

ORDINANCE NO. 5 OF 2022

EAST BRADFORD TOWNSHIP

CHESTER COUNTY, PENNSYLVANIA

AN ORDINANCE AMENDING THE CODE OF THE TOWNSHIP OF EAST BRADFORD, CHESTER COUNTY, PENNSYLVANIA, BY MODIFYING CHAPTER 94 ENTITLED EAST BRADFORD TOWNSHIP STORMWATER MANAGEMENT ORDINANCE, AND PROVIDING FOR SEVERABILITY, REPEALER, RENUMBERING, AND EFFECTIVE DATE.

AND NOW, this 13 day of December, 2022, it is hereby enacted and ordained by the Board of Supervisors of East Bradford Township, Chester County, Pennsylvania as follows:

Section 1. The Code of the Township of East Bradford is amended by modifying Chapter 94. Stormwater Management to read as follows:

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ARTICLE I – GENERAL PROVISIONS

Section 94-101. Short Title

This Ordinance shall be known as the **East Bradford Township Stormwater Management Ordinance**.

Section 94-102. Statement of Findings

The Governing Body of the Township finds that:

- A. Inadequate management of accelerated stormwater runoff resulting from land disturbance and development throughout a watershed increases flooding, flows and velocities, contributes to erosion and sedimentation, overtaxes the capacity of streams and storm sewers, greatly increases the cost of public facilities to convey and manage stormwater, undermines floodplain management and flood reduction efforts in upstream and downstream communities, reduces infiltration and groundwater recharge, increases nonpoint source pollution to waterways, and threatens public health and safety.
- B. Inadequate planning and management of stormwater runoff resulting from land disturbance and development throughout a watershed can harm surface water resources by changing the natural hydrologic patterns, accelerating stream flows (which increase scour and erosion of stream beds and stream banks, thereby elevating sedimentation), destroying aquatic habitat, and elevating aquatic pollutant concentrations and loadings such as sediments, nutrients, heavy metals, and pathogens. Groundwater resources are also impacted through loss of recharge.
- C. A comprehensive program of stormwater management, including minimization of impacts of New Development, Redevelopment, and other Earth Disturbance Activities causing accelerated runoff and erosion and loss of natural infiltration, is fundamental to the public health, safety, and general welfare of the people of the Township and all of the people of the Commonwealth, their resources, and the environment.
- D. Stormwater is an important water resource that provides infiltration and groundwater recharge for water supplies and baseflow of streams, which also protects and maintains surface water quality.
- E. Impacts from stormwater runoff can be minimized by reducing the volume of stormwater generated and by using project designs that maintain the natural hydrologic regime and sustain high water quality, infiltration, stream baseflow, and aquatic ecosystems. Cost-effective and environmentally sensitive stormwater management can be achieved through the use of nonstructural Site design techniques that minimize Impervious Surfaces, reduce disturbance of land and natural resources, avoid sensitive

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areas (i.e., riparian buffers, floodplains, steep slopes, wetlands, etc.), and consider topography and soils to maintain the natural hydrologic regime.

- F. Public education on the control of pollution from stormwater is an essential component in successfully addressing stormwater.
- G. Federal and State regulations require the Township to implement a program of stormwater controls. The Township is required to obtain a permit and comply with its provisions for stormwater discharges from its Separate Storm Sewer System under the National Pollutant Discharge Elimination System (NPDES).
- H. Non-stormwater discharges to Township or other storm sewer systems can contribute to pollution of the Waters of the Commonwealth.
- I. The use of green infrastructure, low impact development (LID), and Conservation Design (CD) are intended to address the root cause of water quality impairment by using systems and practices which use or mimic natural processes to: 1) infiltrate and recharge; 2) evapotranspire; and/or 3) harvest and use precipitation near where it falls to earth. Green infrastructure practices, LID, and CD contribute to the restoration or maintenance of pre-development hydrology.

Section 94-103. Purpose

The purpose of this Ordinance is to protect public health, safety and general welfare, property and water quality by implementing drainage and stormwater management practices, criteria, and provisions included herein for land development, construction and Earth Disturbance Activities, to achieve the following throughout the Township:

- A. Reduce the frequency and magnitude of flooding and stormwater impacts affecting people, property, infrastructure and public services.
- B. Sustain or improve the natural hydrologic characteristics and water quality of groundwater and surface waters.
- C. Protect natural resources, including riparian and aquatic living resources and habitats.
- D. Maintain the natural hydrologic regime of Land Development Sites and their receiving watersheds.
- E. Minimize land disturbance and protect and incorporate natural hydrologic features, drainage patterns, infiltration, and flow conditions within land development Site designs.
- F. Reduce and minimize the volume of stormwater generated, and manage and release stormwater as close to the source of runoff as possible.

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- G. Provide infiltration and maintain natural groundwater recharge to protect groundwater supplies and stream baseflows, prevent degradation of surface water and groundwater quality, and to otherwise protect water resources.
- H. Reduce stormwater pollutant loads to protect and improve the chemical, physical, and biological quality of ground and surface waters.
- I. Reduce scour, erosion and sedimentation of stream channels.
- J. Reduce flooding impacts and preserve and restore the natural flood-carrying capacity of streams and their floodplains.
- K. Protect adjacent and downgradient lands from adverse impacts of direct stormwater discharges.
- L. Minimize Impervious Surfaces and connected Impervious Surfaces to promote infiltration and reduce the volume and impacts of stormwater runoff.
- M. Provide proper long-term operation and maintenance of all permanent Stormwater Management Facilities, BMPs and Conveyances that are implemented within the Township.
- N. Reduce the impacts of runoff from existing developed land undergoing Redevelopment.
- O. Implement an illicit discharge detection and elimination program that addresses non-stormwater discharges.
- P. Provide stormwater management performance standards and design criteria on a watershed basis.
- Q. Provide standards to meet certain NPDES stormwater permit requirements.
- R. Meet legal water quality requirements under State law, including regulations at 25 PA Code Chapter 93, to protect, maintain, reclaim and restore the existing and designated uses of the Waters of the Commonwealth.
- S. Implement the requirements of Total Maximum Daily Load (TMDLs) where applicable to waters within or impacted by the Township.
- T. Provide review procedures and performance standards for stormwater planning and management.
- U. Fulfill the purpose and requirements of PA Act 167 (PA Act 167, Section 3):

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“(1) Encourage planning and management of storm water runoff in each watershed which is consistent with sound water and land use practices.

(2) Authorize a comprehensive program of stormwater management designated to preserve and restore the flood carrying capacity of Commonwealth streams; to preserve to the maximum extent practicable natural storm water runoff regimes and natural course, current and cross-section of water of the Commonwealth; and to protect and conserve ground waters and ground-water recharge areas.

(3) Encourage local administration and management of storm water consistent with the Commonwealth's duty as trustee of natural resources and the people's constitutional right to the preservation of natural, economic, scenic, aesthetic, recreational and historic values of the environment.”

Section 94-104. Statutory Authority

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

- A. 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” (hereinafter referred to as “the Act”);
- B. Second Class Township Code, 53 P.S. Sections 65101 et seq.; and
- C. Act of July 31, 1968, P.L. 805, No. 247, 53 P.S. Section 10101, et seq., as amended, the Pennsylvania Municipalities Planning Code, Act 247 hereinafter referred to as the “MPC”).

Section 94-105. Applicability

- A. The following activities are regulated by this Ordinance:
 - 1. All Regulated Activities as defined in this Ordinance including, but not limited to, New Development, Redevelopment, and Earth Disturbance Activities that are located within the Township shall be subject to regulation by this Ordinance.
 - 2. When a building and/or grading permit is required for any Regulated Activity on an existing parcel or approved lot created by a subdivision and/or improved as a land development project, issuance of the permit shall be conditioned upon adherence to the terms of this Ordinance.
 - 3. This Ordinance contains the stormwater management performance standards and design criteria that are necessary from a watershed-based perspective. The Township’s stormwater management Conveyance and system design criteria (e.g.,

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inlet spacing, inlet type, collection system design and details, outlet structure design, etc.) shall continue to be regulated by the applicable Township ordinance(s) and applicable State regulations or as included in Section 94-311 of this Ordinance.”

B. Duty of Persons Engaged in a Regulated Activity

Notwithstanding any provision(s) of this Ordinance, including exemptions, any Landowner or any person engaged in a Regulated Activity, including but not limited to the alteration or development of land, which may affect stormwater runoff characteristics, shall implement such measures as are reasonably necessary to prevent injury to health, safety, or other property. Such measures also shall include actions as are required to manage the rate, volume, direction, and quality of resulting stormwater runoff in a manner which otherwise adequately protects health, property, and water quality of Waters of the Commonwealth.

C. Phased and Incremental Project Requirements

1. Any Regulated Activity (including but not limited to New Development, Redevelopment, or Earth Disturbance) that is to take place incrementally or in phases, or occurs in sequential projects on the same parcel or property, shall be subject to regulation by this Ordinance if the Regulated Impervious Surface or Earth Disturbance exceeds the corresponding threshold for exemption (as presented in Table 106.1 “Thresholds for Regulated Activities that are Exempt from the Provisions of this Ordinance as Listed Below”).
2. December 10, 2013 shall be the starting point from which to consider tracts as parent tracts relative to future subdivisions, and from which Impervious Surface and Earth Disturbance computations shall be cumulatively considered unless such requirements have previously been adopted, then the earliest date of the applicable Township ordinance adoption shall remain as the starting point.

Section 94-106. Exemptions and Modified Requirements

A. Requirements for Exempt Activities.

1. An exemption from any requirement of this Ordinance shall not relieve the Applicant from implementing all other applicable requirements of this Ordinance or from implementing such measures as are necessary to protect public health, safety, and welfare, property and water quality.
2. An exemption shall not relieve the Applicant from complying with the requirements for State-designated special protection waters designated by PADEP as high quality (HQ) or exceptional value (EV) waters, or any other current or future State or Township water quality protection requirements.

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3. An exemption under this Ordinance shall not relieve the Applicant from complying with all other applicable Township ordinances or regulations.

B. General Exemptions

Regulated Activities that:

1. Involve less than one thousand (1,000) square feet of Regulated Impervious Surfaces AND less than five thousand (5,000) square feet of Earth Disturbance; or
2. Are listed in Subsection 94-106.C, with those activities being exempt from those (and only those) requirements of this Ordinance that are included in the sections and articles listed in Table 94-106.1. Exemptions are for the items noted in Table 94-106.1 only, and shall not relieve the Landowner from other applicable requirements of this Ordinance. Exemption shall not relieve the Applicant from implementing such measures as are necessary to protect health, safety, and welfare, property, and water quality.

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TABLE 94-106.1
Thresholds for Regulated Activities that are Exempt from the Provisions of this Ordinance as Listed Below (see Notes below)

Ordinance Article/Section	Activities Listed in Subsection 106.C.	< 1,000 sq. ft. of Regulated Impervious Surfaces	≥ 1,000 sq. ft. of Proposed Impervious Surfaces and ≤ 2,000 sq. ft. of Regulated Impervious Surfaces
Article I	Not Exempt	Not Exempt	Not Exempt
Article II	Not Exempt	Not Exempt	Not Exempt
Sections 302, and 303, 311	Not Exempt	Not Exempt	Not Exempt
Sections 301, 304, 309, and 310	Exempt	Exempt	Not Exempt
Sections 305, 306, 307 and 308	Exempt	Exempt	Exempt
Article IV	Exempt	Exempt	Not Exempt
Article V	Exempt	Exempt	Not Exempt
Article VI	Exempt	Exempt	Not Exempt
Article VII	Exempt	Exempt	Not Exempt
Article VIII	Not Exempt	Not Exempt	Not Exempt
Article IX	Not Exempt	Not Exempt	Not Exempt
Other Erosion, Sediment and Pollution Control Requirements	Must comply with Title 25, Chapter 102 of the PA Code and other applicable State and Township codes, including the Clean Streams Law.		

Table 94-106.1 Notes:

- Specific activities listed in Subsection 94-106.C are exempt from the indicated requirements, regardless of size.
- A proposed Regulated Activity must be less than BOTH the Regulated Impervious Surfaces and proposed Earth Disturbance thresholds to be eligible for exemption from the requirements listed in this table.
- “Regulated Impervious Surface” - as defined in this Ordinance.
- “Exempt” – Regulated Activities are exempt from the requirements of listed section(s)

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only; all other provisions of this Ordinance apply. These exemptions have no bearing on other municipal regulations or ordinances.

C. Exemptions for Specific Activities

The following specific Regulated Activities are exempt from the requirements of Sections 94-301, 94-304, 94-305, 94-306, 94-307, 94-308, 94-309, and 94-310, and Article IV, Article V, Article VI and Article VII) of this Ordinance (as shown in Table 96-106.1), unless otherwise noted below. All other conveyance and system design standards established by the Township in other codes or ordinances shall be required, and all other provisions of this Ordinance shall apply.

1. Emergency Exemption - Emergency maintenance work performed for the protection of public health, safety and welfare. This exemption is limited to repair of the existing Stormwater Management Facility; upgrades, additions or other improvements are not exempt. A written description of the scope and extent of any emergency work performed shall be submitted to the Township within two (2) calendar days of the commencement of the activity. A detailed plan shall be submitted no later than thirty (30) days following commencement of the activity. If the 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.
2. Maintenance - Any maintenance to an existing Stormwater Management Facility, BMP or Conveyance made in accordance with plans and specifications approved by the Township Engineer or Township.
3. Existing Landscaping - Use of land for maintenance, replacement or enhancement of existing landscaping.
4. Gardening - Use of land for gardening for home consumption.
5. Agricultural Related Activities –
 - a. Agricultural Activities as defined in Article II) when performed in accordance with the requirements of 25 PA Code Chapter 102.
 - b. Conservation Practices (as defined in Article II) that do not involve construction of any new or expanded Impervious Surfaces.
6. Forest Management - Forest management operations, which are consistent with a sound forest management plan approved by the Board and which comply with the Pennsylvania Department of Environmental Protection's management practices contained in its publication "Soil Erosion and Sedimentation Control Guidelines for Forestry" (as amended or replaced by subsequent guidance). Such operations are required to have an Erosion and Sedimentation Control Plan, which meets the

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requirements of 25 PA Code Chapter 102 and meets the erosion and sediment control standards of Section 94-303 of this Ordinance.

7. Maintenance of Existing Paved Surfaces - Replacement of existing gravel and paved surfaces shall meet the erosion and sediment control requirements of 25 PA Code Chapter 102 and Section 94-303 of this Ordinance, and is exempt from all other requirements of this Ordinance listed in Subsection 94-106.C above. Resurfacing of existing gravel and paved surfaces is exempt from the requirements of this Ordinance listed above. Paving of existing gravel surfaces is exempt from the requirements of this Chapter listed above. Construction of new or additional Impervious Surfaces shall comply with all requirements of this Ordinance as indicated in Table 94-106.1.
 8. Township Roadway Shoulder Improvements - Shoulder improvements conducted within the existing roadway cross-section of Township owned roadways, unless an NPDES permit is required, in which case the proposed work must comply with all requirements of this Ordinance.
 9. In-Place Replacement of Residential Dwelling Unit - The replacement in the exact footprint of an existing one- or two-family dwelling unit.
 10. In-Place Replacement, Repair, or Maintenance of Residential Impervious Surfaces - The replacement of existing residential patios, decks, driveways, pools, garages, and/or sidewalks that are accessory to an existing one- or two-family dwelling unit in the exact footprint of the existing Impervious Surface.
- D. Modified Requirements for Small Projects with Impervious Conveyance greater than 1000 s. f. and less than 2000 s. f. of Regulated Impervious Surfaces.
1. Applicant shall submit an Erosion and Sediment Control Permit Application and Stormwater Management Permit Application.

Latest version application instructions and guidelines are available from the Township.

Section 94-107. Reserved

Section 94-108. Reserved

Section 94-109. Compatibility with Other Ordinances or Legal Requirements

- A. Approvals issued and actions taken pursuant to this Ordinance do not relieve the Applicant of the responsibility to secure and comply with other required permits or

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approvals for activities regulated by any other applicable code, rule, act, law, regulation, or ordinance.

- B. To the extent that this Ordinance imposes more rigorous or stringent requirements for stormwater management than any other code, rule, act, law, regulation or ordinance, the specific requirements contained in this Ordinance shall take precedence.
- C. Nothing in this Ordinance shall be construed to affect any of the Township's requirements regarding stormwater matters that do not conflict with the provisions of this Ordinance, such as local stormwater management design criteria (e.g., inlet spacing, inlet type, collection system design and details, outlet structure design, etc.).

Section 94-110. Financial Security

For all activities requiring submittal of a Stormwater Management (SWM) Site Plan that involve subdivision or land development, or for other activities at the discretion of the Township Engineer, the Applicant shall post financial security to the Township for the timely installation and proper construction of all Stormwater Management Facilities as required by the approved SWM Site Plan and this Ordinance, and such financial security shall:

- A. Be equal to or greater than the full construction cost of the required facilities except to the extent that financial security for the cost of any of such improvements is required to be and is posted with the Pennsylvania Department of Transportation in connection with a highway occupancy permit application;

AND

- B. Be determined, collected, applied and enforced in accordance with Sections 509-511 of the MPC and the provisions of the Township's Subdivision and Land Development Ordinance (SALDO).

Section 94-111. Waivers

A. General

The requirements of this Ordinance are essential and shall be strictly adhered to. For any Regulated Activity where, after a close evaluation of alternative Site designs, it proves to be impracticable to meet any one or more of the mandatory minimum standards of this Ordinance on the Site, the Township may approve measures other than those in this Ordinance, subject to Subsections 94-111.B and 94-111.C.

- B. The Board of Supervisors shall have the authority to waive or modify the requirements of one or more provisions of this Ordinance if the literal enforcement will exact undue hardship because of peculiar conditions pertaining to the land in question, provided that such modification will not be contrary to the public interest and that the purpose and intent of the Ordinance is observed. Cost or financial burden shall not be considered a

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hardship. Modification may also be considered if an alternative standard or approach can be demonstrated to provide equal or better achievement of the results intended by the Ordinance. A request for modification shall be in writing and accompany the SWM Site Plan submission. The request shall state in full the grounds and facts on which the request is based, the provision or provisions of the Ordinance involved and the minimum modification necessary. The Board of Supervisors shall have the authority to impose reasonable conditions on the grant of any waiver or modification

C. PADEP Approval Required

No waiver or modification of any regulated stormwater activity involving Earth Disturbance greater than or equal to one (1) acre may be granted by the Township unless that action is approved in advance by PADEP or the Chester County Conservation District.

Section 94-112. Erroneous Permit

Any permit or authorization issued or approved based on false, misleading or erroneous information provided by an Applicant is void without the necessity of any proceedings for revocation. Any work undertaken or use established pursuant to such permit or other authorization is unlawful. No action may be taken by a board, agency, or employee of the Township purporting to validate such a violation.

ARTICLE II – DEFINITIONS

Section 94-201. Interpretation

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

- A. Words used in the present tense include the future tense; the singular number includes the plural, and the plural number includes the singular; words of masculine gender include feminine gender; and words of feminine gender include masculine gender.
- B. The word “includes” or “including” shall not limit the term to the specific example, but is intended to extend its meaning to all other instances of like kind and character.
- C. The word “person” includes an individual, partnership, public or private association or corporation, firm, trust, estate, Township, governmental unit, public utility or any other legal entity whatsoever which is recognized by law as the subject of rights and duties. Whenever used in any section prescribing or imposing a penalty, the term “person” shall include the members of a partnership, the officers, members, servants and agents of an association, officers, agents and servants of a corporation, and the officers of a Township.
- D. The words “shall” and “must” are mandatory; the words “may” and “should” are permissive.

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- E. The words “used” or “occupied” include the words “intended, designed, maintained, or arranged to be used, occupied, or maintained.”
- F. The definitions in this Ordinance are for the purposes of enforcing the provisions of this Ordinance and have no bearing on other Township regulations or ordinances.

Section 94-202. Definitions

Agricultural Activity – Activities associated with agriculture such as agricultural cultivation, agricultural operation, and animal heavy use areas. This includes the work of producing crops including tillage, plowing, disking, harrowing, planting or harvesting crops; or pasturing and raising of livestock; and installation of conservation measures. Construction of new buildings or impervious area is not considered an Agricultural Activity.

Applicant – A Landowner, developer, or other person who has filed an application to the Township for approval to engage in any Regulated Activity as defined in this Ordinance.

