems, shall be equipped with water quality inlets or other similar devices to remove oil, grease, and heavy particulates, suspended solids, hydrocarbons, and other floating substances from stormwater runoff. If devices other than water quality inlets are proposed the Applicant must demonstrate to Middlesex Township's satisfaction that any such alternative will be as effective and as easily maintained. Periodic cleaning of these systems shall be addressed in the SWMP Operation and Maintenance component of the SWMP.

L. Landscaping of BMPs

BMPs shall be landscaped in accordance with the following standards. A professional landscape architect licensed in the Commonwealth of Pennsylvania or a landscape professional with adequate experience in selecting plantings for special or unique uses shall design landscape plans. Upon request by Middlesex Township, the designer's qualification shall be submitted for review and approval.

1. Landscaping shall be required in and around all constructed BMPs with a minimum surface area of one thousand (1,000) square feet for the purposes of:
 - a. Assisting in the management of stormwater;
 - b. Stabilizing the soil within such facilities to minimize and control erosion;
 - c. Mitigating maintenance problems commonly associated with the creation of such facilities.
2. A planting plan and planting schedule shall be submitted in accordance with the following:
 - a. Wet meadows including floors of BMPs
 - 1) Wet meadows and floors of BMPs shall be planted with wildflowers and nonaggressive grasses; the intent being to create a mixed meadow of such plantings where appropriate. Selection of plantings shall be based on whether the area in question is usually well drained or permanently wet and whether the area will be used for recreation purposes. Except as approved by Middlesex Township, no woody plants shall be planted within the saturated zone (phreatic line) of a BMP or on a berm constructed for impounded water.
 - 2) Seeding shall take place either between April 1 and May 15 or between September 1 and October 15. Planting areas shall be soaked to maintain a consistent level of moisture for at least four (4) to six (6) weeks after planting.
 - 3) Wet edges that remain wet all or most of the year shall be planted with wildflowers, grasses, and shrubs. Plants to be located on rims or banks, which remain dry most of the year, shall be planted with species tolerant of dry soil conditions.
 - b. Wooded areas
 - 1) Where BMPs adjoin wooded areas, trees and shrubs shall be selected and planted outside the BMP so as to blend with existing surroundings.
 - 2) Plantings in such areas shall be of sufficient density to eliminate the need for mowing.

- 3) It is recommended that clusters of trees and shrubs be planted around BMPs but well away from outfalls and any constructed berms, where applicable, to provide for wildlife habitat, wind control, and buffering and screening.

c. Slopes

- 1) Where slopes are gentle, a mixture of meadow grasses and wildflowers (for wet meadows) shall be planted.
- 2) On steep slopes as defined by Middlesex Township, dense spreading shrubs (shrubs tolerant of dry soils) shall be planted. Heavy mat mulch shall be used during the period of establishment.
- 3) No woody plant materials or trees shall be located on a constructed or natural berm acting as the impoundment structure of a BMP. Trees shall be located downstream of an impoundment berm a sufficient distance from the toe of the constructed slope to assure that the toe of the slope is outside the drip line of the species at maturity but in no case less than fifteen (15) feet.

d. Other Situations

- 1) In cases where BMPs are to be located in proximity to wetlands or waterways, the Applicant's planting plan and schedule shall consider the sensitive conditions existing therein and be modified accordingly to reflect existing flora.
- 2) BMPs shall be screened in a manner which complements the existing landscape and provides sufficient access for maintenance including vehicles and equipment transport.

ARTICLE IV – GENERAL PROCEDURES AND PROCESSING REQUIREMENTS

Section 401. Plan Submission

- A. Five (5) copies of the SWMP shall be submitted as follows:
1. Two (2) copies to Middlesex Township
 2. Two (2) copies to the Township Engineer
 3. One (1) copy to the County Conservation District (applicable only to final subdivision and land development plans).
- B. Additional copies shall be submitted as requested by the Middlesex Township.