As-Built Plans (Drawings) – Engineering or Site plans or drawings that document the actual locations, dimensions and elevations of the improvements, and building components, and changes made to the original design plans. The final version of these documents, or a copy of same, are signed and sealed by a qualified Licensed Professional and submitted to the Township at the completion of the project, as per the requirements of Section 94-502 of this Ordinance as “final As-Built Plans”.

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

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

BMP (Best Management Practice) – Activities, facilities, designs, measures, or procedures used to manage stormwater impacts from Regulated Activities, to provide water quality treatment, infiltration, volume reduction, and/or peak rate control, to promote groundwater recharge, and to otherwise meet the purposes of this Ordinance. Stormwater BMPs are commonly grouped into one (1) of two (2) broad categories or measures: “structural” or “nonstructural.” In this Ordinance, nonstructural BMPs or measures include certain low impact development and conservation design practices used to minimize the contact of pollutants with stormwater runoff. These practices aim to limit the total volume of stormwater runoff and manage stormwater at its source by techniques such as protecting natural systems and incorporating existing landscape features. Nonstructural BMPs include, but are not limited to, the protection of sensitive and special value features such as wetlands and riparian areas, the preservation of open space while clustering and concentrating development, the reduction of impervious cover, and the disconnection of

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rooftops from storm sewers. Structural BMPs are those that consist of a physical system that is designed and engineered 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, bioretention, wet ponds, permeable paving, grassed swales, riparian buffer, sand filters, detention basins, and manufactured devices. Structural and nonstructural stormwater BMPs are permanent appurtenances to the Site. [See also Stormwater Management Facility and Stormwater Control Measure (SCM)]

Board of Supervisors-The Governing Body of East Bradford Township.

Buffer – See Riparian Buffer.

Carbonate Geology (or carbonate rock formations) – See Karst.

CFS – Cubic Feet per Second.

Channel – A natural or artificial open drainage feature that conveys, continuously or periodically, flowing water and through which stormwater flows. Channels include, but shall not be limited to, natural and man-made drainageways, swales, streams, ditches, canals, and pipes flowing partly full.

CN – Curve number.

Commonwealth – Commonwealth of Pennsylvania.

Conservation Design (CD) – A series of holistic land development design goals 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 complimentary 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; incorporation of unique natural, scenic and historic site features into the configuration of the development; 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 Chester County Conservation District.

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Conservation Plan – A plan written by a planner certified by NRCS that identifies Conservation Practices and includes site specific BMPs for agricultural plowing or tilling activities and animal heavy use areas.

Conservation Practices – Practices installed on agricultural lands to improve farmland, soil and/or water quality which have been identified in a current Conservation Plan.

Conveyance – A natural or manmade, existing or proposed Stormwater Management Facility, feature or channel used for the transportation or transmission of stormwater from one place to another. For the purposes of this Ordinance, Conveyance shall include pipes, drainage ditches, channels and swales (vegetated and other), gutters, stream channels, and like facilities or features.

Design Storm – The magnitude and temporal distribution of precipitation from a storm event measured in probability of occurrence (e.g., a five (5)-year storm) and duration (e.g., twenty-four (24) hours), used in the design and evaluation of stormwater management systems. Also see Return Period.

Detention (or To Detain) – Capture and temporary storage of runoff in a Stormwater Management Facility for release at a controlled rate.

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.

Detention Volume - The volume of runoff that is captured and released into the Waters of the Commonwealth at a controlled rate.

Developer – A person, company, or organization who seeks to undertake any Regulated Activities at a Site in the Township.

Diameter at Breast Height (DBH) – The outside bark diameter of a tree at breast height which is defined as four and one half (4.5) feet (one and thirty-seven one-hundredths of a meter (1.37 m)) above the forest floor on the uphill side of the tree.

Disturbed Area – Land area disturbed by or where an Earth Disturbance Activity is occurring or has occurred.

Drainage Area - That land area contributing runoff to a single point (including but not limited to the point/line of interest used for hydrologic and hydraulic calculations) and that is enclosed by a natural or man-made ridge line.

Earth Disturbance (or Earth Disturbance Activity) – A construction or other human activity which disturbs the surface of the land, including, but not limited to, clearing and grubbing; grading; excavations; embankments; road maintenance; land development;

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building construction; and the moving, depositing, stockpiling, or storing of soil, rock, or earth materials.

Easement – A right of use granted by a Landowner to allow a grantee the use of the designated portion of land for a specified purpose, such as for stormwater management or other drainage purposes.

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

* **Erosion and Sediment (E&S) Control Plan** – A plan required by the Conservation District or the Township to minimize accelerated erosion and sedimentation, and that must be prepared and approved per the applicable requirements.

Evapotranspiration (ET) – The combined processes of evaporation from the water or soil surface and transpiration of water by plants.

FEMA – Federal Emergency Management Agency.

Flood – A temporary condition of partial or complete inundation of land areas from the overflow of streams, rivers, and other waters of this Commonwealth.

Floodplain - Any land area susceptible to inundation by water from any natural source or delineated by applicable FEMA maps and studies as being a Special Flood Hazard Area.

Floodway - The channel of the watercourse and those portions of the adjoining floodplains that are reasonably required to carry and discharge the one hundred (100)-year flood (also called the base flood or one percent (1%) annual chance 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 floodway, it is assumed, absent evidence to the contrary, that the floodway extends from the centerline of the stream and to fifty (50) feet beyond the top of the bank of the stream on both sides.

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

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

Geotextile – A fabric manufactured from synthetic fiber that is used to achieve specific objectives, including infiltration, separation between different types of media (i.e., between soil and stone), or filtration.

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Grade/Grading – 1. (noun) A slope, usually of a road, channel, or natural ground, specified in percent and shown on plans as specified herein. 2. (verb) To finish the surface of a roadbed, the top of an embankment, or the bottom of an excavation.

Green Infrastructure – Systems and practices that use or mimic natural processes to infiltrate, evapotranspire, or reuse stormwater on the site where it is generated.

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

Groundwater Recharge – The replenishment of existing natural groundwater supplies from infiltration of rain or overland flow.

HEC-1 – The U.S. Army Corps of Engineers, Hydrologic Engineering Center (HEC) hydrologic runoff model.

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

High Tunnel - A structure which meets the following:

- A. is used for the production, processing, keeping, storing, sale or shelter of an agricultural commodity as defined in section 2 of the Act of December 19, 1974 (P.L. 973, No. 319), known as the “Pennsylvania Farmland and Forest Land Assessment Act of 1974,” or for the storage of agricultural equipment or supplies; and
- B. is constructed with all the following:
 - 1. has a metal, wood, or plastic frame;
 - 2. when covered, has a plastic, woven textile, or other flexible covering; and has a floor made of soil, crushed stone, matting, pavers, or a floating concrete slab.

Hotspots – Areas where prior or existing land use or activities can potentially generate highly contaminated runoff with concentrations of pollutants in excess of those typically found in stormwater.

Hydrologic Regime – The hydrologic system, cycle or balance that sustains the quality and quantity of stormwater, stream baseflow, storage, and groundwater supplies under natural conditions.

Hydrologic Soil Group (HSG) – A classification of soils by the Natural Resources Conservation Service (NRCS), into four (4) runoff potential groups. The groups range from A soils, which are very permeable and produce little runoff, to D soils, which are not very permeable and produce much more runoff.

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Impervious Surface – A surface that has been compacted or covered with a layer of material so that it prevents or is resistant to infiltration of water, including but not limited to: structures such as roofs, buildings, storage sheds, outdoor decks; other solid, paved, or concrete areas such as streets, driveways, sidewalks, parking lots, patios, swimming pools, tennis or other paved courts; or athletic playfields comprised of synthetic turf materials. For the purposes of determining compliance with this chapter, compacted soils or stone surfaces used for vehicle parking and movement shall be considered impervious. Uncompacted gravel areas with no vehicular traffic, such as gardens, walkways, or patio areas, shall be considered pervious per review by the Township Engineer. Surfaces that were designed to allow infiltration (i.e., pavers and areas of porous pavement) are not to be considered impervious surface if designed to function as a BMP per review by the Township Engineer. Additionally, for the purposes of determining compliance with this chapter, the total horizontal projection area of all ground-mounted and free-standing solar collectors, including solar photovoltaic cells, panels, and arrays, shall be considered pervious so long as the designs note that natural vegetative cover will be preserved and/or restored underneath the solar photovoltaic cells, panels, and arrays, and the area disturbed is planned as a vegetated pervious surface. Surfaces that were designed to allow infiltration (i.e., areas of porous pavement) will be considered on a case-by-case basis by the Township Engineer, based on appropriate documentation and condition of the material, etc.

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

Infiltration Facility – A stormwater BMP designed to collect and discharge runoff into the subsurface in a manner that allows infiltration into underlying soils and groundwater (e.g., French drains, seepage pits, or seepage trenches, etc.).

Intermittent Stream – A defined channel in which surface water is absent during a portion of the year, in response to seasonal variations in precipitation or groundwater discharge.

Invert – The lowest surface, the floor or bottom of a culvert, pipe, drain, sewer, channel, basin, BMP, or orifice.

Karst – A type of topography that is formed over limestone or other carbonate rock formations by dissolving or solution of the rock by water, and that is characterized by closed depressions, sinkholes, caves, a subsurface network of solution conduits and fissures through which groundwater moves, and no perennial surface drainage features.

Land Development – Any of the following activities:

- A. The improvement of one (1) lot or two (2) or more contiguous lots, tracts, or parcels of land for any purpose involving:
 1. A group of two (2) or more residential or nonresidential buildings, whether proposed initially or cumulatively, or a single nonresidential building on a lot or lots regardless of the number of occupants or tenure, or
 2. The division or allocation of land or space, whether initially or cumulatively, between or among two (2) or more existing or prospective occupants by means

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of, or for the purpose of, streets, common areas, leaseholds, condominiums, building groups, or other features;

- B. A subdivision of land;
- C. Development in accordance with Section 503(1.1) of the Pennsylvania Municipalities Planning Code (as amended).

Landowner – The legal or beneficial owner or owners of land including the holder of an option or contract to purchase (whether or not such option or contract is subject to any condition), a lessee if they are authorized under the lease to exercise the rights of the Landowner, or other person having a proprietary interest in the land.

Licensed Professional – A Pennsylvania Registered Professional Engineer licensed by the Pennsylvania Department of State to perform the work required by the Ordinance within the Commonwealth of Pennsylvania.

Limiting Zone – A soil horizon or condition in the soil profile or underlying strata that includes one of the following:

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

Low Impact Development (LID) – Site design approaches and small-scale stormwater management practices that promote the use of natural systems for infiltration, evapotranspiration, and reuse of rainwater. LID can be applied to new development, urban retrofits, and revitalization projects. LID utilizes design techniques that infiltrate, filter, provide evapotranspiration and store runoff close to its source. Rather than rely on costly large-scale conveyance and treatment systems, LID addresses stormwater through a variety of small, cost-effective landscape features located on-site.

MPC - Act of July 31, 1968, P.L. 805, No. 247, 53 P.S. Section 10101, et seq., as amended, the Pennsylvania Municipalities Planning Code, Act 247.

MFEMP – Mushroom Farm Environmental Management Plan.

MS4 - Municipal Separate Storm Sewer System.

Maintenance - The action taken to restore or preserve the as-built functional design of any Stormwater Management Facility or system.

NOAA - National Oceanic and Atmospheric Administration.

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New Development – Any Regulated Activity involving placement or construction of new Impervious Surface or grading over existing pervious land areas not classified as Redevelopment as defined in this Ordinance.

Nonpoint Source Pollution – Pollution that enters a water body from diffuse origins in the watershed and does not result from discernible, confined, or discrete Conveyances.

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

Nonstructural Best Management Practice (BMPs) – See Best Management Practice (BMP).

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

NRCS – Natural Resource Conservation Service (previously Soil Conservation Service, SCS), an agency of the U.S. Department of Agriculture.

PADEP – Pennsylvania Department of Environmental Protection.

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

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

PennDOT – Pennsylvania Department of Transportation.

Pennsylvania Stormwater Best Management Practices Manual (PA BMP Manual) - Document Number 363-0300-002 (December 2006, and as subsequently amended).

Pervious Surface (or Pervious Area) – Any area not defined as Impervious Surface.

Planning Commission – The Planning Commission of **East Bradford Township**.

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

Post-construction – Period after construction during which Disturbed Areas are stabilized, stormwater controls are in place and functioning, and all proposed improvements approved by the Township are completed.

Predevelopment – Ground cover conditions assumed to exist within the proposed Disturbed Area prior to commencement of the Regulated Activity for the purpose of

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calculating the Predevelopment water quality volume, infiltration volume, and peak flow rates as required in this Ordinance.

Pretreatment – Techniques employed in stormwater BMPs to provide storage or filtering, or other methods to trap or remove coarse materials and other pollutants before they enter the stormwater system, but may not necessarily be designed to meet the entire water quality volume requirements of this Ordinance.

Proposed Impervious Surface - All new, additional and replacement Impervious Surfaces.

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 - Any Regulated Activity that involves demolition, removal, reconstruction, or replacement of existing Impervious Surface(s).

Regulated Activity - Any Earth Disturbance Activity(ies) or any activity that involves the alteration or development of land in a manner that may affect stormwater runoff.

Regulated Earth Disturbance Activity – Any activity involving Earth Disturbance subject to regulation under 25 Pennsylvania Code Chapter 92.a, Chapter 102, or the Clean Streams Law.

Regulated Impervious Surface – Proposed impervious surface as part of a current proposed activity and all existing impervious surfaces installed after December 10, 2013, as part of previous activity.

Retention or To Retain – The prevention of direct discharge of stormwater runoff into surface waters or water bodies during or after a storm event by permanent containment in a pond or depression; examples include systems which discharge by percolation to groundwater, exfiltration, and/or evaporation processes and which generally have residence times of less than three (3) days.

Retention Basin – An impoundment that is designed to temporarily detain a certain amount of stormwater from a catchment area and which may be designed to permanently retain stormwater runoff from the catchment area; retention basins always contain water.

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

Return Period - The average interval, in years, within which a storm event of a given magnitude can be expected to occur one (1) time. For example, the twenty-five (25)-year return period rainfall would be expected to occur on average once every twenty-five (25)

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years; or stated in another way, the probability of a twenty-five (25)-year storm occurring in any one (1) year is four-one hundredths (0.04) (i.e., a four (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 and managed to maintain vegetation to protect the integrity of stream channels and shorelines, to reduce the impact of upland sources of pollution by trapping, filtering, and converting sediments, nutrients, and other chemicals, and to supply food, cover and thermal protection to fish and other aquatic species and wildlife.

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

SALDO – See Subdivision and Land Development Ordinance.

SCS – Soil Conservation Service, now known as the Natural Resources Conservation Service.

Sediment – Soil or other materials transported by, suspended in or deposited by surface water as a product of erosion.

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

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

Site – Total area of land in the Township where any proposed Regulated Activity, as defined in this Ordinance, is planned, conducted, or maintained or that is otherwise impacted by the Regulated Activity.

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

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 Frequency – (see Return Period).

Stormwater – Drainage runoff from the surface of the land resulting from precipitation or snow or ice melt.

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Stormwater Control Measure (SCM) – Physical features used to effectively control, minimize, and treat stormwater runoff. [See Best Management Practice (BMP)].

Stormwater Management Facility – Any feature, natural or man-made, that, due to its condition, design, or construction, conveys, stores, or otherwise affects stormwater runoff quality, rate, or quantity, including Best Management Practices and Stormwater Control Measures. Typical Stormwater Management Facilities include, but are not limited to, detention and retention basins, open channels, storm sewers, pipes, and Infiltration Facilities.

Stormwater Management Permit- A permit issued by the Township after the SWM Site Plan has been approved.

Stormwater Management (SWM) Site Plan – The plan prepared by the Applicant or its representative, in accordance with the requirements of Article IV of this Ordinance, indicating how stormwater runoff will be managed at a particular Site in accordance with this Ordinance, and including all necessary design drawings, calculations, supporting text, and documentation to demonstrate that Ordinance requirements have been met, herein referred to as “SWM Site Plan.” All references in this Ordinance to “final” or “approved” SWM Site Plans shall incorporate the approved SWM Site Plan and all subsequent approved revisions thereto.

Stream – A natural watercourse.

Structural Best Management Practices - See BMP (Best Management Practices).

Subdivision - The division or re-division of a lot, tract, or parcel of land as defined in The Pennsylvania Municipalities Planning Code, Act of July 31, 1968, P.L. 805, No. 247 (as amended).

Subdivision and Land Development Ordinance – Subdivision and Land Development ordinance of **East Bradford Township**, Chester County, PA, as amended.

Swale – An artificial or natural waterway or low-lying stretch of land that gathers and conveys stormwater or runoff, and is generally vegetated for soil stabilization, stormwater pollutant removal, and infiltration.

SWM Site Plan – See Stormwater Management Site Plan.

Timber Operations – See Forest Management.

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

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

Township-East Bradford Township, Chester County, Pennsylvania.

USDA – United States Department of Agriculture.

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

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

Waters of the Commonwealth – Any and all rivers, streams, creeks, rivulets, impoundments, ditches, watercourses, storm sewers, lakes, dammed water, wetlands, ponds, springs, and all other bodies or channels of Conveyance of surface and underground water, or parts thereof, whether natural or artificial, within or on the boundaries of the Commonwealth.

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

Wetland – Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, fens, and similar areas.

Woods - Any land area of at least one-quarter (0.25) acre with a natural or naturalized ground cover (excluding manicured turf grass) and that has an average density of two (2) or more viable trees per one thousand five hundred (1,500) square feet with a DBH of six (6) inches or greater and where such trees existed at any time within three (3) years of the time of land development application submission of the proposed project. The land area to be considered Woods shall be measured from the outer drip lines of the outer trees.

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ARTICLE III – STORMWATER MANAGEMENT STANDARDS

Section 94-301. General Requirements

- A. Any person or entity intending to engage in a Regulated Activity shall, prior to commencing the Regulated Activity, apply for and obtain a Stormwater Management Permit and comply with the requirements of this Ordinance. An application for a Stormwater Management Permit and a SWM Site Plan approval shall be submitted on a form prescribed by the Township accompanied by the required fee. Prior to the commencement of any of the Regulated Activities in the Township set forth under Section 94-105 which are not exempt under Section 94-106, a Stormwater Management Permit and a Stormwater Management Site Plan (SWM Site Plan) must be approved in writing by the Township. SWM Site Plans approved by the Township shall be on Site throughout the duration of the Regulated Activity
- B. The stormwater management and runoff control criteria and standards in this Ordinance shall apply to the total proposed Regulated Activity, even if it is to take place in stages. The measurement of Impervious Surfaces shall include all of the Impervious Surfaces in the total proposed Regulated Activity even if the development is to take place in stages.
- C. No Regulated Activity within the Township shall commence until:
 - 1. The Township issues The Stormwater Management Permit and approval of a SWM Site Plan, which demonstrates compliance with the requirements of this Ordinance; and
 - 2. The Applicant has received a letter of adequacy or approval for the Erosion and Sediment Control Plan review by the Township and the Conservation District (if required), and has received all other local, State and Federal permit approvals required for the project involving the Regulated Activity.
- D. Neither submission of an SWM Site Plan under the provisions herein nor compliance with the provisions of this Ordinance shall relieve any person from responsibility for damage to any person or property otherwise imposed by law.
- E. The Applicant shall design the Site to minimize disturbances to land, Site hydrology, and natural resources, and to maintain the natural hydrologic regime, drainage patterns and flow conditions. The Applicant shall apply the procedures set forth in Section 94-304 for the overall Site design and for selection, location and design of features and BMPs to be used to comply with the requirements of this Ordinance.
- F. To the maximum extent practicable, Post-construction stormwater shall be discharged within the drainage area of the same stream or water body receiving the runoff prior to construction of the proposed Regulated Activity.

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- G. For Regulated Activities with one (1) acre or more of proposed Earth Disturbance, existing drainage peak rate discharges up to and including the one-hundred-year storm and the volume of runoff up to and including the two-year-storm onto or through adjacent property(ies) or downgradient property(ies), including diffuse drainage discharge, shall not be altered in any manner by Regulated Activities under this Part without written permission from, and, where applicable as determined by the Township, an easement and agreement with, the affected landowner(s) for conveyance of discharges onto or through their property(ies). Altered stormwater discharges shall be subject to any applicable discharge criteria specified in this chapter.
- H. Areas located outside of the Site (i.e., areas outside of the Regulated Activity) that drain through a proposed Site are not subject to water quality and volume control, infiltration, stream channel protection, or peak flow rate control requirements (as presented in Sections 94-305, 94-306, 94-307, and 94-308). Drainage facilities located on the Site shall be designed to safely convey flows from outside of the Site through the Site.
- I. If Site conditions preclude capture of runoff from limited portions of the Disturbed Area for achieving water quality volume control standards, stream channel protection standards, and the 2-year, 5-year and 10-year storm event peak runoff rate reduction standards for New Development required by this Ordinance, the Applicant shall propose alternate methods to mitigate the bypass of the BMPs, subject to the approval of the Township Engineer. In no case shall resulting peak rate be greater than the Pre-development peak rate for the equivalent design storm.
- J. For all Regulated Activities, erosion and sediment control BMPs shall be designed, implemented, operated, and maintained during the Regulated Activities (i.e., during construction) as required to meet the purposes and requirements of this Ordinance, to meet the erosion and sediment control requirements of the Township, if applicable, and to meet all requirements under Title 25 of the PA Code and the Clean Streams Law.
- K. For all Regulated Activities, permanent BMPs and Conveyances shall be designed, implemented, operated, and maintained to meet the purposes and requirements of this Ordinance and to meet all requirements under Title 25 of the Pennsylvania Code, the Clean Streams Law, and the Storm Water Management Act.
- L. The design of all BMPs and Conveyances shall incorporate sound engineering principles and practices in a manner that does not aggravate existing stormwater problems as identified by the Township. The Township reserves the right to disapprove any design that would result in construction in an area affected by existing stormwater problem(s) or continuation of an existing stormwater problem(s).
- M. Existing wetlands, either on the Site or on an adjacent property, shall not be used to meet the minimum design requirements for stormwater management or stormwater runoff quality treatment. Stormwater discharges to existing wetlands shall not degrade the quality or hydrologic integrity of the wetland.

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N. Hotspots Runoff Controls –

Specific structural or pollution prevention practices may be required, as determined to be necessary by the Township Engineer, to pretreat runoff from Hotspots prior to infiltration. Following is a list of examples of Hotspots:

1. Vehicle salvage yards and recycling facilities;
2. Vehicle fueling stations;
3. Vehicle service and maintenance facilities;
4. Vehicle and equipment cleaning facilities;
5. Fleet storage areas (bus, truck, etc.);
6. Industrial sites based on Standard Industrial Classification Codes;
7. Marinas (service and maintenance areas);
8. Outdoor liquid container storage;
9. Outdoor loading/unloading facilities;
10. Public works storage areas;
11. Facilities that generate or store hazardous materials;
12. Commercial container nursery;
13. Contaminated sites/brownfields;
14. Other land uses and activities as designated by the Township.

O. Contaminated and Brownfield Sites -

Where BMPs may contribute to the migration of contaminants in groundwater, the water quality and runoff volume, stream channel protection, and peak rate control standards shall be met; however, at the Township Engineer's discretion, the minimum infiltration requirement may be reduced or eliminated commensurate with the contaminated area and the required water quality and runoff control measures may be increased to mitigate the reduced infiltration requirement for the contaminated area.

P. Additional Water Quality Requirements -

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The Township may require additional stormwater control measures for stormwater discharges to special management areas including, but not limited to:

1. Water bodies listed as “impaired” by PADEP.
 2. Any water body or watershed with an approved Total Maximum Daily Load (TMDL).
 3. Areas of known existing flooding problems.
 4. Critical areas with sensitive resources (e.g., State designated special protection waters, cold water fisheries, carbonate geology or other groundwater recharge areas that may be highly vulnerable to contamination, drainage areas to water supply reservoirs, etc.).
- Q. Applicants shall utilize the *Pennsylvania Stormwater Best Management Practices Manual* (PA BMP Manual), as amended, or other sources acceptable to the Township Engineer, for testing and design standards for BMPs, and where there is a conflict with the provisions of this Ordinance, the most restrictive applies.
- R. For areas underlain by karst or carbonate geology that may be susceptible to the formation of sinkholes and other karst features, the location, type, and design of infiltration BMPs shall be based on a Site evaluation conducted by a qualified Licensed Professional and based on the PA BMP Manual (as amended) or other design guidance acceptable to the Township Engineer.
- S. All Regulated Activities located within a Special Flood Hazard Area designated by the Federal Emergency Management Agency (FEMA) shall comply with section 115-42 of the Zoning Ordinance and 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.
- T. Disturbance of existing ground cover during construction of the proposed Regulated Activity is prohibited within fifty (50) feet of top-of-bank of all perennial and intermittent waterways, water bodies (lakes, ponds, etc.) and wetlands, except for activities otherwise approved by State or local agencies (e.g., stream restoration projects, road crossings, subsurface utility projects, etc.). At the Township Engineer’s discretion, and with Conservation District and PADEP approval where necessary, the non-disturbance buffer may be reduced because of setback or other Site constraints, but never be less than ten (10) feet.
- U. Applicant shall demonstrate compliance with section 115-45.3 of the Zoning Chapter.

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Section 94-302. Permit Requirements by Other Governmental Entities

The following permit or other regulatory requirements may apply to certain Regulated Activities and shall be met prior to (or as a condition of) final approval by the Township of the SWM Site Plan and prior to commencement of any Regulated Activities, as applicable:

- A. All Regulated Activities subject to permit or regulatory requirements by PADEP under regulations at Title 25 Pennsylvania Code Chapter 102, or erosion and sediment control requirements of the Township.
- B. Work within natural drainage ways subject to permit by PADEP under Title 25 Pennsylvania Code Chapter 105.
- C. Any BMP or Conveyance that would be located in or adjacent to surface Waters of the Commonwealth, including wetlands, subject to permit by PADEP under Title 25 Pennsylvania Code Chapter 105.
- D. Any BMP or Conveyance that would be located on or discharge to a State highway right-of-way, or require access to or from a State highway and be subject to approval by PennDOT.
- E. Culverts, bridges, storm sewers, or any other facilities which must pass or convey flows from the tributary area and any facility which may constitute a dam subject to permit by PADEP under Title 25 Pennsylvania Code Chapter 105.

Section 94-303. Erosion and Sediment Control

- A. No Regulated Activity within the Township shall commence until:
 - 1. The Township receives documentation that the Applicant has received:
 - a. A “letter of adequacy” from the Conservation District or other approval from PADEP in compliance with Title 25 Chapter 102 of the Pennsylvania Code of an Erosion and Sediment Control Plan for construction activities for projects where the area of disturbance equals or exceeds one (1) acre, where pond dredging is involved, or when the disturbance is associated with activities described under Title 25, Chapter 105 of the Pennsylvania Code permits.;
 - b. A PADEP NPDES Permit for Stormwater Discharges Associated with Construction Activities as required under Title 25 Pennsylvania Code Chapter 92.a, if applicable;
 - c. Evidence of any other permit(s) or approvals required for the Regulated Activities; and

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2. An Erosion and Sediment Control Plan has been approved by the Township, if required.
- B. A copy of the Erosion and Sediment Control Plan and any required permit(s), as required by PADEP regulations, shall be available on the Site at all times.
- C. Additional erosion and sediment control measures shall be applied where infiltration BMPs are proposed, at a minimum including those required in Subsection 96-306.M.

Section 94-304. Site Design Process

The Applicant shall design the Site to minimize the disturbances to land, Site hydrology, and natural resources, and to maintain the natural hydrologic regime, drainage patterns and flow conditions. The Applicant shall demonstrate in its SWM Site Plan (as required in Subsection 94-402.C that the design sequence, objectives and techniques described below were applied to the maximum extent practicable in the Site design of the Regulated Activity while complying with all other requirements of this Ordinance. The Site design shall:

- A. First, identify and delineate all existing natural resources and natural and man-made hydrologic features listed in Subsection 94-402.B.8 that are located within the Site, or receive discharge from, or may be impacted by the proposed Regulated Activity.
- B. Second, provide a prioritized listing of these resources and features to identify:
 1. Those to be incorporated into the Site design in a manner that provides protection from any disturbance or impact from the proposed Regulated Activity;
 2. Those to be protected from further disturbance or impact but for which the proposed Regulated Activity will provide improvement to existing conditions;
 3. Those that can be incorporated into and utilized as components of the overall Site design in a manner that protects or improves their existing conditions while utilizing their hydrologic function within the limits of their available capacity (e.g., for infiltration, evapotranspiration, or reducing pollutant loads, runoff volume or peak discharge rates, etc.) to reduce the need for or size of constructed BMPs; and
 4. Those that may be considered for alteration, disturbance or removal.
- C. Third, develop the Site design to achieve the following:
 1. Recognize and incorporate the priorities identified in Section 94-304.B as the basis for the proposed Site layout, grading, construction, and permanent ground cover design;
 2. Minimize Earth Disturbance (both surface and subsurface);

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3. Maximize protection of or improvement to natural resources and special management areas;
4. Minimize the disturbance of natural Site hydrology, in particular natural drainage features and patterns, discharge points and flow characteristics, natural infiltration patterns and characteristics, and natural channel and floodplain conveyance capacity;
5. Incorporate natural hydrologic features and functions identified in Subsection 94-304.B into the Site design to protect and utilize those features and their hydrologic functions to reduce the need for or size of constructed BMPs;
6. Maximize infiltration and the use of natural Site infiltration features, patterns and conditions, and evapotranspiration features;
7. Apply selective grading design methods to provide final grading patterns or preserve existing topography in order to evenly distribute runoff and minimize concentrated flows;
8. Minimize the cumulative area to be covered by Impervious Surfaces and:
 - a. Minimize the size of individual Impervious Surfaces,
 - b. Separate large Impervious Surfaces into smaller components,
 - c. Disconnect runoff from one Impervious Surface to another, and
 - d. Utilize porous materials in place of impervious wherever practicable;
9. Minimize the volume and peak discharge rates of stormwater generated;
10. Avoid or minimize stormwater runoff pollutant loads and receiving stream channel erosion;
11. Locate infiltration and other BMPs:
 - a. At or as near to the source of generation as possible, and
 - b. At depths that are as shallow as possible;
12. Prioritize the selection and design of BMPs as follows:
 - a. Nonstructural and vegetation BMPs, then
 - b. Structural (surface and subsurface) BMPs;

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13. For flow volumes requiring conveyance from the source of generation to a BMP for management, give preference to open channel conveyance techniques that provide infiltration and water quality benefits, and landscaped-based management in common open space areas, where practicable; and
 14. Consider additional guidance for incorporating natural hydrology into the Site and BMP designs, methods and techniques that support the objectives of Subsections 94-304.B and 94-304.C. Appendix A presents additional discussion of “Conservation Design” and “Low Impact Development.”
- D. The procedures set forth above shall be utilized to the maximum extent practicable for the overall Site design and selection, location and design of features and BMPs to be used to comply with the requirements of Sections 94-305, 94-306, 94-307 and 94-308.

Section 94-305. Water Quality and Runoff Volume Requirements

To control Post-construction stormwater impacts from Regulated Activities and meet State water quality requirements, BMPs shall be provided in the Site design that replicate Predevelopment stormwater infiltration and runoff conditions, such that Post-construction stormwater discharges do not degrade the physical, chemical, or biological characteristics of the receiving waters. The green infrastructure and Low Impact Development (LID) practices provided in the PA BMP Manual, as well as the guidance on green infrastructure, LID and Conservation Design (CD) provided in Appendix A, shall be utilized for all regulated activities wherever possible. The Applicant shall comply with the following water quality and runoff volume requirements for all Regulated Activities, including all New Development and Redevelopment activities:

- A. The Post-construction total runoff volume shall not exceed the Predevelopment total runoff volume for all storms equal to or less than the two (2)-year, twenty-four (24)-hour duration precipitation (design storm). The water quality and runoff volume to be managed shall consist of any runoff volume generated by the proposed Regulated Activity over and above the Predevelopment total runoff volume and shall be captured and permanently retained or infiltrated on the Site. Permanent retention options may include, but are not limited to, reuse, evaporation, transpiration, and infiltration.
- B. For modeling purposes, the Predevelopment ground cover conditions shall be determined using the corresponding ground cover assumptions presented in Subsection 94-309.D of this Ordinance.
- C. The design of the Stormwater Management Facility outlet shall provide for protection from clogging and unwanted sedimentation.
- D. BMPs that moderate the temperature of stormwater shall be used to protect the temperature of receiving waters. The Applicant shall fulfill the requirements of the PADEP “Thermal Impact Analysis” for the “PAG-02 Stormwater Discharges

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Associated with Construction Activities, NOI for Coverage under General or Individual Permit” if they cannot meet the volume control requirements.

- E. Water quality improvement shall be achieved in conjunction with achieving the infiltration requirements of Section 94-306. The infiltration volume required under Section 94-306 may be included as a component of the water quality volume. If the calculated water quality and runoff volume is greater than the volume infiltrated, then the difference between the two (2) volumes shall be managed for water quality and runoff volume control through other techniques or practices but shall not be discharged from the Site.
- F. Runoff from the Disturbed Area shall be treated for water quality prior to entering existing waterways or water bodies. If a stormwater management practice does not provide water quality treatment, then water quality BMPs shall be utilized to provide pre-treatment prior to the runoff entering the stormwater management practice.
- G. The Township may require additional water quality and runoff control measures for stormwater discharging to special management areas such as those listed in Subsection 94-301.P.
- H. When the Regulated Activity contains or is divided by multiple drainage areas, the water quality and runoff volume shall be separately addressed for each drainage area.
- I. Weighted averaging of runoff coefficients shall not be used for manual computations or input data for water quality and runoff volume calculations.
- J. Areas located outside of the Site (i.e., areas outside of the Regulated Activity) may be excluded from the calculation of the water quality and runoff volume requirements.
- K. Water quality and volume control practices shall be selected and designed to meet the criteria of Subsection 94-304.C that apply to water quality and volume control.
- L. Evapotranspiration may be quantified and credited towards meeting volume requirements according to the PADEP Post Construction Stormwater Management (PCSM) Spreadsheet and Instructions (December 2020) or the most recent guidance from PADEP.

Section 94-306. Infiltration Requirements

Providing for infiltration consistent with the natural hydrologic regime is required to compensate for the reduction in the recharge that occurs when the ground surface is disturbed or Impervious Surface is created or expanded. The Applicant shall achieve the following infiltration requirements:

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- A. For Regulated Activities involving both New Development and Redevelopment, infiltration shall be designed to accommodate the entire water quality and runoff volume required in § 9-305. Infiltration BMPs shall be consistent with the design and infiltration period guidelines included in the PA BMP Manual or other PA DEP design guidance. If the runoff volume required by § 9-305 cannot be infiltrated, then alternative methods consistent with the PA BMP Manual (as amended) or other PA DEP guidance, such as the Managed Release Concept, may be used to manage this volume with approval from the Township Engineer.
- B. For Regulated Activities involving both New Development and Redevelopment, the volume of a minimum of one (1)-inch of runoff from all Regulated Impervious Surfaces shall be infiltrated.
- C. [This paragraph left blank intentionally.]
- D. If the requirements of Subsection 306.A or 306.B cannot be physically accomplished, then the Applicant shall be responsible for demonstrating with data or calculations to the satisfaction of the Township Engineer why this infiltration volume cannot be physically accomplished on the Site (e.g., shallow depth to bedrock or limiting zone, open voids, steep slopes, etc.) and what alternative volume can be infiltrated.
- E. Only if a minimum infiltration of the first one-half (0.5) inch of runoff volume cannot be physically accomplished on the site, shall a waiver from § 9-306 be considered by the Township, in accordance with § 94-111.
- F. If Site conditions preclude capture of runoff from portions of the Impervious Surfaces, the infiltration volume for the remaining area shall be increased an equivalent amount to offset the loss.
- G. When a project contains or is divided by multiple watersheds, the infiltration volume shall be separately addressed for each watershed.
- H. Existing Impervious Surfaces located in areas outside of the Site (i.e., outside of the Regulated Activity) may be excluded from the calculation of the required infiltration volume.
- I. A detailed soils evaluation of the Site shall be conducted by a qualified professional and at a minimum shall address soil permeability, depth to bedrock, and subgrade stability. The general process for designing the infiltration BMP shall be conducted by a qualified Licensed Professional and shall be consistent with the PA BMP Manual (as amended) (or other guidance acceptable to the Township Engineer) and in general shall:
 - 1. Analyze hydrologic soil groups as well as natural and man-made features within the Site to determine general areas of suitability for infiltration practices. In areas where development on fill material is under consideration, conduct geotechnical

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investigations of sub-grade stability; infiltration may not be ruled out without conducting these tests.

2. Provide field tests such as double ring infiltrometer or other hydraulic conductivity tests (at the elevation of the proposed infiltration surface) to determine the appropriate hydraulic conductivity rate. Standard septic/sewage percolation tests are not acceptable for design purposes.
 3. Design the Infiltration Facility for the required retention (infiltration) volume based on field-determined infiltration capacity (and apply safety factor as per applicable design guidelines) at the elevation of the proposed infiltration surface.
 4. On-lot infiltration features are encouraged; however, it shall be demonstrated to the Township Engineer that the soils are conducive to infiltration on the identified lots.
- J. Infiltration BMPs shall be selected based on suitability of soils and Site conditions and shall be constructed on soils that have the following characteristics:
1. A minimum depth of twenty-four (24) inches between the bottom of the BMP and the top of the Limiting Zone. Additional depth may be required in areas underlain by karst or carbonate geology (see Subsection 94-306.N).
 2. An infiltration rate sufficient to accept the additional stormwater volume and drain completely as determined by field tests conducted by the Applicant.
 3. The Infiltration Facility shall completely drain the retention (infiltration) volume within three (3) days (seventy-two (72) hours) from the end of the design storm.
- K. All infiltration practices shall:
1. Be selected and designed to meet the criteria of Subsection 94-304.C that are applicable to infiltration;
 2. Be set back at least 25 feet from all buildings and features with sub-grade elements (e.g., basements, foundation walls, etc.), unless otherwise approved by the Township Engineer.
 3. Be set back at least 10 feet from property lines and right of way boundaries.
 4. For any infiltration practice that collects runoff from shared or multiple features and that is located within 25 feet of a building or feature with sub-grade elements (e.g., basements, foundation walls, etc.), the bottom elevation shall be set below the elevation of the sub-grade element.

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- L. Infiltration Facilities shall be located to avoid introducing contaminants to groundwater by adhering to the following practices:
1. When a Hotspot is located in the area draining to a proposed Infiltration Facility, an evaluation of the potential of groundwater contamination from the proposed Infiltration Facility shall be performed, including a hydrogeologic investigation (if necessary) by a qualified Licensed Professional to determine what, if any, pre-treatment or additional design considerations are needed to protect groundwater quality.
 2. When located within a “well head protection area” of a public water supply well, infiltration practices shall be in conformance with the applicable approved source water protection assessment or source water protection plan.
 3. The Applicant shall provide appropriate safeguards against groundwater contamination for land uses that may cause groundwater contamination should there be a mishap or spill.
- M. 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 to the Township Engineer for review. All areas designated for infiltration shall not receive runoff until the contributory drainage area has achieved final stabilization.
- N. Consideration of infiltration BMPs for areas underlain by karst or carbonate geology is encouraged, but only where the design, supporting calculations, results of soils or other Site investigations or other documentation are provided to the Township demonstrating that the potential or likelihood of subsidence or sinkholes is minimal. Evaluation of Site conditions and infiltration design shall rely on guidance in the PA BMP Manual (as amended) or other guidance acceptable to the Township Engineer.
- O. 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.
- P. 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.

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- Q. 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.
- R. All infiltration practices shall have appropriate positive overflow controls.
- S. No sand, salt or other particulate matter may be applied to a porous surface material for winter ice conditions.
- T. The following procedures and materials shall be required during the construction of all subsurface facilities:
 - 1. Excavation for the Infiltration Facility shall be performed with equipment that will not compact the bottom of the seepage bed/trench or like facility.
 - 2. The bottom of the bed and/or trench shall be scarified prior to the placement of aggregate.
 - 3. Only clean aggregate with documented porosity, free of fines, shall be allowed.
 - 4. The tops, bottoms and sides of all seepage beds, trenches, or like facilities shall be covered with drainage fabric. Fabric shall be non-woven fabric acceptable to the Township Engineer.
 - 5. Stormwater shall be distributed throughout the entire seepage bed/trench or like facility and provisions for the collection of debris shall be provided in all facilities.