Section 402. Plan Review

- A. The SWMPs shall be reviewed for consistency with the provisions of this Ordinance by the Township Engineer. After review, the Township Engineer shall provide a written recommendation for Middlesex Township to approve or disapprove the SWMP. If it is recommended to disapprove the SWMP, the Township Engineer shall state in writing the reasons for the disapproval. The Township Engineer also may recommend approval of the SWMP with conditions and, if so, shall provide in writing conditions for approval.
- B. For SWMPs that do not require Subdivision and Land Development approval, the Municipality shall notify the applicant in writing within forty-five (45) calendar days from the date of the SWMP submission to the Township whether the SWMP is approved or disapproved.
- C. If the SWMP involves a Subdivision and Land Development Plan, review and action on the SWMP shall be completed within the time required by the Pennsylvania Municipalities Planning Code. If a longer period is provided by other statute, regulation, or ordinance, the applicant will be so notified by Middlesex Township. If Middlesex Township disapproves the SWMP, Middlesex Township shall cite in writing the reasons for disapproval.

Section 403. Modification of Plans

A modification to a previously approved SWMP shall require a resubmission of the original SWMP in accordance with this Article if the modification involves a change in BMPs or techniques, or that involves the relocation or redesign of the approved BMPs or, as determined by

Middlesex Township, that it is necessary because soil or other conditions are not as stated in the SWMP. The applicable review fee must accompany the resubmission.

Section 404. Resubmission of Disapproved Storm Water Management Plans

A SWMP that has been disapproved by action of the Middlesex Township Board of Supervisors may be resubmitted in accordance with this Article with the revisions addressing Middlesex Township's concerns. The applicable review fee must accompany a resubmission of a disapproved SWMP.

Section 405. Authorization to Construct and Term of Validity

Middlesex Township's approval of a SWMP authorizes the regulated activities contained in the SWMP for a maximum term of validity of five (5) years following the date of approval. Terms of validity shall commence on the date Middlesex Township signs the approval for a SWMP. If an approved SWMP is not completed within the term of validity, then Middlesex Township may consider the SWMP disapproved and may revoke any and all permits. SWMP that are considered disapproved by Middlesex Township may be resubmitted in accordance with *Section 404* of this Ordinance.

Section 406. As-Built Plans, Completion Certificate, and Final Inspection

- A. In addition to those As-Built Plan requirements contained in *Section 1303 of the Subdivision and Land Development Ordinance*, the developer/applicant shall be responsible for providing As-Built Plans of all BMPs included in the approved SWMP. The As-Built Plans and an explanation of any discrepancies with the Construction Plans shall be submitted to the Middlesex Township for review by the Township Engineer prior to requesting the final release of improvement security.
- B. The As-Built Plan submission shall include a certification of completion signed by a Professional Engineer licensed in the State of Pennsylvania verifying that all permanent BMPs have been constructed according to the approved plans and specifications. If said Engineer finds the As-Built Plan indicative of variations from the approved designs, a report must be submitted to the Township Engineer indicating the extent of the variations and the impacts to compliance with the requirements of this Ordinance. The variations report must be certified, signed and sealed by a Professional Engineer Licensed in the State of Pennsylvania.
- C. After receipt of the As-Built Plan, Middlesex Township may conduct a final inspection of all approved BMPs. This inspection can include use of field survey personnel and equipment to verify location, elevation, and grades of as-built elements.

ARTICLE V - OPERATION AND MAINTENANCE

Section 501. General Responsibilities

- A. The owner of BMPs shall be responsible for the proper operation and maintenance of those facilities during and after construction. An Operation and Maintenance Plan consistent with the requirements of this Ordinance shall be prepared for review and approval by the Township Engineer.
- B. Ownership and Maintenance
All BMPs identified within an approved SWMP shall be owned and maintained by one, or a combination of, the following entities:

1. Private Ownership for Individual On-Lot BMPs

- a. Where individual on-lot BMPs are proposed, the Subdivision and/or Land Development Plan shall contain a note in a form satisfactory to the Middlesex Township Solicitor designating the entity responsible for operation and maintenance of the on-lot facilities consistent with an approved Operation and Maintenance Plan and, in the event that the responsible person or entity fails to do so, granting to Middlesex Township the right but not the duty to enter upon the premises to repair or restore said facilities, to charge and assess the costs thereof to the owner, and to enforce said charges and assessments by lien upon the property. In addition, the deed for each lot shall contain a covenant binding the grantee and all successors title and interest designating the responsibility for operation and maintenance of the on-lot facilities. The following is an example of such a clause:

"UNDER AND SUBJECT, nevertheless, to the following conditions and restrictions: Prior to the construction of a dwelling or any other earthmoving activities, Grantee shall construct the permanent BMP(s) as shown on the Stormwater Management Plan prepared by [name of engineering firm], dated [] and last revised on [] and approved by Middlesex Township; thereafter, the Grantee (" lot owner"), his heirs, executors, administrators, successors and assigns, at his or their sole cost and expense, shall operate, maintain and repair said BMP(s) on the lot in accordance with said plan, so that the BMP(s) shall at all times continue to operate and function in the same manner and capacity as they were designed".

"In the event of the failure of the owner to comply with these conditions and restrictions, Middlesex Township shall reserve the right at its option, but not the obligation, to have said BMP(s) repaired or restored as required, and the costs thereof shall be assessed to the lot owner; said assessment shall be a charge and a

continuing lien upon the property herein. Middlesex Township, before it may exercise this right, shall notify the lot owner by certified mail of its intention to take the aforementioned action. The notice shall set forth in what manner the owner has neglected the operation and maintenance of or repair to the BMP(s), and if the owner fails to correct or repair the items listed in the notice from Middlesex Township, then Middlesex Township may exercise this right”.

- b. In addition to the above, developers of parcels with more than one (1) dwelling unit shall record in the Office of Recorder of Deeds for Cumberland County a Declaration of Covenants and Restrictions in a form satisfactory to the Middlesex Township Solicitor describing the responsibility for operation and maintenance of the BMPs, consistent with an approved Operation and Maintenance Plan, prior to the sale of any individual lots. The terms of this covenant and restriction shall run with the land and be binding upon the initial grantee(s) of each lot within the subdivision, his, her or their heirs, administrators, successors and/ or assigns.

2. Homeowners or Condominium Association Ownership

Where a homeowners' association is created to own and manage common facilities, the Subdivision and/or Land Development Plan shall contain a note in a form satisfactory to the Middlesex Township Solicitor designating the entity responsible for construction and/or maintenance of the BMPs consistent with an approved Operation and Maintenance Plan and, in the event that the responsible entity fails to do so, granting to Middlesex Township the right but not the duty to enter upon the premises to repair or restore said facilities, to charge and assess the costs thereof to each owner of property within the development and to enforce said charges and assessments by lien upon each property within the development. In addition, the developer shall record in the Office of Recorder of Deeds for Cumberland County a declaration of covenants in a form satisfactory to Middlesex Township Solicitor setting forth the rights and responsibilities of the homeowners' association for operation and maintenance of the BMPs, prior to the sale of individual lots. The terms of this covenant and restriction shall run with the land and be binding upon the initial grantee(s) of each lot within the subdivision, his, her or their heirs, administrators, successors and/or assigns.

3. Municipal Ownership

Where Middlesex Township has accepted an offer of dedication of the permanent BMPs, Middlesex Township shall be responsible for operation and maintenance. Municipal ownership notwithstanding, the applicant is required to prepare an Operation and Maintenance Plan, as defined herein. Upon approval of the BMPs by Middlesex Township, the applicant shall provide a lump sum long-term maintenance payment to

Middlesex Township to be reserved and used at all times only for costs of operation and maintenance of the dedicated facilities, as follows:

- a. Long-term Maintenance Payment. The Long-Term Maintenance payment shall be in an amount equal to the present value of operation and maintenance costs for the facilities for a ten (10) year period. The Long-Term Maintenance Payment shall be based on a ten (10) year cost estimate prepared by the Applicant's engineer and reviewed and approved by the Township Engineer. The amount of the payment shall include all costs of operation and maintenance, including but not be limited to, typical operation and maintenance, landscaping and planting, tax payments, and construction of any kind associated with the use, benefit, and enjoyment of the facilities. In particular, a description of routine facility operation, day-to-day management requirements and a description of projected maintenance actions and schedules necessary to ensure proper operation of BMPs shall be submitted for review and approval to the Township Engineer.
- b. Documentation. The terms of the Long-Term Maintenance Payment shall be documented as part of the SWMP and the Operation and Maintenance Plan.

C. Operation and Maintenance Plan

An Operation and Maintenance Plan and Instruction Booklet shall be prepared to identify the ownership, operation and maintenance responsibilities, and as-built conditions for all BMPs. At a minimum, the Operation and Maintenance Plan shall include the following:

1. Ownership of and responsibility for operation and maintenance of BMPs including names and contact information shall be required.
2. Any obligations concerning perpetual maintenance of natural drainage or infiltration facilities, and other facilities identified within the SWMP.
3. A description of the permanent BMPs on the site, explaining how each practice is intended to function and operate over time. All drainage and access easements shall be depicted and any site restrictions to be recorded against the property shall be identified on the Plan. All such easements and restrictions shall be perfected to run with the land and be binding upon the landowner and any successors in title and/or interest.
4. A description of the actions, budget and schedule for operating and maintaining the BMPs. This description should be written in a clear manner, consistent with the knowledge and understanding of the intended user.

5. A general description of operation and maintenance activities and responsibilities for BMPs held in common or on-lot, including but not limited to: lawn care, vegetation maintenance, clean out of accumulated debris and sediment (including from grates, trash racks, inlets, etc.), liability insurance, maintenance and repair of BMPs, landscaping and planting, payment of taxes, and construction of any kind associated with the use, benefit, and enjoyment of the facilities by the owners. In particular, a description of routine facility operation and day-to-day management requirements (as needed) and a description of routine maintenance actions and schedules necessary to ensure proper operation of BMPs shall be submitted.
6. Assurances that no action will be taken by any lot owner to disrupt or in any way impair the effectiveness of any BMPs, setting forth in deed restrictions the ability of Middlesex Township to take corrective measures if it is determined at any time that stipulated permanent BMPs have been eliminated, altered, or improperly maintained, including the ability of Middlesex Township to cause the work to be done and lien all costs against the property should the required corrective measures not be taken by the lot owner, following written notification, within a period of time set by Township Board of Supervisors.

Parties responsible for the long term operation and maintenance of BMPs shall make records of the installation and of all maintenance, inspections, and repairs and shall retain the records for at least ten (10) years. These records shall be submitted to Middlesex Township as established by the Operation and Maintenance Plan or as otherwise required by the Middlesex Township Board of Supervisors.

D. Inspection

BMPs must be inspected by the Landowner or the owner's designee according to the following list of minimum frequencies or as otherwise specified by Middlesex Township. All inspection reports shall be submitted to Middlesex Township within thirty (30) days of the date of completion of inspection.

- Annually for the first five (5) years.
- Once every three (3)years thereafter.

E. Other Reporting Requirements

The owner or developer, which ever the case may be, shall submit copies of the following applicable reports to the Middlesex Township Zoning Officer within thirty (30) days of notification by the Township.