Section 94-307. Stream Channel Protection Requirements

For Regulated Activities involving New Development with one (1) or more acres of Earth Disturbance, the Applicant shall comply with the following stream channel protection requirements to minimize stream channel erosion and associated water quality impacts to the receiving waters:

- A. The peak flow rate of the Post-construction two (2)-year, twenty-four (24)-hour design storm shall be reduced to the Predevelopment peak flow rate of the one (1)-year, twenty-four (24)-hour duration precipitation, using the SCS Type II distribution.
- B. To the maximum extent practicable, and unless otherwise approved by the Township Engineer, the Post-construction one (1)-year, twenty-four (24)-hour storm flow shall be detained for a minimum of twenty-four (24) hours and a maximum not to exceed seventy-two (72) hours from a point in time when the maximum volume of water from the one (1)-year, twenty-four (24)-hour storm is stored in a proposed BMP (i.e., when the maximum water surface elevation is achieved in the facility). Release of water can

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begin at the start of the storm (i.e., the invert of the orifice is at the invert of the proposed BMP).

- C. For modeling purposes, the Predevelopment ground cover conditions shall be determined using the corresponding ground cover assumptions presented in Subsection 94-309.D of this Ordinance.
- D. The minimum orifice size in the outlet structure to the BMP shall be three (3) inches in diameter unless otherwise approved by the Township Engineer, and a trash rack shall be installed to prevent clogging. For Sites with small drainage areas contributing to the BMP that do not provide enough runoff volume to allow a twenty-four (24) hour attenuation with the three (3)-inch orifice, the calculations shall be submitted showing this condition.
- E. When the calculated orifice size is below three (3) inches, gravel filters (or other methods) are recommended to discharge low-flow rates subject to the Township Engineer's satisfaction. When filters are utilized, maintenance provisions shall be provided to ensure filters meet the design function.
- F. All proposed Stormwater Management Facilities shall make use of measures to extend the flow path and increase the travel time of flows in the facility.
- G. When a Regulated Activity contains or is divided by multiple drainage areas, the peak flow rate control shall be separately addressed for each drainage area.

Section 94-308. Stormwater Peak Rate Control Requirements

The Applicant shall comply with the following peak flow rate control requirements for all Regulated Activities including those that involve New Development and Redevelopment.

- A. Post-construction peak flow rates from any Regulated Activity shall not exceed the Predevelopment peak flow rates as shown for each of the design storms specified in Table 94-308.1, except that the Predevelopment Design Storm for New Development Regulated Activities shall be 2-year (as opposed to 1-year) for the 2-year Postconstruction Design Storm where Type A soils (as classified by the United States Department of Agriculture, Natural Resources Conservation Service) are present.

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**TABLE 94-308.1
Peak Rate Control Standards**

**(Peak Flow Rate of the Post-construction Design Storm
Shall be Reduced to the Peak Flow Rate of the Corresponding Predevelopment
Design Storm Shown in the Table)**

POST-CONSTRUCTION DESIGN STORM FREQUENCY (24-Hour Duration)	PREDEVELOPMENT DESIGN STORM	
	New Development Regulated Activities	Redevelopment Regulated Activities
2-Year	1-Year	2-Year
5-Year	5-Year	5-Year
10-Year	10-Year	10-Year
25-Year	25-Year	25-Year
50-Year	50-Year	50-Year
100-Year	100-Year	100-Year

- B. For modeling purposes, the Predevelopment ground cover conditions shall be determined using the corresponding ground cover assumptions presented in Subsection 94-309.D of this Ordinance.
- C. For Regulated Activities involving only Redevelopment, no peak flow rate controls are required when and **only if** the total Regulated Impervious Surface area is at least twenty percent (20%) less than the total existing Impervious Surface area to be disturbed by the Regulated Activity. In all cases where this requirement is not met, the Redevelopment Regulated Activity shall achieve the peak flow rate controls presented in Table 94-308.1, using the Redevelopment Ground Cover Assumptions presented in Subsection 94-309.D. This design criterion for Redevelopment is only permitted with approval of the Township Engineer. It shall result in no impact on downstream properties.
- D. Only the area of the proposed Regulated Activity shall be subject to the peak flow rate control standards of this Ordinance. Undisturbed areas for which the discharge point has not changed are not subject to the peak flow rate control standards.
- E. Areas located outside of the Site (i.e., areas outside of the Regulated Activity) that drain through a proposed Site are not subject to peak flow rate control requirements. Drainage facilities located on the Site shall be designed to safely convey flows from outside of the Site through the Site.
- F. When a Regulated Activity contains or is divided by multiple drainage areas, the peak flow rate controls shall be separately addressed for each drainage area.
- G. The effect of structural and non-structural stormwater management practices implemented as part of the overall Site design may be taken into consideration when calculating total storage volume and peak flow rates.

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Section 94-309. Calculation Methodology

- A. Stormwater runoff from all Regulated Activity Sites with a drainage area of greater than five (5) acres shall be calculated using a generally accepted calculation technique(s) that is based on the NRCS Soil Cover Complex Method. Table 94-309.1 summarizes acceptable computation methods. The method selected for use shall be based on the individual limitations and suitability of each method for a particular Site.

TABLE 94-309.1

**ACCEPTABLE COMPUTATION METHODOLOGIES FOR
SWM SITE PLAN**

METHOD	DEVELOPED BY	APPLICABILITY
TR-20 (or commercial computer package based on TR-20)	USDA NRCS	Applicable where use of full hydrology computer model is desirable or necessary.
TR-55 (or commercial computer package based on TR-55)	USDA NRCS	Applicable for land development plans where limitations described in TR-55 are met.
HEC-1/ HEC-HMS	US Army Corps of Engineers	Applicable where use of a full hydrologic computer model is desirable or necessary.
Other Methods	Varies	Other computation methodologies approved by the Township.

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- B. All calculations using the Soil Cover Complex Method shall use the appropriate design rainfall depths for the various return period storms consistent with this Ordinance. Rainfall depths used shall be obtained from the latest version of the Precipitation-Frequency Atlas of the United States, National Oceanic and Atmospheric Administration (NOAA), National Weather Service, Hydrometeorological Design Studies Center, Silver Spring, Maryland (NOAA Atlas 14) values consistent with a partial duration series. When stormwater calculations are performed for routing procedures or infiltration, water quality and runoff volume functions, the duration of rainfall shall be twenty-four (24) hours.
- C. The Applicant shall utilize the following ground cover assumptions for all Predevelopment water quality and runoff volume, infiltration volume and peak flow rate calculations:
1. For Regulated Activities involving New Development, the following ground cover assumptions shall be used:
 - a. For areas that are Woods (as defined in Article II of this Ordinance), Predevelopment calculations shall assume ground cover of “Woods in good condition”.
 - b. For all other areas (including all Impervious Surfaces), Predevelopment calculations shall assume ground cover of “meadow”.
 2. For Regulated Activities involving Redevelopment, the following ground cover assumptions shall be used:
 - a. For areas that are Woods (as defined in Article II of this Ordinance), Predevelopment calculations shall assume ground cover of “Woods in good condition”.
 - b. For areas that are not Woods or not Impervious Surfaces, Predevelopment calculations shall assume ground cover of “meadow”.
 - c. For areas that are Impervious Surfaces, Predevelopment calculations shall assume at least twenty percent (20%) of the existing Impervious Surface area to be disturbed as “meadow” ground cover.
 3. The Applicant shall determine which stormwater standards apply to the proposed Regulated Activity as follows:
 - a. Stormwater standards for New Development shall apply to all proposed Regulated Activities that involve only New Development activities as defined in this Ordinance.
 - b. Stormwater standards for Redevelopment shall apply to all proposed Regulated

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Activities that involve only Redevelopment activities as defined in this Ordinance.

- c. At the discretion of the Township Engineer, Regulated Activities that involve a combination of both New Development and Redevelopment activities, as defined in this Ordinance, may either:
 - i. Apply the stormwater standards (Redevelopment or New Development) that are associated with the activity that involves the greatest amount of land area; or
 - ii. Apply the Redevelopment and New Development stormwater standards to the corresponding Redevelopment and New Development portions of the proposed Regulated Activity.
- E. Runoff curve numbers (CN) for both Predevelopment and proposed (Post-construction) conditions to be used in the Soil Cover Complex Method shall be obtained from Table B-1 in Appendix B of this Ordinance.
- F. Runoff coefficients (C) for both Predevelopment and proposed (Post-construction) conditions for use in the Rational Method shall be obtained from Table B-2 in Appendix B of this Ordinance.
- G. Weighted averaging of runoff coefficients shall not be used for manual computations or input data for water quality and runoff volume calculations.
- H. Hydraulic computations to determine the capacity of pipes, culverts, and storm sewers shall be consistent with methods and computations contained in the Federal Highway Administration Hydraulic Design Series Number 5 (Publication No. FHWA-NHI-01-020 HDS No. 5, as amended). Hydraulic computations to determine the capacity of open channels shall be consistent with methods and computations contained in the Federal Highway Administration Hydraulic Engineering Circular Number 15 (Publication No. FHWA-NHI-05-114 HEC 15, as amended). Values for Manning's roughness coefficient (n) shall be consistent with Table B-3 in Appendix B of the Ordinance.
- I. Runoff calculations shall include the following assumptions:
 - 1. Average antecedent moisture conditions (for the Soil Cover Complex Method only for example, TR-55, TR-20).
 - 2. A type II distribution storm (for the Soil Cover Complex Method only for example, TR-55, TR-20).

Section 94-310. Other Requirements

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- A. Any BMP intended to hold standing water for four (4) days or longer shall be designed to incorporate biologic controls consistent with the West Nile Guidance found in Appendix C, PADEP document 363-0300-001 “Design Criteria – Wetlands Replacement/Monitoring” (as amended), (or contact the Pennsylvania State Cooperative Wetland Center or the Penn State Cooperative Extension Office for design information.)
- B. Any stormwater basin required or regulated by this Ordinance designed to store runoff and requiring a berm or earthen embankment shall be designed to provide an emergency spillway to safely convey flow up to and including the one hundred (100)-year proposed conditions. The height of embankment shall provide a minimum (1.0) foot of Freeboard above the maximum pool elevation computed when the facility functions for the one hundred (100)-year proposed conditions inflow. Should any BMP require a dam safety permit under PA Chapter 105 regulations, the facility shall be designed in accordance with and meet the regulations of PA Chapter 105 concerning dam safety. PA Chapter 105 may require the safe conveyance of storms larger than one hundred (100)-year event.
- C. Any drainage Conveyance facility and/or channel not governed by PA Chapter 105 regulations shall be designed to convey, without damage to the drainage facility or roadway, runoff from the twenty-five (25)-year storm event. Larger storm events (fifty (50)-year and one hundred (100)-year storms) shall also be safely conveyed in the direction of natural flow without creating additional damage to any drainage facilities, nearby structures, or roadways.
- D. Conveyance facilities to or exiting from Stormwater Management Facilities (i.e., detention basins) shall be designed to convey the design flow to or from the facility.
- E. Roadway crossings or structures located within designated floodplain areas shall be able to convey runoff from a 100-year design storm consistent with Federal Emergency Management Agency National Flood Insurance Program – Floodplain Management Requirements.
- F. Any Stormwater Management Facility located within a PennDOT right-of-way shall comply with PennDOT minimum design standards and permit submission and approval requirements.
- G. Adequate erosion protection and energy dissipation shall be provided along all open channels and at all points of discharge. Design methods shall be consistent with the Federal Highway Administration Hydraulic Engineering Circular Number 11 (Publication No. FHWA-IP-89-016, as amended) and the PADEP Erosion and Sediment Pollution Control Program Manual (Publication No. 363-2134-008, as amended), or other design guidance acceptable to the Township Engineer.

Section 94-311. Other Conveyance and System Design Standards

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- A. The Township has obtained a Phase II individual national pollutant discharge elimination system permit for operation of small municipal separate storm sewer systems (MS-4) from the Pennsylvania Department of Environmental Protection (PaDEP). In the event of design criteria conflict between this chapter and the PaDEP Ordinance, the more stringent requirement shall apply; and in the event of a dispute in this regard, the Township Engineer's determination shall be final.
1. While some minor modification of internal drainage areas will be considered in the development process, the relocation of substantial areas from one internal drainage area to another will not be acceptable.
 2. The stormwater management calculations for postdeveloped conditions (runoff curve number concentration times, etc.) shall assume the following:
 - a. Residential subdivision by right (conventional):
 - i. The maximum impervious coverage allowed by zoning will be constructed on each individual lot if the lot is less than 1 acre in area. If the lot is greater than or equal to 1 acre in area, the lot development shall be assumed to be the maximum permitted by zoning for a 1 acre lot.
 - ii. The maximum amount of woodland removal allowed by zoning will be from each lot and converted to lawn or impervious surfaces as proposed.
 - iii. The woodland underbrush and forest litter are removed from all woodland areas not permitted to be removed on each lot.
 - b. Residential subdivision by conditional use (open space development option):
 - i. The maximum impervious coverage allowed by zoning will be constructed on the entire original tract(s).
 - ii. The maximum amount of woodland removal permitted by zoning will be removed from the original tract(s) and converted to lawn or impervious surfaces as proposed.
 - iii. The woodland underbrush and forest litter will be removed from all woodland areas not permitted to be removed that are also located on individual postdeveloped lots.
 - c. Commercial, industrial, institutional and other types of nonresidential development:
 - i. The maximum impervious coverage allowed by zoning will be constructed on the entire original tract(s).

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- ii. The maximum amount of woodland removal permitted by zoning will be removed from the original tract(s) and converted to lawn or impervious surfaces as proposed.

3. Basins.

- a. Basins shall be installed prior to any earthmoving or land disturbance which they will serve. The phasing of their construction shall be noted in the narrative and on the plan. Allowance must be made in designs for sediment storage and sediment removal during and after construction. Stormwater Management Facilities must be returned to a one-hundred-percent capacity when construction activities are complete.
- b. Detention basins shall be designed to utilize the natural contours of the land. When such design is not feasible, the construction of the basin shall utilize slopes as shallow as possible to blend the structures into the existing topography. The use of multiple-detention facilities, which are small and less intrusive on the site, shall be used to meet the requirements of this subsection.
- c. Stormwater detention basins shall be located a minimum (50) feet from any structure, whether existing or proposed, or any property boundary or ultimate right-of-way line and a minimum (50) feet from existing wetlands and the banks of existing streams.
- d. Interior slopes in basins shall have a maximum grade of one to three, while exterior grades shall be a maximum grade of one to four wherever possible.
- e. The top of a basin berm shall be no less than (10) feet in width.
- f. A clay core keyed into the situ soil shall be required.
- g. An access ramp with a slope no greater than 20% and an access easement (20) feet in width shall be provided to each basin to facilitate cleanout.

4. Spillways.

- a. Basins shall be designed with an emergency spillway to allow passage of the predevelopment one-hundred-year peak runoff rate flow over the berm with a minimum one-foot freeboard. The spillway shall be designed according to Soil Conservation methods, sized assuming that outlet structures are plugged.
- b. The direct discharge of concentrated stormwater flow from a basin across adjacent properties shall not be permitted, except when stormwater has entered a stream or drainage structure.
- c. Outfall pipes from basins shall have a minimum diameter of (18) inches and shall be fitted with trash racks.

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- d. Outlet facilities, including all piping and riser structures, shall be constructed of reinforced concrete or shall be standard concrete structures meeting Pennsylvania Department of Transportation standards.
5. Conveyance of stormwater.
- a. Except where slopes exceed 6%, properly designed, graded and turfed drainage swales shall be required rather than storm sewers in residential areas and in commercial and industrial areas, except as otherwise specified by the Township Engineer. Where swales are used to convey stormwater flows, they shall be broad and flat in cross section. Particular care shall be given to points of discharge from gutter lines at the end of a cut road construction where water will discharge over banks with the possibility of creating erosion channels.
 - b. All natural streams, channels, swales or drainage systems existing prior to development shall be maintained in their existing conditions. Alterations to the existing natural conditions of the site shall be kept to a minimum; where necessary, storm sewers, culverts, bridges and related installations shall be provided to:
 - i. Permit the unimpeded flow and maintain the natural characteristics of existing streams, channels, swales or other watercourses.
 - ii. Ensure adequate drainage of all low points along the line of streets.
 - c. Culverts under roadways shall be designed for a fifty-year return storm and shall have a natural stream bottom, except when under a single access road. For a single access street, a one-hundred-year return storm shall be used. A culvert for a driveway shall be designed for a ten-year storm. The ten-year return storm shall be used to design inlets and pipes in nonsump conditions. For sump conditions and thereafter, the one-hundred-year return storm shall be used. Culverts shall be provided with wing walls and constructed for the full width of the right-of-way. Bridges shall be provided with a paved flow line and deep aprons and wing walls at each end. The cartway area over the bridge shall be as wide as the widest road connecting with the bridge, or, if the character of the road is expected to change for future planning, the cartway of the bridge shall be made to anticipate this condition. On either side of the cartway, the bridge railing shall be at least (5) feet back from the edge of the final cartway width, and this (5) feet may be used to place sidewalks, present or future, if sidewalks are to be run up to and connected with the bridge on either end or either side. Encroachment permits shall be obtained from the Pennsylvania Department of Environmental Protection for stream crossing under the jurisdiction of that Department before construction begins.

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- d. All data and information used shall be compatible with the Pennsylvania Department of Transportation Design Manual, Part 2, Highway Design, October 1976, or the latest revision thereof.
- e. For preliminary design of the inlets and pipes, the Manning's Method may be implemented. The final design shall require an inlet/outlet hydraulic analysis be performed with a maximum headwater height of (1) foot below the top of grate elevation.
- f. All stormwater inlet casings, manhole covers and frames, piping and other appurtenances shall conform to the Pennsylvania Department of Transportation Specifications, Publication 408, dated 1991, or latest revision thereof. All stormwater piping shall be reinforced concrete, the class of piping shall be determined by Pennsylvania Department of Transportation design standards.
- g. Inlet spacing, not to exceed (300) feet, shall be so arranged that at least 95% of the flow will be captured. In addition, the spacing from any high point to an inlet shall not exceed (400) feet.
- h. When designing the capture rate of inlets, a plugging factor of 0.05 shall be assumed.
- i. Submission plans shall include a detail of grates (with associated design curves) and trench details for open conveyance systems.
- j. Storm sewers and culverts shall be constructed of reinforced concrete and have a minimum fifteen-inch diameter and minimum grade of 1/2%.
- k. Changes in alignment shall be made with straight sections connected by inlets and/or manholes.
- l. Manholes and/or inlets shall not be more than (300) feet apart for pipes less than or equal to (24) inches in diameter nor greater than (450) feet apart for pipes larger in diameter.
- m. Stormwater management and/or drainage designs shall not rely on the ability of roof gutter collection systems to convey runoff to Stormwater Management Facilities. Overland flow or underground piping systems shall be designed down slope of the proposed building to convey roof gutter overflows to the stormwater facility. All drainage piping systems, drainage swales, channels, conveyance systems, etc. shall be designed for the one-hundred-year return frequency design storm and shall meet other minimum requirements of the Township Code. A stormwater easement a minimum of (10) feet in width from each side of the drainage facility and an access strip (20) feet in width from the public right-of-way to the facility shall be provided for any such systems, described by metes and bounds. Such easements shall be deducted from gross lot areas as required by the Township Code.

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**ARTICLE IV – STORMWATER MANAGEMENT (SWM) SITE
PLAN REQUIREMENTS**

Section 94-401. General Requirements

For any Regulated Activity, unless exempt per the provisions of Section 94-106:

- A. Preparation and implementation of an approved SWM Site Plan is required.
- B. No Regulated Activity shall commence until the Township issues written approval of a SWM Site Plan, which demonstrates compliance with the requirements of this Ordinance and, if required, a letter of adequacy has been issued by the Conservation District for an Erosion and Sediment Control Plan.
- C. The preliminary or final approval of subdivision and/or land development plans, and the issuance of any building or occupancy permit shall not proceed until the Applicant has received written approval of a SWM Site Plan from the Township.
- D. The SWM Site Plan approved by the Township shall be on Site throughout the duration of the Regulated Activity.

Section 94-402. SWM Site Plan Contents

The SWM Site Plan shall consist of a general description of the project including items described in Section 94-304, calculations, maps, and plans. A note on the maps shall refer to the associated computations and Erosion and Sediment Control Plan by title and date. The cover sheet of the computations and Erosion and Sediment Control Plan shall refer to the associated maps by title and date. All SWM Site Plan materials shall be submitted to the Township in a format that is clear, concise, legible, neat, and well organized; otherwise, the SWM Site Plan shall not be accepted for review and shall be returned to the Applicant.

The following items shall be included in the SWM Site Plan:

- A. General
 - 1. A general description of the proposed project;
 - 2. A listing of all regulatory approvals required for the proposed project and the status of the review and approval process for each. Final approval or adequacy letters must be submitted to the Township prior to (or as a condition of) the Township's issuing final approval of the SWM Site Plan. Proof of application or documentation of required permit(s) or approvals for the programs listed below shall be part of the SWM Site Plan, if applicable:

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- a. NPDES Permit for Stormwater Discharges Associated with Construction Activities;
 - b. PADEP permits as needed:
 - i. PADEP Joint Permit Application,
 - ii. Chapter 105 (Dam Safety and Waterway Management),
 - iii. Chapter 106 (Floodplain Management);
 - c. PennDOT Highway Occupancy Permit;
 - d. Erosion and Sediment Control Plan letter of adequacy; and
 - e. Any other permit under applicable State or Federal regulations.
3. A statement, signed by the Applicant, acknowledging that any revision to the approved SWM Site Plan shall be submitted to and approved by the Township, and that a revised Erosion and Sediment Control Plan shall be submitted to, and approved by, the Conservation District or Township (as applicable) for a determination of adequacy prior to construction of the revised features.
4. The following signature block signed and sealed by the qualified Licensed Professional responsible for the preparation of the SWM Site Plan:

“I (name), on this date (date of signature), hereby certify to the best of my knowledge that the SWM Site Plan meets all design standards and criteria of the East Bradford Township’s Ordinance Chapter 94, Stormwater Management, as amended.” *[Note: include signature, name, discipline of professional license, and license stamp or seal here]*

5. The following signature block for the Township:

“On behalf of East Bradford Township, the Township Engineer, on this date (date of signature), has reviewed and hereby certifies to the best of my knowledge that the SWM Site Plan meets all design standards and criteria of East Bradford Township’s ordinance, Chapter 94, Stormwater Management, as amended, being the East Bradford Township Stormwater Management Ordinance.”

B. Maps or Plan Sheets

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Map(s) or plan sheets of the Site shall be submitted on minimum twenty-four (24)-inch by thirty-six (36)-inch sheets and shall be prepared in a form that meets the requirements for recording at the Chester County Office of the Recorder of Deeds and the requirements of the Operation and Maintenance (O&M) Plan and O&M Agreement (Article VII). If the SALDO has additional or more stringent criteria than this Ordinance, then the SALDO criteria shall also apply. Unless otherwise approved by the Township Engineer, the contents of the maps or plan sheets shall include, but not be limited to:

1. A location map, with a scale of one (1) inch equals two thousand (2,000) feet or greater, showing the Site location relative to highways, Township boundaries, or other identifiable landmarks.
2. The name of the project, tax parcel number(s), and the names, addresses and phone numbers of the owner of the property, the Applicant, and firm preparing the plan.
3. Signature and seal of the qualified Licensed Professional(s) responsible for preparation of the maps and plan sheets.
4. The date of SWM Site Plan submission and revision dates, as applicable.
5. A graphic and written scale of one (1) inch equals no more than fifty (50) feet.
6. A north arrow.
7. Legal property boundaries, including:
 - a. The total project property boundary and size with distances marked to the nearest foot and bearings to the nearest degree.
 - b. Boundaries, size and description of purpose of all existing easements and deed-restricted areas of the project property, with distances marked to the nearest foot and bearings to the nearest degree.
8. Existing natural resources and natural or man-made hydrologic features that are located within the Site or receiving discharge from, or that may otherwise be impacted by, the proposed Regulated Activity, including but not limited to:
 - a. All existing natural resources, hydrologic features and drainage patterns including natural waterways, water bodies, wetlands, streams (intermittent and perennial), ponds, lakes, vernal pools, etc., natural infiltration areas and patterns, areas of significant natural evapotranspiration, and other water features and aquatic resources.

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- b. Any existing man-made drainage features, BMPs, Conveyances, facilities, open channels, swales, drainage patterns, or other flood, stormwater or drainage control features.
- c. For the Site, discharge points and locations of concentrated flows and their drainage areas.
- d. For named waters, show names and their watershed boundaries within the Site.
- e. Special management areas (as per Subsection 94-301.P).
- f. For the water bodies, streams and wetlands identified in Subsection 94-402.B.8.a, label or otherwise show the following attributes, if applicable:
 - i. The Designated Use as determined by PADEP (25 PA Code Chapter 93);
 - ii. Impairments listed on the PADEP “Integrated List” (as updated) and the listed source and cause of impairment;
 - iii. Name, date, and target pollutant(s) for any approved Total Maximum Daily Load (TMDL); and
 - iv. Drainages to water supply reservoirs.
- g. Areas that are part of the Pennsylvania Natural Diversity Inventory (PNDI) and a list of potential impacts and clearances received (for Regulated Activities involving one (1) acre or more proposed Earth Disturbance).
- h. Woods, vegetated riparian buffers and other areas of natural vegetation.
- i. Topography using contours (with elevations based on established benchmarks) at intervals of two (2) feet. In areas of slopes greater than thirty (30) percent five (5)-foot contour intervals may be used. The datum used and the location, elevation and datum of any benchmarks used shall be shown.
- j. Areas classified by the Township as steep slopes.
- k. Soil names and boundaries, general type of soils with Hydrologic Soil Group noted, and in particular note areas most conducive to infiltration BMPs, such as groups A and B, etc., estimated permeabilities in inches per hour, and location and other results of all soil tests and borings.
- l. If present, areas with underlying carbonate geologic units, existing sinkholes, subsidence or other karst features, and any associated groundwater recharge areas with increased vulnerability to contamination.
- m. Any contaminated surface or subsurface areas of the Site.

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- n. Water supply wells –
 - i. Location of existing well(s) on the project property and delineation of the(ir) recharge area(s) (if known), or a fifty (50) foot diameter assumed recharge area;
 - ii. Location of existing well(s) within fifty (50) feet beyond the boundary of the project property boundary (if public water supply is proposed for the Regulated Activity); and
 - o. Current FEMA one hundred (100)-year floodplain boundaries, elevations, and Floodway boundaries for any Special Flood Hazard Areas on or within one hundred (100) feet of the property.
 - p. Boundaries of riparian buffer(s) as defined by section 115-43.3C(1) of the Zoning Chapter.
 - q. Boundaries of a fifty (50) foot construction non-disturbance buffer to protect streams (intermittent and perennial), wetlands and other water bodies during construction of the proposed Regulated Activity.
9. Location of the proposed Regulated Activity, limits of Earth Disturbance (Disturbed Area), and BMPs and Conveyances relative to the location of existing natural resources and hydrologic features and special management areas resulting from the Site design process of Section 94-304.
10. Description of existing and proposed ground cover and land use including the type and total area.
11. Existing and proposed man-made features including roads, paved areas, buildings, and other Impervious and Pervious Surfaces on the project property (or an appropriate portion of the property as determined in consultation with the Township Engineer) and within the proposed Disturbed Area, and including the type and total area of the following:
- a. Existing Impervious Surfaces installed after December 10, 2013;
 - b. Existing Impervious Surfaces proposed to be replaced;
 - c. Existing Impervious Surfaces to be permanently removed and replaced with pervious ground cover;
 - d. New or additional Impervious Surfaces; and

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- e. Percent of the Site covered by Impervious Surfaces for both the existing and proposed Post-construction conditions.
12. The total extent of the upstream area draining through the Site.
 13. All BMPs, Conveyances and other Stormwater Management Facilities shall be located on the plan sheets, including design drawings, profile drawings, construction details, materials to be used, description of function, etc.
 14. Complete delineation of the flow paths used for calculating the time of concentration for the Predevelopment and Post-construction conditions shall be included.
 15. The locations of all existing and proposed utilities, sanitary sewers, on-lot wastewater facilities (including subsurface tanks and leach fields), and water supply lines within the Site and within fifty (50) feet beyond the proposed limits of Earth Disturbance.
 16. A grading plan, including all areas of proposed Earth Disturbance and the proposed Regulated Activity and delineating the boundary or limits of Earth Disturbance of the Site. The total Disturbed Area of the Site shall be noted in square feet and acres.
 17. Proposed final grade elevations and contours at intervals of two (2) feet. In areas of steep slopes (greater than thirty (30) percent), five (5)-foot contour intervals may be used.
 18. For each proposed BMP and Conveyance included in the SWM Site Plan (including any to be located on any property other than the property being developed by the Applicant), the following shall be included on the SWM Site Plan map or plan sheets:
 - a. Identification of the person responsible for ongoing inspections, operation, repair, and maintenance of the BMP or Conveyance after completion of construction.
 - b. Delineation of the land area, structures, Impervious Surfaces, and Conveyances draining to and from the BMP or Conveyance.
 - c. Easements, as per the requirements of Article VII, that shall include:
 - i. Boundaries labeled with distances shown in feet and bearings to the nearest degree;
 - ii. Notes or other documentation, as needed, to grant the Township the right of access to all BMPs and Conveyances for the purposes of inspection and

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enforcement of the requirements of this Ordinance, and any applicable O&M Plans and O&M Agreements;

- iii. Notes or other documentation, as needed, to grant the Township the right of access to all roadways necessary to access all BMPs and Conveyances, where roadways are not to be dedicated to the Township;
 - iv. Notes or other documentation as needed to grant the owner of any BMP or Conveyance the right of access for the purpose of inspection, operation, maintenance, and repair of the BMP or Conveyance that is to be owned, operated and maintained by a person other than the Township, and other than the owner of the property on which the BMP or Conveyance is located;
 - v. A minimum (20)-foot wide perimeter (or other width as determined in consultation with the Township Engineer) around all BMPs and Conveyances;
 - vi. Sufficient vehicular ingress to and egress from a public right-of-way or roadway, as determined in consultation with the Township Engineer; and
 - vii. Accompanying notes or other documentation as needed, and in accordance with Article VII describing the type, purpose and total area of easements, who the easement is granted to, and the rights, duties and obligations of the parties with respect to every BMP or Conveyance.
- d. Boundaries of land areas (if any) for which deed restrictions are required for the purpose of protecting and prohibiting disturbance to a BMP or Conveyance, indicating the area to which the restriction applies with distances shown in feet and bearings to the nearest degree, and a written description of the type, purpose and nature of the restriction.
- e. Other items that may be needed to comply with all other requirements of Article VII.
- C. A written description of the following information shall be included in the SWM Site Plan:
- 1. Existing features, conditions, natural resources, hydrologic features, and special management areas (as listed in Subsection 94-402.B.8);
 - 2. How the Site design achieves the requirements of Section 94-304, and if applicable, where they could not be achieved and why;
 - 3. The overall stormwater management design concept for the project and how the Site design achieves the requirements of Sections 94-301 through 94-311 of Article III;

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4. Proposed features and conditions, proposed erosion and sediment control features, proposed BMPs, Conveyances, and any other stormwater facilities;
 5. A description of the effect of the project (in terms of flow alteration and runoff volumes, water quality and peak flows, etc.) on existing natural resources, hydrologic features and special management areas, adjacent and downgradient properties, and any existing Township or other stormwater Conveyance system(s), that may be affected by or receive runoff from the Regulated Activity (whether located within or outside of the area of the Regulated Activity), and specifics of how erosion, water quality and flow impacts will be avoided or otherwise mitigated;
 6. Proposed nonpoint source pollution controls and justification and confirmation that the proposed project will not result in any increased pollutant loadings to any existing stream or stream impairment identified by PADEP, or to any receiving water body;
 7. Expected project time schedule; and
 8. Description of construction stages or project phases, if so proposed.
- D. A detailed Site evaluation conducted by a qualified Licensed Professional for projects proposed in areas of carbonate geology or karst topography, and other environmentally sensitive areas, such as contaminated sites and brownfields, as described in Subsections 94-301.O and 94-301.R of this Ordinance.
- E. Stormwater runoff design computations and documentation, such as hydrologic, hydraulic, and structural computations, assumptions, BMP loading ratios, etc., consistent with the guidelines and criteria presented in the PA BMP Manual (as amended) or other guidance acceptable to the Township Engineer, and used in the design of the BMPs, Conveyances and other features proposed to be utilized for stormwater management, or as otherwise necessary to demonstrate that the requirements of this Ordinance have been met, specifically including the requirements in Sections 94-301 and 94-304 through 94-309.
- F. Inspections, Operation and Maintenance Requirements
- The following documents shall be prepared and submitted to the Township for review and approval as part of the SWM Site Plan, in accordance with the requirements of Article VII, for each BMP and Conveyance included in the SWM Site Plan (including any to be located on any property other than the property being developed by the Applicant):
1. An O&M Plan;
 2. An O&M Agreement;

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3. Any easement agreements that are needed to ensure access, inspection, maintenance, operation, repair and permanent protection of any permanent BMP(s) and Conveyances associated with the Regulated Activity;
 4. Any written deed, deed amendment or equivalent document (if needed) to be recorded against a subject property, as shown on the SWM Site Plan maps or plan sheets, or recorded plan sheets for the purpose of protecting and prohibiting disturbance to a BMP or Conveyance; and
 5. Written approval, easement agreements, or other documentation for discharges to adjacent or downgradient properties when required to comply with Subsection 94-301.G and Article VII of this Ordinance.
- G. An Erosion and Sediment Control Plan, where applicable, as prepared for and submitted to the Conservation District and/or Township. A letter of adequacy from the Conservation District, if applicable, must be submitted to the Township prior to (or as a condition of) the Township's final approval of the SWM Site Plan.
- H. A Highway Occupancy Permit from the Pennsylvania Department of Transportation (PennDOT) District Office must be submitted to the Township prior to (or as a condition of) the Township's final approval of the SWM Site Plan when utilization of a PennDOT storm drainage system is proposed.

Section 94-403. SWM Site Plan Submission

A complete SWM Site Plan that complies with all applicable provisions of Section 94-402 shall be submitted to the Township for review and approval, as follows:

- A. The SWM Site Plan shall be coordinated with the applicable State and Federal permit process and the Township SALDO review process. All permit approvals or letters of adequacy not yet received by the Applicant at the time of submittal of the SWM Site Plan to the Township must be submitted to the Township prior to (or as a condition of) the Township's final approval of the SWM Site Plan.
- B. For projects that require SALDO approval, the SWM Site Plan shall be submitted by the Applicant as part of the preliminary plan submission where applicable for the Regulated Activity.
- C. For Regulated Activities that do not require SALDO approval, the SWM Site Plan shall be submitted by the Applicant for review in accordance with instructions from the Township.
- D. The number of copies of the SWM Site Plan to be submitted by the Applicant for review shall be in accordance with instructions from the Township.

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- E. The corresponding review fee shall be submitted to the Township simultaneously with the SWM Site Plan, per the Township's fee schedule.
- F. Any submissions to the Township that are found to be incomplete shall not be accepted for review and shall be returned to the Applicant within five (5) business days with a notification in writing of the specific manner in which the submission is incomplete.
- G. Financial security, per the requirements of Section 94-110, shall be submitted to the Township prior to approval of the SWM Site Plan.

Section 94-404. SWM Site Plan Review

- A. The SWM Site Plan shall be submitted to the Township for review by the Township Engineer for consistency with this Ordinance and the respective PA Act 167 Stormwater Management Plan(s). The Township Engineer will review the SWM Site Plan for any subdivision or land development for compliance with this Ordinance and the Township SALDO provisions not otherwise superseded by this Ordinance.
- B. If applicable, the Applicant shall have received a "letter of adequacy" from the Conservation District or other PADEP approval for the proposed Regulated Activity prior to (or as a condition of) final approval by the Township.
- C. The Township Engineer will notify the Applicant and the Township in writing, within forty-five (45) calendar days, whether the SWM Site Plan is consistent with the requirements of this Ordinance. If the SWM Site Plan involves a subdivision and land development Plan, the notification shall occur within the time period allowed by the MPC (as amended). If a longer notification period is provided by other statute, regulation, or ordinance, the Applicant will be so notified by the Township.
 - 1. If the Township Engineer determines that the SWM Site Plan is consistent with this Ordinance, the Township Engineer shall forward a letter of consistency to the Township, who shall then forward a copy to the Applicant.
 - 2. The Township may approve the SWM Site Plan with conditions reasonably defined to make the SWM Site Plan compliant with the terms of this Ordinance, and, if so, shall provide the conditions for approval in writing.
 - 3. If the Township Engineer determines that the SWM Site Plan is inconsistent or noncompliant with this Ordinance, the Township Engineer will forward a letter to the Township, with a copy to the Applicant citing the reason(s) and specific Ordinance sections for the inconsistency or noncompliance. Inconsistency or noncompliance may be due to inadequate information to make a reasonable judgment as to compliance with this Ordinance. Any SWM Site Plans that are inconsistent or noncompliant may be revised by the Applicant and resubmitted in accordance with Section 94-406 when consistent with this Ordinance. Resubmission will commence a new Township review and notification time period.

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- D. The Township will not grant final approval to any proposed subdivision, land development, or Regulated Activity specified in this Ordinance if the SWM Site Plan has been found to be inconsistent with this Ordinance.
- E. All required permits from PADEP shall be obtained and submitted to the Township prior to (or as a condition of) final approval of any proposed subdivision, land development, or other Regulated Activity by the Township.
- F. No building permits for any Regulated Activity will be approved by the Township if the SWM Site Plan has been found to be inconsistent with this Ordinance, as determined by the Township Engineer. All required permits from PADEP shall be obtained prior to issuance of a building permit.
- G. The Township's approval of a SWM Site Plan shall be valid for a period not to exceed five (5) years commencing on the date that the Township approved the SWM Site Plan. If Stormwater Management Facilities included in the approved SWM Site Plan have not been constructed, or if constructed, As-Built Plans of these facilities have not been approved within this five (5) year time period, then the Applicant may seek reinstatement of approval of the expired SWM Site Plan. If the Township determines that the expired SWM Site Plan is consistent and compliant with current regulations and requirements, then the expired SWM Site Plan will be reinstated; otherwise, it will be rejected. The Applicant will be prohibited from conducting any Regulated Activity until a reinstated or newly approved SWM Site Plan is obtained in accordance with Section 94-406 of this Ordinance.
- H. All or portions of the final approved SWM Site Plan shall be recorded (as "record plans") per the instructions of the Township.
- I. Upon completion of construction, the Applicant shall be responsible for completing final As-Built Plans of all BMPs, Conveyances, or other Stormwater Management Facilities included in the approved SWM Site Plan as per the requirements of Section 94-502 of this Ordinance.

Section 96-405. Revision of SWM Site Plans

- A. A submitted SWM Site Plan under review by the Township shall be revised and resubmitted for any of the following reasons:
 - 1. A change in stormwater management BMPs, Conveyances, facilities or techniques;
 - 2. Relocation or redesign of stormwater management BMPs, Conveyances, or facilities; or
 - 3. Soil or other Site conditions are not as stated on the SWM Site Plan as determined by the Township Engineer, and the new conditions necessitate design changes.

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The revised SWM Site Plan shall be resubmitted in accordance with Section 94-403 and subject to review as specified in Section 94-404 of this Ordinance.

- B. A revision to an approved SWM Site Plan shall be submitted to the Township, accompanied by the applicable Township review fee.

Section 94-406. Resubmission of Inconsistent or Noncompliant SWM Site Plans

Any SWM Site Plan deemed inconsistent or noncompliant may be revised and resubmitted with the revisions addressing the Township Engineer's concerns documented in writing. The submission shall be addressed to the Township in accordance with Section 94-403 of this Ordinance, distributed accordingly, and be subject to review as specified in Section 94-404 of this Ordinance. The applicable Township review fee shall accompany a resubmission of a SWM Site Plan previously determined to be inconsistent or noncompliant.