1. Copies of all Federal, State, and County operational approvals, certificates, permits and applications, ongoing environmental reports and monitoring results relating to environmental, pollution control, hazardous substance, and drinking water laws and regulations pertaining to the use of the site, as and when required, to be submitted to federal, state, and county governmental authorities. The following tabulates various reports required for uses involving hazardous substances:

HAZARDOUS SUBSTANCES FORMS, PLANS AND REPORTS		
Form, Plan or Report	Authorizing Agency	Purposes
Environmental Hazard Survey Form	PA Dept. of Labor & Industry PA Worker & Community Right-to-Know Act	Describes the hazardous substances emitted, discharged or disposed of from the workplace.
Hazardous Substance Survey Form	PA Dept. of Labor & Industry PA Worker & Community Right-to-Know Act	Provides a listing of all hazardous substances found in the workplace
Pollution Incident Prevention (PIP) Plan	PA DEP Ch 101	Emergency response plan for facilities that handle materials with potential for accidental pollution of the waters of the Commonwealth.
Preparedness, Prevention & Contingency (PPC) Plan	EPA, Federal Resource Conservation & Recovery Act, as amended PA DEP Ch. 260-270	Emergency Response plan for facilities that generate, store, treat, or dispose of hazardous wastes.
SARA Title III Off-Site Plan	EPA Federal Superfund Amendments & Reauthorization Act	Identifies the transportation routes of extremely hazardous substances, a description of the workplace and a risk analysis of the operation to the surrounding community
SARA Title III Tier I & Tier II Reports	EPA Federal Superfund Amendments & Reauthorization Act	Tier I lists the amounts and location within the workplace of extremely hazardous substances by type of hazard (e.g., fire, explosion, acute health hazard). Tier II provides a listing of each specific extremely hazardous substance in the workplace and each specific hazardous substance exceeding 10,000 pounds on-site at any one time
Spill Prevention Control & Countermeasure (SPCC) Plan	EPA Federal Clean Water Act 40 CFR 112	Emergency response plan for facilities that handle hazardous substances or petroleum products as defined in the Clean Water Act.
Spill Prevention Response (SPR) Plan	PA DEP PA Storage Tank & Spill Prevention Act	Emergency response plan for facilities with an aboveground storage tank exceeding a volume of 21,000 gallons.

2. In the event that any contaminants and/or substances regulated under federal, or state environmental, pollution control, hazardous substance, and drinking water laws and regulations are released in reportable quantities on or from the subject property, copies of any and all notices, reports and documents which such owner filed with any Federal, State and/or County governmental authorities that relate to such release, as and when such notices, reports and documents are required to be filed with such governmental authorities;
3. Copies of all notices, orders, rules, decisions, recommendations, enforcement actions, and/or similar documentation, as and when received by such record owner of any such lot or tract of land from any Federal, State, or County Governmental Authority in connection with the enforcement of environmental, pollution control, hazardous substance, and drinking water laws and regulations; and,

4. Failure to comply with the above requirements so as to not permit Middlesex Township or any governmental agency to respond in a timely manner to prevent, minimize, and/or contain damage to the groundwater and/or damage to the environment shall be subject to the enforcement provisions as contained herein.

Section 502. Operations and Maintenance Agreements

A. The owner of any land upon which permanent BMPs will be placed, constructed or implemented, as described in an approved SWMP and the Operations and Maintenance Plan, shall record the following documents in the Office of the Recorder of Deeds for Cumberland County, within fifteen (15) days of approval of the Operations and Maintenance Plan by Middlesex Township:

1. The Operations and Maintenance Plan, or a summary thereof,
2. The Operations and Maintenance Agreement, and
3. Access and/or Drainage Easements.

B. The Operation and Maintenance Agreement shall be substantially the same as the sample agreement in *Appendix B* of this Ordinance.

C. Other items or conditions may be included in the Operation and Maintenance Agreement where determined necessary to guarantee the satisfactory operation and maintenance of all permanent BMPs. The agreement shall be subject to the review and approval of the Middlesex Township.

D. Middlesex Township may suspend or revoke any approvals granted for the project site upon discovery of the failure of the owner to comply with this Ordinance.

ARTICLE VI - FEES AND EXPENSES

Section 601. General

Middlesex Township may include all costs incurred in the review fee charged to an Applicant. The costs and review fees specified in this Article shall be established from time to time by Resolution of the Board of Supervisors. The review fee may include but not be limited to costs for the following:

- A. Administrative/clerical processing
- B. Township Engineer review of the SWMP
- C. Township Solicitor reviews and comments
- D. Inspections including review of As-Built drawings
- E. Attendance at meetings

All fees must be paid at the time of any SWMP submission to Middlesex Township and no SWMP shall be considered submitted until such as time as all appropriate fees have been paid.