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**ARTICLE V – PERFORMANCE AND INSPECTION OF
REGULATED ACTIVITIES, AND FINAL AS-BUILT PLANS**

Section 94-501. Performance and Inspection of Regulated Activities

- A. All Regulated Activities shall be conducted, operated and maintained in accordance with the requirements set forth in Articles III, VII, and VIII of this Ordinance. When a SWM Site Plan is required by this Ordinance, all Regulated Activities shall be performed in accordance with the requirements of the final approved SWM Site Plan.
- B. The Township Engineer or other Township designee shall be provided access to the Site to inspect all phases of the erosion and sediment control measures and installation of the permanent BMPs and Conveyances at such times as deemed appropriate by the Township Engineer or other Township designee.
- C. Periodic inspections may be made by the Township Engineer or other designee during construction. A set of design plans approved by the Township shall be on file and available for viewing at the Site throughout the duration of the construction activity.
- D. Inspections, including but not limited to a final inspection, of all constructed BMPs, Conveyances, or other stormwater facilities, and related improvements may be conducted by the Township Engineer or other designee to confirm compliance with this Ordinance and with the final approved SWM Site Plan prior to the issuance of any occupancy permit, use permit, or other form of final approval of the project by the Township.
- E. Upon completion of construction, every permanent stormwater BMP, Conveyance or other Stormwater Management Facility constructed or used as part of the Regulated Activity shall be operated, maintained and inspected by the Landowner, or other designated person, in accordance with the O&M Plan and O&M Agreement approved by the Township.
- F. The Township or its designee may periodically inspect any permanent stormwater BMP, Conveyance or Stormwater Management Facility for compliance with this Ordinance, an approved O&M Plan, or an approved O&M Agreement, per the provisions of Article IX. The Township may inspect at any time it has reason to believe a violation exists. The Township may pursue enforcement for violations consistent with the provisions of Article IX.
- G. If an NPDES Permit for Stormwater Discharges Associated with Construction Activities was required for the Regulated Activity, a Notice of Termination (NOT) approval must be obtained from PADEP or Chester County Conservation District upon completion of construction prior to final approval and closeout of the Drainage Permit by the Township.

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Section 94-502. Final As-Built Plans

- A. For Regulated Activities involving one (1) acre or more of Earth Disturbance, the Applicant shall provide to the Township final As-Built Plans (signed and sealed by a qualified Licensed Professional) of all BMPs, Conveyances, other stormwater facilities, and related improvements shown in the final approved SWM Site Plan.
- B. The final As-Built Plans shall include the following for all BMPs, Conveyances, other stormwater facilities and related improvements:
 - 1. The location, elevations, dimensions, and as-built conditions of all BMPs, Conveyances, other stormwater facilities, and related improvements including topographic contours and all typical details for storm drainage and conveyance systems, Stormwater Management Facilities and Impervious Surfaces (existing, proposed, or constructed) included in the approved SWM Site Plan. The latitude and longitude coordinates for all permanent SWM BMPs at the central location of the BMPs to within one hundred thousandth of one degree; and
 - 2. Explanation of any discrepancies or variations from the final approved SWM Site Plan, other related approved construction plans, calculations and specifications (and approved revisions thereto).
- C. The final As-Built Plans shall include a certification of completion signed and sealed by a qualified Licensed Professional verifying that all permanent BMPs and Conveyances have been constructed according to the final approved SWM Site Plan and related approved construction plans, calculations and specifications.
- D. After receipt of the As-Built Plans by the Township, the Township or its designee may review the As-Built Plans for consistency with this Ordinance, the final approved SWM Site Plan, other related approved construction plans, and subsequent approved revisions thereto, as well as actual conditions at the Site, and the Township may conduct a final inspection, as per Subsection 94-501.D.
- E. The As-Built Plans must be received, reviewed and determined to be acceptable by the Township prior to:
 - 1. Close out of the drainage permit or other close out of the project by the Township;
 - 2. Release of the financial security or other performance guarantee; and
 - 3. Dedication of the stormwater facilities to the Township, or conveyance to a homeowners association, or other person responsible for operation, maintenance and repair.

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- F. Final occupancy permit(s) or Use Permit or other final approval to use or operate the constructed improvement may not be issued by the Township until the final As-Built Plans have been accepted.
- G. Upon final acceptance of the final As-Built Plans by the Township, the Applicant shall review and, if required by the Township, revise and re-record the O&M Plan and the O&M Agreement to reflect the final as-built conditions and information for each permanent BMP or Conveyance, in accordance with the requirements of Article VII.
- H. All or portions of the final As-Built Plans shall be recorded if required by the Township.

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ARTICLE VI – FEES AND EXPENSES

Section 94-601. Township SWM Site Plan Review and Inspection Fees

Fees have been established by the Township as adopted by Resolution No.13 of 2013 or as otherwise allowed by law to defray plan review and construction inspection costs incurred by the Township. All fees listed in Subsection 94-602.A shall be paid by the Applicant at the time of SWM Site Plan submission.

A review and inspection fee schedule including where applicable the deposit of a review escrow has been established by resolution of the Township Board of Supervisors based on the size of the Regulated Activity and based on the Township's costs for reviewing SWM Site Plans, O&M Plans and Agreements and As-Built Plans, and conducting inspections pursuant to Section 94-501. The Township shall periodically update the review and inspection fee schedule to ensure that review costs are adequately reimbursed.

Section 94-602. Expenses Covered by Fees and Review Escrow

- A. The fees and review escrow required of the Applicant by this Ordinance shall be fixed by the Board of Supervisors by Resolution and shall at a minimum cover:
1. Administrative costs;
 2. The review of the SWM Site Plan by the Township, the Township Engineer, Township solicitor and other Township consultants;
 3. Coordination and meetings with the Applicant;
 4. The inspection of erosion and sediment control measures, BMPs, Conveyances and other related improvements during construction;
 5. Review of project communications, reports, and additional supporting information;
 6. Other Site inspections;
 7. The final inspection upon completion of the BMPs, Conveyances, and other Stormwater Management Facilities and related improvements presented in the SWM Site Plan; and
 8. Review of final As-Built Plan submission and revised calculations, and inspections as needed.
- B. The Applicant shall also reimburse all expenses incurred by the Township for any additional work or Township solicitor or consultant fees required to enforce any permit provisions regulated by this Ordinance, correct violations, and ensure proper completion of remedial actions.

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ARTICLE VII – OPERATION AND MAINTENANCE (O&M)
RESPONSIBILITIES AND EASEMENTS

Section 94-701. General Requirements for Protection, Operation and Maintenance of Stormwater BMPs and Conveyances

The following shall apply to all Regulated Activities in accordance with the requirements of the subsequent sections of this Article VII.

- A. Continuing operations and maintenance responsibilities of all permanent BMPs, Conveyances, or other Stormwater Management Facilities shall be reviewed and approved by the Township along with the SWM Site Plan. The Township may require an offer of a dedication of such facilities as part of the requirements for approval of the SWM Site Plan. Such a requirement is not an indication that the Township will accept the facilities. The Township reserves the right to accept or reject the operations and maintenance responsibility for any portion of or all of the BMPs, Conveyances or other stormwater controls and facilities.
- B. An Operation and Maintenance (O&M) Plan shall be submitted to the Township for review and approval for all existing and proposed permanent BMPs and man-made Conveyances or other stormwater facilities identified in the SWM Site Plan. Multiple BMPs or Conveyances may be addressed by a combined O&M Plan where all such facilities are similar in O&M requirements and ownership.
- C. The O&M Plan(s) and O&M Agreement(s) shall name the person identified in the SWM Site Plan who shall be the owner of and be responsible for ongoing inspections, operation, repair, and maintenance of each BMP or Conveyance following completion of construction.
- D. For any BMP or man-made Conveyance (including any to be located on any property other than the property being developed by the Applicant) to be owned by a person other than the Township:
 - 1. An O&M Agreement shall be submitted to the Township for review and approval; and
 - 2. The O&M Plan shall be attached to, incorporated within, and recorded as a public record along with a fully executed O&M Agreement, all of which shall be recorded as a restrictive covenant that runs with the land and shall be binding upon the Landowner and any heirs, administrators, successors in interest or assigns of the Landowner.
- E. The following shall be provided for all BMPs and Conveyances (including any to be located on any property other than the property being developed by the Applicant) by

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an O&M or other agreement or by otherwise establishing covenants, easements, deed restrictions, or by dedication to the Township:

1. Permanent protection of the BMP or Conveyance from disturbance or alteration;
 2. Right of entry and access for the Township for inspection and enforcement of this Ordinance (including Subsection 94-903.G) and any applicable O&M Plan or O&M Agreement; and
 3. Right of entry and access for the person owning the BMP or Conveyance and responsible for fulfilling the O&M requirements when that person is not the Township and is different from the owner of the property on which the BMP or Conveyance is located (such as may be applicable for Subsection 94-301.G of this Ordinance).
- F. All O&M and other agreements, covenants, easements and deed restrictions shall:
1. Be submitted to the Township for review and approval;
 2. Be recorded as a public record, upon approval, against each parcel(s) which is part of the SWM Site Plan or otherwise contains any BMP or Conveyance comprising part of the Regulated Activity which is the subject of an O&M Agreement; and
 3. Run with the land and be binding upon the Landowner, its heirs, administrators, successors in interest, and assigns.
- G. The materials, documents and content required by this Article VII may be prepared in conjunction with and incorporated with similar materials, documents and content required for other permit or approval applications, such as those required by PADEP for the Post Construction Stormwater Management Plan.

Section 94-702. Operation and Maintenance Plans

The following items shall be included in the O&M Plan, unless otherwise approved by the Township Engineer:

- A. A plan sheet(s) or map(s) showing each BMP and man-made Conveyance and which shall include, but not be limited to:
1. Property(ies) identification (owner name and address; and property address and/or lot and/or tax parcel number, etc.), property boundaries and tax parcel number of the land parcel on which the BMP or Conveyance is located.
 2. Name, address, phone number, date prepared, signature and seal of the Licensed Professional responsible for preparation of the plan sheet or map.

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3. Clear identification of the location, dimensions, and function of each BMP or Conveyance covered by the O&M Plan.
4. The location of each BMP and Conveyance relative to roadways, property boundaries, or other identifiable landmarks and existing natural drainage features such as streams, lakes, ponds, or other bodies of water within the immediate vicinity of, or receiving discharge from, the BMP or Conveyance.
5. Delineation of the land area, structures, Impervious Surfaces and Conveyances draining to and from the BMP.
6. Representative elevations and/or topographic contours at intervals of two (2) feet, or other as acceptable to the Township Engineer.
7. Other features including FEMA floodplain and floodway boundaries, sinkholes, etc. located within the immediate proximity of each BMP and Conveyance.
8. Locations of areas of vegetation to be managed or preserved that function as a BMP or Conveyance.
9. The locations of all surface and subsurface utilities, on-lot waste water facilities, sanitary sewers, and water lines within twenty (20) feet of each BMP or Conveyance.
10. The following as it pertains to any easements, covenants and deed restrictions established for each applicable BMP or Conveyance:
 - a. Boundaries delineated with bearings and distances shown that encompass the BMP or Conveyance and that includes a (20) foot perimeter area surrounding these features and sufficient vehicular ingress to and egress from a public right-of-way and roadway;
 - b. Labels specifying the type and purpose of the easement, covenant, or deed restriction and who it benefits; and
 - c. Labels with reference to any corresponding easement agreement, covenant, deed restriction or other document to be recorded.
11. The plan sheet or map shall be prepared at sufficient scale for Township review, and ultimately for the use by the person responsible for operation and maintenance, and shall also be prepared at a legible scale that meets the requirements for recordation along with (and as an attachment to) the O&M Agreement and O&M Plan at the Chester County Office of the Recorder of Deeds.

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B. The following information shall be included in the O&M Plan and written in a manner consistent with the knowledge and understanding of the person who will be responsible for the maintenance activities:

1. The name and address of the following:
 - a. Property(ies) on which each BMP or Conveyance is located;
 - b. Owner of the property;
 - c. Owner of each stormwater BMP or Conveyance who is responsible for implementation of the O&M Plan;
 - d. Person responsible for maintaining adequate liability insurance and payment of taxes; and
 - e. Person preparing the O&M Plan.
2. A description of each BMP and Conveyance and how the BMPs and Conveyances are intended to function.
3. A description of actions necessary to operate, inspect, and maintain each BMP or Conveyance, including but not limited to:
 - a. Lawn care, vegetation maintenance, landscaping and planting;
 - b. Clean out of accumulated debris and sediment (including from grates, trash racks, inlets, etc.); and
 - c. Other anticipated periodic maintenance and repair.
4. The following statement shall be included:

“The Landowner acknowledges that, per the provisions of the Township’s Stormwater Management Ordinance, it is unlawful to modify, remove, fill, landscape, alter or impair the effectiveness of, or place any structure, other vegetation, yard waste, brush cuttings, or other waste or debris into any permanent stormwater management BMP or Conveyance described in this O&M Plan or to allow the BMP or Conveyance to exist in a condition which does not conform to this O&M Plan, without written approval from the Township.”

5. Inspection and maintenance schedules.

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6. Explanation of the purpose and limitations of any easements, covenants, or deed restrictions associated with any BMP or Conveyance that are to be recorded against the property.
- C. A statement that no BMP or man-made Conveyance may be used by the owner or others for any purpose other than its intended stormwater control function, or, if approved by the Township Engineer, a statement of specific allowable uses of the BMP (i.e., recreational benefits that maybe associated with certain BMPs owned by a homeowners association, or allowable uses by an individual residential Landowner).
- D. A statement that establishes a reasonable time frame for remedy of deficiencies found by the owner during their inspections.
- E. Language needed to fulfill the requirements of Subsections 94-705.B, 94-705.C, and 94-705.D of this Ordinance.

Section 94-703. Operation and Maintenance Agreements

- A. An O&M Agreement shall be required for any BMP or man-made Conveyance to be owned by a person other than the Township, and the Agreement shall:
 1. Be between the owner of the BMP or Conveyance and the Township, and shall be substantially the same as the O&M Agreement in Appendix D;
 2. Incorporate the approved O&M Plan(s) for all BMPs or Conveyances to be covered by the O&M Agreement;
 3. Set forth the rights, duties and obligations of the owner of the BMP or Conveyance and the Township, and be consistent with the approved O&M Plan(s);
 4. Be recorded as a deed restriction or restrictive covenant that runs with the land and shall be binding upon the Landowner, its heirs, administrators, successors in interest, and assigns;
 5. Be submitted to the Township for review prior to approval of the SWM Site Plan;
 6. Upon approval by the Township, be signed by the designated owner of the BMP or Conveyance and submitted for signature by the Township; and
 7. When fully executed, be recorded by the Landowner at the Chester County Office of the Recorder of Deeds following Township approval of the O&M Plan and prior to the start of construction.
- B. Other items or conditions may be required by the Township to be included in the O&M Agreement where determined necessary by the Township to guarantee the satisfactory operation and maintenance of all permanent BMPs and Conveyances.

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- C. After approval of the final As-Built Plans per the requirements of Article V, the Applicant shall review and, if necessary and if required by the Township, revise and re-record the O&M Plan and O&M Agreement to reflect the final as-built conditions of each BMP and Conveyance if different from the information included in the original recorded documents.

Section 94-704. Easements and Deed Restrictions

- A. Easements shall be established in connection with any Regulated Activity for all permanent BMPs and Conveyances that will not be dedicated to or otherwise owned by the Township, (including any to be located on any property other than the property being developed by the Applicant), and shall:
1. Include all land area occupied by each BMP or Conveyance;
 2. Include a (20) foot wide perimeter (or other width as determined in consultation with the Township Engineer) surrounding the feature(s);
 3. Provide sufficient vehicular ingress and egress from a public right-of-way and roadway;
 4. Permanently protect every BMP and Conveyance from disturbance or alteration where not otherwise protected by a recorded O&M Agreement, covenant, deed restriction or other means;
 5. Grant the Township the right, but not the duty, to access every BMP and Conveyance from a public right-of-way or public roadway to conduct periodic inspections and to undertake other actions that may be necessary to enforce the requirements of this Ordinance, or of any applicable O&M Plan or O&M Agreement; where roadways will not be dedicated to the Township, the Township shall be granted access to the private roadways as necessary to access every BMP and Conveyance;
 6. Grant the owner of each BMP and Conveyance the right to access, inspect, operate, maintain, and repair the BMP or Conveyance when the feature is to be owned, operated and maintained by a person other than the Township and other than the owner of the parcel on which it is located;
 7. Be shown, with bearings and distances noted, on the SWM Site Plan map/plan sheets, O&M Plan map/plan sheets, final As-Built Plans, and be signed and sealed by a qualified Licensed Professional;
 8. Include language legally sufficient to ensure that the easement shall run with the land and bind the Landowner granting the easement, its heirs, administrators, successors in interest and assigns, into perpetuity; and

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9. Be recorded by the Township at the Chester County Office of the Recorder of Deeds following Township approval and prior to the start of construction.
- B. For any BMP or Conveyance to be owned by a person other than the Township or the Landowner owning the parcel upon which a BMP or Conveyance is located, an easement agreement shall be prepared and executed between the Landowner and the owner of the BMP or Conveyance which shall:
1. Describe the ownership interests of all parties to the easement agreement, including the ownership of the BMP or Conveyance;
 2. Include a written legal (metes and bounds) description of the easement area, with reference to a recorded plan sheet showing the legal boundaries of the easement area (or an accompanying plan sheet/map), signed and sealed by a qualified Licensed Professional;
 3. Grant an easement from the Landowner to the owner of each BMP and Conveyance, establishing the right and obligation to occupy, access, inspect, operate, maintain, and repair the BMP or Conveyance;
 4. Include a description of the purpose of the easement and the responsibilities of the parties involved;
 5. Incorporate by reference or be recorded with, the corresponding O&M Plan and O&M Agreement;
 6. Restrict the Landowner's use of the easement area of the parcel on which the BMP or Conveyance is located, consistent with the rights granted to the owner of the BMP or Conveyance;
 7. Be submitted to the Township for review and approval prior to approval of the SWM Site Plan;
 8. Upon approval by the Township, be signed by the owner of the BMP(s) or Conveyance(s) and the Landowner and submitted for signature by the Township;
 9. Include language legally sufficient to ensure that the easement will run with the land affected by the easement and that the easement agreement is binding upon the parties to the easement agreement, their heirs, administrators, successors in interest and assigns, into perpetuity;
 10. Contain additional provisions or information as required by the Township; and
 11. When fully executed, be recorded by the Township at the Chester County Office of the Recorder of Deeds against all parcels affected by the terms of the easement

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agreement, within (90) days of the Township's approval of the corresponding O&M Plan.

- C. For any BMP or Conveyance which is designed to receive runoff from another parcel or parcels and which is owned by the Landowner of the parcel upon which the BMP or Conveyance is located, in addition to any easement or easement agreement required pursuant to Subsection 94-704 A. or B., an easement agreement shall be prepared and executed between the Landowner of the parcel or parcels draining to the BMP or Conveyance and the owner of the BMP or Conveyance. This easement agreement shall:
1. Describe the ownership interests of all parties to the easement agreement, including the ownership of all affected parcels and of the BMP or Conveyance;
 2. Provide for the grant of a drainage easement from the owner of the BMP or Conveyance to the Landowner of the parcel(s) draining to the BMP, which shall extend from the shared parcel boundary(ies) to the receiving BMP and shall include the connecting flow path(s) or Conveyance;
 3. Include a written legal (metes and bounds) description of the easement area, with reference to a recorded plan sheet showing the legal boundaries of the easement area (or an accompanying plan sheet/map), signed and sealed by a Licensed Professional.
 4. Incorporate by reference or be recorded with the corresponding O&M Plan and O&M Agreement;
 5. State that the purpose of the easement agreement is to ensure the continuous right of the discharging parcel to discharge onto the parcel containing the BMP and into the BMP or Conveyance;
 6. Restrict the BMP or Conveyance owner's use of the easement area of the parcel upon which the BMP or Conveyance is located, consistent with the purpose of the easement granted;
 7. Establish the duty and responsibility of the Landowner of the parcel or parcels draining to the BMP or Conveyance to maintain the existing drainages on the discharging parcel or parcels as designed and constructed to discharge to the receiving BMP;
 8. Include language legally sufficient to ensure that the easement will run with the land and will bind all parties to the easement agreement, their heirs, administrators, successors in interest and assigns, into perpetuity;
 9. Be submitted to the Township for review and approval prior to approval of the SWM Site Plan;

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10. Contain all additional provisions or information as the Township may require upon review; and
 11. Be executed by the parties to the easement agreement and recorded by the Township at the Chester County Recorder of Deeds Office against the draining parcel(s) and the parcel upon which the BMP or Conveyance is located within (90) days of the Township's approval of the corresponding O&M Plan.
- D. For any area(s) shown on the SWM Site Plan maps/plan sheets or As-Built Plan sheets as requiring, or area(s) that is otherwise determined to require, deed restriction(s) for the purpose of protecting and prohibiting disturbance to a BMP or Conveyance, such deed restrictions will be incorporated into a written deed, restrictive covenant, or equivalent document. The deed or other document shall:
1. Include a clear and understandable description of the purpose, terms and conditions of the restricted use;
 2. Include the written legal description (metes and bounds description) of the area to which the restrictions apply that is consistent with the boundary shown on the O&M plan sheets and SWM Site Plan maps/plan sheets;
 3. Make reference to any corresponding O&M Plan(s) and O&M Agreement(s);
 4. Include language legally sufficient to ensure that the terms of the restriction run with the land and shall be binding upon the Landowner, its heirs, administrators, successors in interest, and assigns;
 5. Be submitted to the Township for review and approval prior to approval of the SWM Site Plan;
 6. Upon approval by the Township, be signed by the Landowner and owner of the BMP or Conveyance and submitted to the Township; and
 7. Be fully executed and recorded by the Township at the Chester County Office of the Recorder of Deeds within (90) days of the Township's approval of the O&M Plan.

Section 94-705. Other Post-construction Responsibilities

- A. The provisions of Section 94-804 of this Ordinance shall apply to any permanent BMP or Conveyance that is constructed as part of an approved SWM Site Plan or covered by an approved O&M Plan.

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- B. The person responsible for the operation and maintenance of a BMP or Conveyance shall make records of the installation and of all maintenance and repairs, and shall retain the records for at least (10) years. These records shall be submitted to the Township.
- C. Upon final inspection, the Township shall inform the person responsible for the operation and maintenance whether the submission of periodic (annual or other frequency) inspection and maintenance reports will be required.
- D. The owner of each BMP and Conveyance shall keep on file with the Township the name, address, and telephone number of the person responsible for maintenance activities and implementation of the O&M Plan. In the event of a change, new information shall be submitted by the BMP or Conveyance owner to the Township within (30) working days of the change.

Section 94-706. Inspection and BMP Operation and Maintenance Requirements

- A. The landowner or the landowner's designee shall inspect SWM BMPs, facilities and/or structures installed under this Ordinance according to the following frequencies, at a minimum, to ensure the BMPs, facilities and/or structures continue to function as intended:
 - 1. Annually for the first 5 years;
 - 2. Once every 3 years thereafter; and
 - 3. During or immediately after the cessation of a 10-year or greater storm, as determined by the Township Engineer. Inspection reports for inspections during or after the cessation of a 10-year or greater storm event are only required to be submitted if requested by the Township or Township Engineer
- B. Inspections shall be conducted during or immediately following precipitation events or in dry weather conditions if the BMP design parameters include dewatering within a specified period of time. A written inspection report shall be created to document each inspection. The inspection report shall contain the date and time of the inspection, the individual(s) who completed the inspection, the location of the BMP, Stormwater Management Facility or structure inspection, observations on performance, and recommendations for improving performance, if applicable. Inspection reports shall be submitted to the Township within 30 days following completion of the inspection.

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ARTICLE VIII – PROHIBITIONS

Section 94-801. Prohibited Discharges

- A. Any drain or conveyance, whether on the surface or subsurface, that allows any non-stormwater discharge including sewage, process wastewater, and wash water to enter the Township's separate storm sewer system, riparian buffers, wetlands, or other Waters of the Commonwealth is prohibited.

- B. No person shall allow, or cause to allow, discharges into the Township's separate storm sewer system or the Waters of the Commonwealth that are not composed entirely of stormwater, except:
 - 1. As provided in Subsection 94-801.C below; and
 - 2. Discharges allowed under a State or Federal permit.

- C. The following discharges are authorized unless they are determined by the Township to be significant contributors to pollution to the Township's separate storm sewer system or to the Waters of the Commonwealth:
 - 1. Discharges from fire fighting activities;
 - 2. Potable water sources including water line and fire hydrant flushings, if such discharges do not contain detectable concentrations of Total Residual Chlorine (TRC);
 - 3. Non-contaminated irrigation drainage water;
 - 4. Non-contaminated HVAC condensation and water from geothermal systems;
 - 5. Springs;
 - 6. Water from crawl space pumps;
 - 7. 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;
 - 8. Diverted stream flows;
 - 9. Flows from riparian habitats and wetlands;
 - 10. Uncontaminated water from foundations or from footing drains;
 - 11. Lawn watering;

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12. [This section left blank intentionally];
 13. Uncontaminated groundwater;
 14. Residential (i.e., not commercial) vehicle wash water where cleaning agents are not utilized;
 15. Routine external building washdown (which does not use detergents or other compounds); and
 16. Non-contaminated hydrostatic test water discharges, if such discharges do not contain detectable concentrations of TRC.
- D. In the event that the Township determines that any of the discharges identified in Section 94-801.C significantly contribute pollutants to the Township's separate storm sewer system or to the Waters of the Commonwealth, or is notified of such significant contribution of pollution by PADEP, the Township will notify the responsible person to cease the discharge.
- E. Upon notice provided by the Township under Section 94-801.D, the discharger shall, within a reasonable time period, as determined by the Township consistent with the degree of pollution caused by the discharge, cease the discharge.
- F. Nothing in this section shall affect a discharger's responsibilities under State law.
- G. Discharge from a swimming pool, hot tub or spa is prohibited, and such discharge shall not be made into a public sanitary sewer. Refer to Appendix E for PADEP Management of Swimming Pool, Hot Tub, and Spa Water Discharges Fact Sheet.

Section 94-802. Prohibited Connections

The following connections are prohibited, except as provided in Section 94-801.C above:

- A. Any drain or Conveyance, whether on the surface or subsurface, that allows any non-stormwater discharge, including sewage, process wastewater, and wash water to enter a separate storm sewer system, and any connections to the separate storm sewer system from indoor drains and sinks. Any drain or conveyance that delivers non-stormwater discharges directly into wetlands, riparian buffers, or other Waters of the Commonwealth is prohibited.
- B. Any drain or Conveyance connected from a commercial or industrial land use to a separate storm sewer system, which has not been documented in plans, maps, or equivalent records and approved by the Township.

Section 94-803. Roof Drains and Sump Pumps

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- A. Roof drains and sump pump discharges shall not be connected to sanitary sewers.
- B. Roof drain, sump pump, foundation and footing drain discharges:
 - 1. To the maximum extent practicable, shall discharge to infiltration or vegetative BMPs, or to vegetated or other areas with adequate capacity;
 - 2. May be connected to streets, storm sewers, or roadside ditches only if determined necessary or acceptable by the Township Engineer; and
 - 3. Shall be considered in stormwater management calculations to demonstrate that Conveyance and receiving facilities have adequate capacity.

Section 94-804. Alteration of BMPs

- A. No person shall modify, remove, fill, landscape, alter, or impair the effectiveness of any stormwater BMPs, Conveyances, Stormwater Management Facilities, areas or structures unless the activity is part of an approved maintenance program, without the written approval of the Township.
- B. No person shall place any structure, fill, landscaping, additional vegetation, yard waste, brush cuttings, or other waste or debris into a BMP or Conveyance, or within a stormwater easement, that would limit or alter the functioning of the stormwater BMP or Conveyance, without the written approval of the Township.

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ARTICLE IX – ENFORCEMENT AND PENALTIES

Section 94-901. Public Nuisance

- A. Any Regulated Activity conducted in the violation of any provision of this Ordinance is hereby deemed a public nuisance.
- B. Each day that a violation continues shall constitute a separate violation.
- C. A separate violation will be found to exist for each section of this Ordinance found to have been violated.
- D. To the extent that the Township does not enforce any provision of this Ordinance, such action or inaction shall not constitute a waiver by the Township of its rights of future enforcement hereunder.

Section 94-902. Right of Entry

- A. Upon presentation of proper credentials, duly authorized officers or agents of the Township may enter at reasonable times upon any property within the Township to inspect the implementation, condition, or operation and maintenance of all erosion and sediment controls and permanent stormwater BMPs, Conveyances, or other Stormwater Management Facilities both during and after completion of a Regulated Activity, or for compliance with any requirement of this Ordinance.
- B. Persons working on behalf of the Township shall have the right to temporarily locate on or in any BMP, Conveyance or other Stormwater Management Facility in the Township such devices as are necessary to conduct monitoring and/or sampling of the discharges from such BMP or Conveyance, or other stormwater facilities.
- C. Failure of the Landowner or representative to grant access to the Township within (72) hours of notification, verbal or written, is a violation of this Ordinance.

Section 94-903. Enforcement

- A. The Township Engineer or other designee is hereby authorized and directed to enforce all of the provisions of this Ordinance. The Township Board of Supervisors may delegate enforcement duties, including the initial determination of Ordinance violation and service of notice, if notice is given, to such other officers or agents as the Township shall deem qualified for that purpose.
- B. It shall be the responsibility of the Landowner of the real property on which any Regulated Activity is proposed to occur, is occurring, or has occurred to comply with the applicable terms and conditions of this Ordinance.

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- C. All Township inspections for compliance with the approved SWM Site Plan shall be the responsibility of the Township or its designee.
- D. During any stage of the work of any Regulated Activity, if the Township Engineer or other designee determines that the erosion and sediment control measures, permanent BMPs, Conveyances or other stormwater facilities are not being installed or maintained in accordance with the approved SWM Site Plan, the Township may suspend or revoke any existing permits or other approvals or issue a stop work order until the deficiencies are corrected or until a revised SWM Site Plan is submitted and approved, if and as determined to be necessary by the Township Engineer or other designee.
- E. In the event that the Township Engineer or other designee finds that a person has violated a provision of this Ordinance, or fails to conform to the requirements of any permit or approval issued by the Township, or any O&M Plan or O&M Agreement approved by the Township, the Township may order compliance by written notice of the violation to the Landowner.
- F. Such notice may, without limitation, require the following remedies:
 - 1. Performance of monitoring, analyses, and reporting;
 - 2. Elimination of prohibited connections or discharges;
 - 3. Cessation of any violating discharges, practices, or operations;
 - 4. Abatement or remediation of stormwater pollution or contamination hazards and the restoration of any affected property;
 - 5. Payment of a fine to cover administrative and remediation costs and/or forfeiture of financial security;
 - 6. Implementation of stormwater controls, BMPs, and Conveyances; and
 - 7. Operation, maintenance or repair of BMPs, Conveyances or other stormwater facilities.
- G. Such notice shall set forth the nature of the violation(s), citing to specific sections of this Ordinance which have not been met, and establish a time limit for commencement of correction and completion of correction of the violations(s). The notice shall provide for a right of the Landowner's appeal to the Township Board of Supervisors in accordance with Section 94-906 of this Ordinance. Said notice shall further advise that, if applicable, should the violator fail to take the required action within the established deadline, possible sanctions, clearly described, may be imposed, or the work may be done by the Township or designee, and the expense thereof shall be charged to the violator.

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- H. Failure to comply within the time specified in such notice shall also subject such person to the penalty provisions of this Ordinance. All such penalties shall be deemed cumulative and shall not prevent the Township from pursuing any and all other remedies available in law or equity.

Section 94-904. Suspension and Revocation of Permits and Approvals

- A. Any building, land development, or other permit or approval issued by the Township may be suspended or revoked by the Township for:
1. Noncompliance with or failure to implement any provision of the permit or approved SWM Site Plan or O&M Agreement;
 2. A violation of any provision of this Ordinance or any other law or regulation applicable to the Regulated Activity;
 3. The creation of any condition or the commission of any act during the Regulated Activity that constitutes or creates a hazard or nuisance, or endangers the life, health, safety, or property of others; or
 4. Failure to correct a violation within the allowed time period allowed per notice given by the Township.
- B. Prior to revocation or suspension of a permit, unless there is immediate danger or threat of such danger to life, public health or property, at the request of the Applicant, the Township's Board of Supervisors shall schedule a hearing on the violation and proposed revocation or suspension, pursuant to public notice. The expense of a hearing shall be the Applicant's responsibility.
- C. A suspended permit or approval may be reinstated by the Township when:
1. The Township Engineer or other designee has inspected and approved the corrections to the BMPs, Conveyances or other Stormwater Management Facilities, or the elimination of the hazard or nuisance; and
 2. The Township is satisfied that the violation has been corrected.
- D. A permit or approval that has been revoked by the Township cannot be reinstated. The Applicant may apply for a new permit or approval in accordance with this Ordinance.

Section 94-905. Penalties

- A. Any person violating or permitting the violation of the provisions of this Ordinance shall be subject to a fine of not more than \$1000.00 for each violation, recoverable with costs. The establishment of a violation for purposes of setting fines or penalties for such violation shall be in accordance with a citation to a magisterial district judge

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with jurisdiction and venue over the location of the violation and such an action will be subject to the procedures provided for the enforcement of summary offenses under the Pennsylvania Rules of Criminal Procedure. A separate offense shall arise for each day or portion thereof a violation is found to exist and may be determined for each section of this Ordinance which is found to have been violated.

- B. In addition, the Township may, through its solicitor, 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 legal or equitable forms of remedy or relief. Such relief may include costs, fees, and charges, including the Township's attorney's fees (charged at the hourly rate approved by the Board of Supervisors of the Township) and costs, as may be permitted by law.

- C. Notwithstanding any other provision of this Ordinance, the Township shall have the right at any or all times deemed necessary by the Township Engineer or designee to enter upon any property within the Township to inspect and, upon determination of a violation of this Ordinance, to correct the violation, with all expenses associated with correcting the violation to be charged to the property owner responsible for the violation.

Section 94-906. Appeals

- A. Any person aggrieved by any decision of the Township's Board of Supervisors relative to the provisions of this Ordinance may appeal to the Chester County Court of Common Pleas within thirty (30) days of the date of the Township's written decision.

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ORDINANCE APPENDIX A

**CONSERVATION DESIGN AND
LOW IMPACT DEVELOPMENT
SITE DESIGN**

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**CONSERVATION DESIGN &
LOW IMPACT DEVELOPMENT SITE DESIGN**

INTRODUCTION

Traditional approaches to land development often radically alter natural hydrologic conditions by constructing collection and conveyance systems that are designed to remove runoff from a site as quickly as possible and capture it in a detention basin. This approach has often led to the degradation of water quality, reduced groundwater recharge, and increased volumes of stormwater runoff, as well as the imposition of expenditures to detain and manage concentrated runoff downstream. Fortunately, the study of hydrology (the way rainfall interacts with slopes, soils, and vegetation) offers a number of alternative approaches that respect the natural environment and ultimately save money. The accompanying ordinance encourages the use of Conservation Design (CD), Low Impact Development (LID), and green infrastructure to preserve, restore and maintain pre-development hydrology on sites with planned land disturbance and development activity. The site design practices and recommendations included in this appendix provide a framework to assist developers, municipal planning commission members, and others involved in local land use planning with designing and implementing development that minimizes the impacts of stormwater runoff to local streams.

Conventionally designed development often divides a parcel into buildable lots, streets, and parking areas, while only keeping traditionally undevelopable areas (wetlands, floodplains, steep slopes) as open space. Existing site hydrology and natural features are often an afterthought in locating and designing stormwater systems. In contrast, Conservation Design and Low Impact Development practices strive to minimize landscape and natural feature disturbance to maintain a site's natural drainage patterns and flow conditions.

CD is a holistic site design process that aims to protect and maintain a site's unique natural, historic, and cultural features. CD emphasizes the protection of key land and environmental resources to maintain site hydrology; preserves and/or enhances significant concentrations of natural resources, open space, wildlife habitat, biodiversity corridors, and greenways (interconnected open space); incorporates unique natural, scenic, and historic site features into the configuration of the development; preserves the integral characteristics of the site as viewed from adjacent roads; and ensures flexibility in development design to meet community needs for complementary and aesthetically pleasing development.

LID consists of site design approaches and small-scale stormwater management practices that promote the use of natural systems for infiltration, evapotranspiration (returning moisture to the atmosphere through vegetation), and the harvest and reuse of rainwater. LID addresses the root cause of water quality impairment by managing stormwater as close to the point of generation as possible.

Together, CD and LID offer unique opportunities to balance the "carrying capacity" of the

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land, the human demands on the land (including land economics), and the design constraints and opportunities of a site, which together allow for a dynamic interaction between people and the natural world. The goal is to produce a design that balances the demands of human use (scale, pattern, autonomy, privacy, views, etc.) with the requirements for a sustainable landscape (reduction in land fragmentation and use conflicts, preservation of watershed hydrology, protection of wildlife corridors and species diversity, conservation of natural resources, etc.). CD and LID are integrated development processes that respect natural site conditions and attempt to replicate and/or improve the natural hydrology of a site. The abundance of Chester County's streams and headwater areas, agricultural land (consisting of prime agricultural soils), unique aquatic and terrestrial habitat, and scenic and historic resources, argue for design approaches responsive to conservation principles.

This appendix provides information on the principles, processes, and common practices of CD and LID to assist designers and planners to achieve site designs that best maintain pre-construction stormwater runoff conditions, protect site amenities, and preserve natural resources. Components of this appendix include:

- Implementation Challenges
- Design Principles and Techniques;
- Design Process;
- Design Practices;
- Benefits of Conservation Design;
- Conclusion; and
- References.

IMPLEMENTATION CHALLENGES

Various techniques exist to accomplish the purposes of CD and LID (see the list of Design Practices starting on Page 12). However, many municipal codes currently prevent creative site design and engineering by requiring mechanical "by the numbers" development of sites. Restrictive zoning, subjective economic concerns, jurisdictional preferences, and personal tastes determine how a site is developed and how stormwater will be managed. These can pose significant impediments to the use of CD and LID. Such issues, left unaddressed, will "fail to comprehensively maintain predevelopment ecological functions at sites and fail to prevent development impacts to overall watershed ecological health" (Low Impact Development, Prince George's County, Maryland). Several examples of practices that may be limited by municipal zoning or subdivision and land development ordinances (SALDO) are presented in the Design Practices section to assist municipalities, developers, and landowners to understand how to improve the development design process to allow or require CD and LID practices.

Dialogue between developers, municipalities, and planners should be encouraged early in the design process to evaluate all potential site design options. Discussions on proposed site layouts often do not occur until after the submission of preliminary/final developments plans. At this point, substantial time and expense have already gone into the development

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of these plans, resulting in the reduced preference to make substantial changes or re-designs. Thus, discussions of potential site considerations between landowners, developers, municipalities, and planners early in the design process is critical to ensuring CD and LID practices are incorporated. While the Municipalities Planning Code prevents municipalities from mandating the submission of sketch plans unless they waive preliminary or final plan requirements, voluntary submission of these plans should be encouraged. Other options also exist; for example, municipalities could mandate the sketch plan but permit a one-step preliminary/final plan submission. Moreover, this site design process emphasizes the importance of dialogue. Remaining open minded to alternative site designs, including flexibility of area and bulk standards, building types, lot sizes, and even construction standards, among others, may achieve multiple benefits, not the least of which is the protection of site hydrology and improved management of stormwater.

One of the greatest challenges to reducing the impact of development is to control the volume of stormwater runoff generated from a site. Typically, a development's increase in impervious surface contributes to reduced infiltration, evapotranspiration, and attenuation of stormwater runoff. This can result in reduced groundwater levels and lower stream baseflow during periods of dry weather and higher stream flows during and after precipitation events (which can result in increased occurrences of flooding and the erosion and destabilization of downstream streambanks). CD and LID techniques strive to prevent these problems by encouraging land development site designs that minimize post-development runoff rates and volumes and minimize needs for artificial conveyance and storage facilities. This process attempts to incorporate the desired land development into the natural hydrologic landscape in a manner that maintains and utilizes existing site hydrology features and functions to minimize generation of new stormwater runoff, thus avoiding the cumulative environmental impacts often associated with land development and reducing the need for and size of constructed stormwater facilities.

Site design practices include preserving natural drainage features, minimizing impervious surface area, reducing the hydraulic connectivity of impervious surfaces, and protecting natural depression storage. Applying this site design process helps maintain site hydrology and manage stormwater by:

- minimizing the generation of stormwater runoff (achieved by designing to the land, considering site drainage patterns and infiltration characteristics, reducing grading and compaction, and considering scale and placement of buildings); managing stormwater as close to the point of generation as possible (by disconnecting impervious surfaces, rather than collecting storm flows from all such surfaces, and distributing such flows to landscaped-based BMPs);
- providing open and vegetated channel conveyance (as needed to treat water quality, reduce velocity and infiltrate); and
- managing remaining conveyed stormwater in common open space (as needed to disperse low velocity storm flows, treat water quality, infiltrate, and release).