ARTICLE VII - PROHIBITIONS

Section 701. Prohibited Discharges and Connections

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

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

Section 702. Roof Drains and Sump Pumps

Roof drains and sump pumps shall not discharge to any impervious area, subject to site conditions.

Section 703. Alteration of SWMP BMPs

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

ARTICLE VIII - ENFORCEMENT AND PENALTIES

Section 801. Right-of-Entry

Upon presentation of proper credentials, the representatives of Middlesex Township may enter at reasonable times upon any property within the Township to inspect the condition of the BMPs in regard to any aspect regulated by this Ordinance.

Section 802. Enforcement

- A. It shall be unlawful for a person to undertake any Regulated Activity except as provided in an approved SWMP, unless specifically exempted in *Section 106* of this Ordinance.
- B. Inspections regarding compliance with the SWMP during project construction are a responsibility of the applicant. Middlesex Township reserves the right to conduct inspections at any time during and after construction.

Section 803. Suspension and Revocation

- A. Any approval or permit issued by Middlesex Township may be suspended or revoked for:
 - 1. Non-compliance with or failure to implement any provision of the approved SWMP or Operation and Maintenance Agreement.
 - 2. A violation of any provision of this Ordinance or any other applicable law, ordinance, rule or regulation relating to the Regulated Activity.
 - 3. The creation of any condition or the commission of any act during the Regulated Activity which constitutes or creates a hazard or nuisance, pollution, or which endangers the life or property of others.
- B. A suspended approval may be reinstated by Middlesex Township when:
 - 1. Middlesex Township has inspected and approved the corrections to the violations that caused the suspension.
 - 2. Middlesex Township is satisfied that the violation has been corrected.
- C. An approval that has been revoked by Middlesex Township cannot be reinstated. The Applicant may apply for a new approval under the provisions of this Ordinance.

- D. If a violation causes no immediate danger to life, public health, or property, at its sole discretion, Middlesex Township may provide a limited time period for the owner to correct the violation. In these cases, the Township will provide the owner, or the owner's designee, with a written notice of the violation and the time period allowed for the owner to correct the violation. If the owner does not correct the violation within the allowed time period, the Township may revoke or suspend any, or all, applicable approvals and permits pertaining to any provision of this Ordinance.

Section 804. Penalties

- A. Anyone violating the provisions of this Ordinance shall be guilty of a summary offense, and upon conviction shall be subject to a fine of not more than \$1,000 for each violation, recoverable with costs. Each day that the violation continues shall be a separate offense and penalties shall be cumulative.
- B. In addition, Middlesex Township may institute injunctive, mandamus, or any other appropriate action or proceeding at law or in equity for the enforcement of this Ordinance. Any court of competent jurisdiction shall have the right to issue restraining orders, temporary or permanent injunctions, mandamus, or other appropriate forms of remedy or relief.

Section 805. Appeals

- A. Any person aggrieved by any action of Middlesex Township or its designee, relevant to the provisions of this Ordinance, may appeal to Middlesex Township within thirty (30) days of that action giving rise to the appeal.
- B. Any person aggrieved by any decision of Middlesex Township as a result of a timely appeal made as provided in Section 805.A, above, may appeal to the Cumberland County Court of Common Pleas within thirty (30) days of the decision of Middlesex Township.

ARTICLE IX - REFERENCES

APPENDIX A

NON-STRUCTURAL STORMWATER MANAGEMENT PRACTICES

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:

- 1. 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 tiltration. Developments designed to fit site topography also minimizes the amount of grading on site.
- 2. Protecting Natural Depression Storage Areas-** Depression 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.

3. **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.
4. **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.
5. **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.
6. **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.
7. **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.
8. **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.
9. **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.

- 10. 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.
- 11. 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, reduced water quality degradation of receiving streams/water bodies, and enhancement of aesthetics and reduction of development costs. Beneficial results include more stable baseflows in receiving streams, improved groundwater recharge, reduced flood flows, reduced pollutant loads, and reduced costs for conveyance and storage.

(Source: This appendix is taken from, *Guidance on MS4 Ordinance Provisions, Document Number 3920300- 003*, by the Pennsylvania Department of Environmental Protection, dated August 2, 2003.)

APPENDIX B

Tax Parcel No(s).:

STORMWATER BEST MANAGEMENT PRACTICES OPERATIONS AND MAINTENANCE AGREEMENT

THIS AGREEMENT, made and entered into this (____) day of (201_), by and between _____ (hereinafter the "Landowner"), and Middlesex Township, Cumberland County, Pennsylvania, (hereinafter "Municipality");

WITNESSETH

WHEREAS, the Landowner is the owner of certain real property as recorded by deed in the land records of Cumberland County, Pennsylvania, in Deed Book ___, Page ___ [or Instrument No.] (hereinafter "Property").

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

WHEREAS, the Stormwater Management BMP Operations and Maintenance Plan approved by Middlesex Township (hereinafter the "Plan") for the Property identified herein, which is attached hereto as Exhibit A and made part hereof, as approved by Middlesex Township, provides for management of stormwater within the confines of the Property through the use of Best Management Practices ("BMPs"); and

WHEREAS, Middlesex Township, and the Landowner, his, her, its and/or their heirs, successors and/or assigns, agree that the health, safety, and welfare of the residents of Middlesex Township and the protection and maintenance of water quality require that on-site stormwater BMPs be constructed and maintained on the Property; and

WHEREAS, Middlesex Township requires, through the implementation of the Plan, that stormwater BMPs as required by said Plan and the Middlesex Township Stormwater Management Ordinance be constructed and adequately operated and maintained by the Landowner, his, her, its, and/or their successors and assigns.

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

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

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

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

1. The BMPs shall be constructed by the Landowner in accordance with the plans and specifications identified in the Plan as attached hereto as Exhibit A.
2. The Landowner shall operate and maintain the BMPs as shown on the Plan in good working order acceptable to Middlesex Township and in accordance with the specific maintenance requirements noted on the Plan.
3. The Landowner hereby grants permission to Middlesex Township, its authorized agents and employees, to enter upon the property, at reasonable times and upon presentation of proper identification, to inspect the BMPs whenever it deems necessary.
4. In the event the Landowner fails to operate and maintain the BMPs as shown on the Plan in good working order acceptable to Middlesex Township, Middlesex Township or its representatives may enter upon the Property and take whatever action is deemed necessary to maintain said BMPs. This provision shall not be construed to allow Middlesex Township to erect any permanent structure on the Property of the Landowner. It is expressly understood and agreed that Middlesex 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 Middlesex Township.
5. In the event Middlesex 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, or incurs any legal expenses in performing such work and/or the enforcement of this Agreement, the Landowner shall reimburse Middlesex Township for all expenses (direct and indirect) incurred within ten (10) days of receipt of invoice from Middlesex Township.
6. The intent and purpose of this Agreement is to ensure the proper maintenance of the onsite BMPs by the Landowner; provided, however, that this Agreement shall not be deemed to create or effect

any additional liability of or on any party for damage alleged to result from or be caused by stormwater or stormwater runoff.

7. The Landowner, his, her, its and/or their heirs, executors, administrators, assigns, and other successors in interests shall and do hereby release, indemnify and hold harmless Middlesex Township, Middlesex Township's Board of Supervisors, its employees, appointees, agents, contractors and designated representatives of and from all damages, accidents, casualties, losses, injuries, death, occurrences, and/or claims which arise, might arise, are asserted or may be asserted against Middlesex Township, Middlesex Township's Board of Supervisors, its employees, appointees, agents contractors and representatives from the construction, presence, existence, or maintenance of the BMPs by the Landowner or Middlesex Township . In the event that a claim is asserted against Middlesex Township, Middlesex Township's Board of Supervisors, employees, appointess, agents, contractors and designated representatives Middlesex Township shall promptly notify the Landowner and the Landowner shall defend, at Landowner's own expense, any suit based on the claim and if any judgment, award or verdict is given or granted the Landowner shall pay said judgment, award or verdict and all costs, interest and expenses associated therewith.
8. Middlesex Township may inspect the BMPs whenever necessary to ensure their proper continued functioning.

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

ATTEST:

Middlesex Township

By: _____

(Township Seal)

WITNESS:

Landowner:

COMMONWEALTH OF PENNSYLVANIA)

: SS.

COUNTY OF)

ON THIS, the day of , 20__ before me, the undersigned officer, personally appeared and , known to me (or satisfactorily proven) to be the persons whose name are subscribed to the within instrument and acknowledged that they executed the foregoing for the purposes contained therein.

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

Notary Public

COMMONWEALTH OF PENNSYLVANIA)

: SS.

COUNTY OF CUMBERLAND)

On this the day of , 2010, before me, the undersigned officer, personally appeared , known to me (or satisfactorily proven) to be the person whose name is subscribed to the within instrument as (Vice) Chairman of the Middlesex Township Board of Supervisors and acknowledged that he executed the same for the purposes therein contained being authorized to do so.

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

Notary Public

(Source: This appendix is taken from, *Guidance on MS4 Ordinance Provisions, Document Number 3920300- 003*, by the Pennsylvania Department of Environmental Protection, dated August 2, 2003.)

APPENDIX C

Disconnected Impervious Area (DIA)

1. Rooftop Disconnection

When rooftop downspouts are directed to a pervious area that allows for infiltration, filtration, and increased time of concentration, the rooftop may qualify as completely or partially Disconnected Impervious Area (DIA) and a portion of the impervious rooftop area may be excluded from the calculation of total impervious area.

A rooftop is considered to be completely or partially disconnected if it meets the requirements listed below:

- The contributing area of rooftop to each disconnected discharge is 500 square feet or less, and
- The soil, in proximity of the roof water discharge area, is not designated as hydrologic soil group "D" or equivalent, and
- The overland flow path from roof water discharge area has a positive slope of 5% or less.

For designs that meet these requirements, the portion of the roof that may be considered disconnected depends on the length of the overland path as designated in *Table C.1*.

Table C.1: Partial Rooftop Disconnection	
Length of Pervious Flow Path *	Roof Area Treated as Disconnected
(ft)	(% of contributing area)
0 – 14	0
15 – 29	20
30 – 44	40
45 – 59	60
60 – 74	80
75 or more	100
* Flow path cannot include impervious surfaces and must be at least 15 feet from any impervious surfaces.	

2. Pavement Disconnection

When pavement runoff is directed to a pervious area that allows for infiltration, filtration, and increased time of concentration, the contributing pavement area may qualify as a DIA that may be

excluded from the calculation of total impervious area. This applies generally only to small or narrow pavement structures such as driveways and narrow pathways through otherwise pervious areas (e.g. a walkway or bike path through a park).

Pavement is disconnected if the pavement, or area adjacent to the pavement, meets the requirements below:

- The length of overland flow is greater than or equal to the contributing length, and
- The contributing flow path over impervious area is not more than 75 feet, and
- The soil is not designated as hydrologic soil group "D" or equivalent, and
- The slope of the contributing impervious area is 5% or less, and
- The slope of the overland flow path is 5% or less.

If the discharge is concentrated at one or more discrete points, no more than 1,000 square feet may discharge to any one point. In addition, a gravel strip or other spreading device is required for concentrated discharges. For non-concentrated discharges along the edge of the pavement this requirement is waived; however, there must be a provision for the establishment of vegetation along the pavement edge and temporary stabilization of the area until vegetation becomes stabilized.