A well-designed site will contain a mix of all these features.

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In some communities, the use of CD and LID will require a paradigm shift in how we think about and regulate development; community education, be that of residents, developers, engineers, or community officials, will be important if we are to achieve the multiple benefits offered through the use of these alternative design principles and practices.

DESIGN PRINCIPLES AND TECHNIQUES

CD and LID place significant emphasis on maintaining, mimicking, or improving the natural hydrology of land undergoing development. A site's natural hydrology refers to the drainage patterns and infiltration characteristics existing on a site. With CD and LID, effort is placed on development design that minimizes the generation of stormwater runoff. This can be achieved by designing to the land, i.e., giving consideration to site drainage patterns and site infiltration characteristics, reducing grading and compaction, and carefully considering the placement and scale of streets and buildings. Consideration of the natural drainage patterns of a site and the capacity of the site to infiltrate water are central to the concept of managing stormwater on-site.

Where stormwater is generated, the next step involves managing such storm flows as close to the source of generation as possible. This is achieved by disconnecting impervious surfaces and distributing storm flows to green infrastructure. Disconnection allows for management near the source of generation rather than the traditional approach of conveying all storm flows to a central "catch and release" facility (expensive to build and expensive to maintain). Where distributed management practices common to LID are insufficient to accommodate storm flows, CD encourages the use of open channel conveyance systems, such as vegetated channels, bioswales, and wet swales, that further manage storm flows in common open space. This multi-management approach (or four-step management process) – minimizing the generation of stormwater, landscape-based management near the point of generation, open channel conveyance, and management in common open space – is a clear advantage of CD (see Figure 1).

It should also be noted that CD is quite effective on sites with limited infiltration capability, principally, because the four-step management process builds redundancies into runoff management, seeking to achieve disconnection, using LID, providing open channel conveyance, and making use of common open space where other tools and techniques are insufficient on their own.

Figure 1
Conservation Design Principles
Maintaining Site Hydrology and Managing Stormwater

- Step 1 – Minimize Generation of Stormwater Runoff through Development Design: Achieved by Designing to the Land & Optimizing the Cumulative Benefits of the Site’s Natural Hydrologic Features**
- Consider Natural Drainage Patterns and Infiltration Characteristics
 - Reduce Grading and Compaction by Utilizing Natural Topography
 - Consider Placement and Scale of Streets and Buildings
 - Minimize Land Disturbance – both Surface and Subsurface
 - Minimize Cumulative Area to be Covered by Impervious and Compacted Surfaces
- Step 2 – Manage Stormwater as Close to the Point of Generation as Possible using Distributed LID Practices**
- Take Advantage of the Natural Hydrologic Landscape to Achieve Runoff Controls
 - Disconnect Impervious Surfaces
 - Distribute Storm Flows to Green Infrastructure
- Step 3 – Utilize Open Channel Conveyance (as needed)**
- Step 4 – Management in Common Open Space (or as conveyed to other green infrastructure practices)**
- Integrate Management Facilities into the Natural Environment
 - Incorporate Natural Site Features into the Design
 - Create Site Amenities that can be Enjoyed by Residents and Provide a Community Aesthetic

No single approach is appropriate for all sites; rather, CD is a process by which to assess the appropriateness of different techniques (LID or otherwise) for different sites. The key to making CD and LID work is a willingness on the part of all involved to be flexible in how a particular site is developed. With this in mind, CD makes it possible to achieve multiple objectives, both in terms of site design (controlling peak flows, reducing total volume, and enhancing water quality), as well as those related to community (protecting

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natural resources, preserving habitat, interconnecting open space, providing greenways, and achieving better designed communities). (See Figure 2)

Figure 2
Common Objectives Of
Conservation Design

Conservation Design practices are intended to protect environmental resources, preserve open space, and manage stormwater by respecting natural drainage patterns and infiltration characteristics.

Common Objectives

Site Design Objectives

Maintain Natural Drainage Patterns

Preserve Water Budget and Natural Infiltration

Minimize Grading – Design to the Site (Minimum Disturbance, Minimum Maintenance)

Reduce Need for Traditional Structural Stormwater Management Facilities (incorporate the use of Green Infrastructure)

Reduce Impervious Cover

Preserve Natural Features & Habitat (Contiguous Open Space) Roads

Community Objectives

Community Commons/Greens

Lots that Front or Back to Open Space

“Neighborhoods” within Neighborhoods

Options for a Variety of Housing Types/Lot Sizes

Incorporate Unique Site Features into the Design (Natural/Scenic/Historic)

Preserve Characteristics of Site as Viewed from Adjoining

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Provide Open Space Linkages with
Adjacent Parcels

Provide Trail Systems and/or
Alternative Transportation
Options

CD and LID involve identifying and prioritizing natural resources and natural and constructed hydrologic features and incorporating such features into the overall site design to take advantage of their efficiencies in hydrologic performance, their cost efficiencies of reducing the need for or size of constructed stormwater facilities, and their aesthetic amenities.

Techniques to apply Figure 1 design principles are presented in Table 1.

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Table 1 – Site Design Process Principles and Techniques

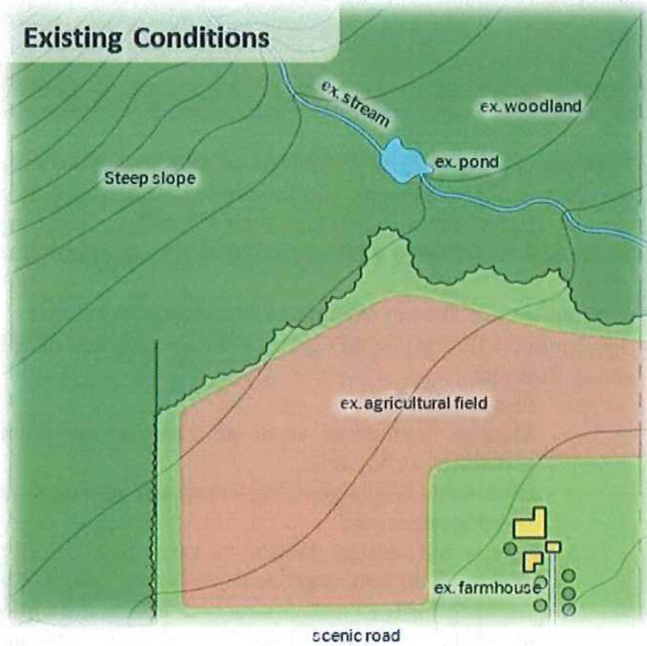
Conservation Design Principles	Select Design Techniques
<p>Development Design that Minimizes the Generation of Stormwater Runoff: Achieved by Designing to the Land & Optimizing the Cumulative Benefits of the Site's Natural Hydrologic Features</p>	<ul style="list-style-type: none"> • Maintain the natural soil structure and vegetative cover that are often critical components of maintaining the hydrologic functions of natural infiltration, bioretention, flow attenuation, evapotranspiration, and pollutant removal. Strive to achieve multiple stormwater objectives (i.e., maintain hydrologic regime including both peak rate and total volume control, water quality control, and temperature control). • Protect, or improve, natural resources to reduce the needs for environmental mitigation, future environmental restoration, and cumulative flow and water quality impacts of unnecessary disturbances within the watershed system. • Minimize the disturbance of natural surface and groundwater drainage features and patterns, discharge points and flow characteristics, natural infiltration and evapotranspiration patterns and characteristics, natural stream channel stability, and floodplain conveyance, etc. • Minimize the size of individual impervious surfaces. • Separate large impervious surfaces into smaller components. • Avoid unnecessary impervious surfaces. • Utilize porous materials where suited in lieu of impervious materials. • Prioritize on-site hydrologic features (i.e., for protection, improvement, utilization, or alteration) and natural site drainage patterns and infiltration characteristics and consider them for the cornerstones of the conceptual site design. Prevent rather than minimize. • Reduce grading and compaction by applying selective grading design methods to provide final grading patterns that preserve existing topography where it most benefits natural hydrologic functions and where needed; this results in graded areas that evenly distribute runoff and minimize concentrated runoff flows. • Consider the scale and placement of buildings and other infrastructure to minimize impact to natural hydrologic features. • Incorporate unique natural, scenic, and historic site features into the configuration of the development, and ensure flexibility in development design to meet community needs for complementary and aesthetically pleasing development.

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Conservation Design Principles	Select Design Techniques
Managing Stormwater as Close to the Point of Generation as Possible using Distributed LID Practices	<ul style="list-style-type: none"> • Incorporate natural hydrologic features that have been selected for their available capacity and function into the overall system of site runoff controls (protect their hydrologic and natural ecosystem functions without directing additional stormwater to them). • Disconnect runoff from one impervious surface to another. • Incorporate LID (or similar) green infrastructure and distribute storm flows to: <ul style="list-style-type: none"> ○ Reduce runoff; ○ Manage stormwater at or as close to the point of generation as possible; ○ Disconnect discharges from streets and municipal storm sewer systems; and ○ Select and design BMPs to give first priority to nonstructural and vegetated (landscape-based) BMPs, second priority to surface structural BMPs, third priority to subsurface structural BMPs, and design subsurface BMPs as shallow as possible.
Open Channel Conveyance (as needed)	<ul style="list-style-type: none"> • Convey concentrated flows by means of innovative pervious vegetated channels rather than piped systems • Provide open channel conveyance, as needed, to: <ul style="list-style-type: none"> ○ Treat water quality; ○ Reduce runoff velocity; and ○ Promote infiltration and evapotranspiration of runoff.
Management in Common Open Space (or as conveyed to other green infrastructure practices)	<ul style="list-style-type: none"> • Rely on natural processes within the soil mantle and the plant community to the maximum extent practicable. • Manage remaining conveyed stormwater from small storms in common open space areas to achieve multiple objectives: <ul style="list-style-type: none"> ○ Disperse storm flows and reduce velocity; ○ Treat water quality; and ○ Promote infiltration and evapotranspiration of runoff. • Provide for appropriate conveyance to retention or detention storage facilities as needed for flows from large storm events (as needed). • Maintain open space functions consistent with common area uses (passive recreation, on-site sewage management, scenic vistas, etc). Management practices should be integrated into the natural environment and be site amenities.

The concepts presented in Figures 1 and 2, and further described in Table 1, are graphically presented below in Figures 3.1, 3.2, 3.3, 3.4, 3.5, and 3.6.

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60
Total acres of site

38
Existing acres of
woodland

Figure 3.1: Existing conditions on a 60-acre, majority wooded parcel

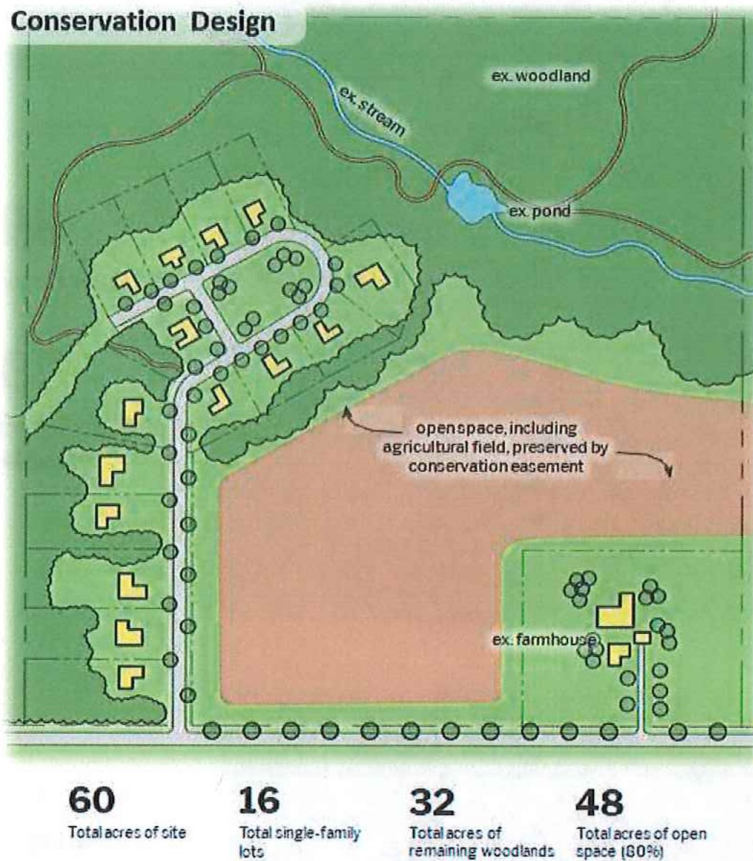


- No accommodation for connections to future development
- Clearing and building in riparian and floodplain areas
- Wide streets throughout
- Conventional stormwater facilities
- Natural areas significantly disturbed
- Site layout not designed to fit terrain resulting in excessive grading

16 **15** **0**
Total single-family lots Acres of remaining woodlands Acres of open space

Figure 3.2: Example of how the above parcel may be developed using conventional layout methods

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✓ RECOMMENDED

- **Provides open space linkages with adjacent parcels.** Maintain contiguous open space
- **Minimizes grading: Design to the site** Minimum disturbance, minimum maintenance
- **Preserves water budget and natural infiltration** Narrow roads, smaller lots
- **Reduces need for traditional structural stormwater management facilities** Incorporate the use of green infrastructure
- **Maintains natural drainage patterns**

- Houses line new road, with all lots adjacent to protected open space
- Trail system
- New road leaves existing stone wall and can connect to future development on adjacent property
- Spatial characteristics of existing farmstead maintained
- Reduced lot size (0.75 acres)

Figure 3.3: Example of a single-family development on the same parcel using the principles of Conservation Design and Low Impact Development

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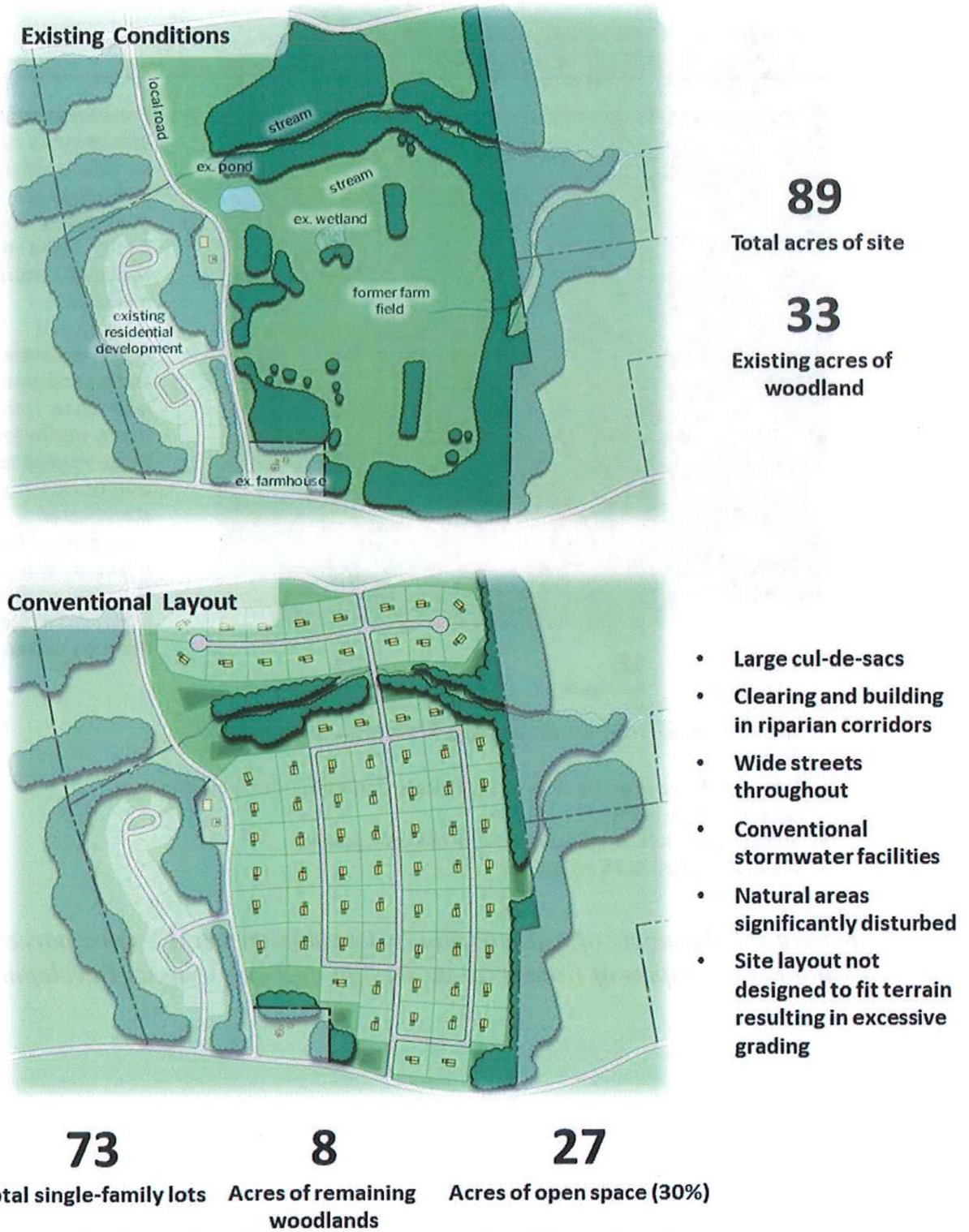


Figure 3.4: Example of how a larger parcel with a mix of open meadows, woodlands, scattered fence rows, and stream corridors may

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be developed using conventional layout methods. Lot sizes are approximately $\frac{3}{4}$ of an acre.

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Conservation Design



85

Total Single Family Homes

33

Acres of remaining woodlands

67

Acres of open space (75%)

Conservation Design



- Provides open space linkages with adjacent parcels
- Designed to the site to minimize grading
- Narrower roads and smaller lots to reduce impervious cover
- Maintains natural drainage patterns
- Preserves natural features and habitat
- Community commons and green space
- Trail systems
- Characteristic of site preserved as viewed from adjoining roads

Figure 3.5: Example of single-family development on the same parcel using the principles of Conservation Design and Low Impact Development. Lot sizes are approximately $\frac{1}{4}$ of an acre.

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96
Total lots, 110 units

33
Acres of
remaining woodlands

67
Acres of
open space (75%)



- Provides open space linkages with adjacent parcels
- Designed to the site to minimize grading
- Narrower roads and smaller lots to reduce impervious cover
- Maintains natural drainage patterns
- Preserves natural features and habitat
- Community commons and green space
- Trail systems
- Characteristic of site preserved as viewed from adjoining roads

Note: While the Conservation Design graphics shown above optimize unit types and lot sizes (and thus allow greater density), it is recognized that this type of mixed use may not be appropriate in some zoning districts. However, Conservation Design works equally well where housing diversity is not appropriate.

Figure 3.6: Example of higher density mixed use site design on the same parcel using the principles of Conservation Design and Low Impact Development.

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DESIGN PROCESS

The first step in applying CD is to identify, delineate and assess the functions of all existing natural resources and natural and constructed hydrologic features that: are located within the project site; will receive discharge from the project site; or may be impacted by runoff or disturbance from the proposed land development project. These include:

- Streams, waterways, springs, wetlands, vernal pools, and water bodies;
- Drainage patterns, conveyances, and discharge points;
- Natural infiltration areas and patterns;
- Areas of natural vegetation or woodlands that provide significant evapotranspiration, pollutant removal, bank stabilization, flow attenuation, or riparian buffer functions;
- Floodplains; and
- Other features that contribute to the overall hydrologic function and value of the site and its receiving streams.

Once this inventory and assessment are completed, these identified resources and features are then prioritized for their ability to provide hydrologic function and performance for managing runoff from the proposed site improvements. Specifically, they should be prioritized as follows:

- Those to be incorporated into the site design in a manner that provides for their protection from any disturbance or impact from the proposed land development;
- Those to be protected from further disturbance or impact and for which the proposed land development will provide improvement to existing conditions;
- Those that can be incorporated into and utilized as components of the overall site design in a manner that protects or improves their existing conditions while utilizing their hydrologic function (i.e., for infiltration, evapotranspiration, or reducing pollutant loads, runoff volume or peak discharge rates, etc.) to reduce the need for or size of constructed BMPs; and
- Those that may be considered for alteration, disturbance, or removal.

These prioritizations are then applied as the basis on which to begin the site design lay-out, grading, construction, and permanent ground cover designs to achieve the CD Principles outlined above.

Evaluating a Site Using Conservation Design Principles

The following is a suggested series of steps that landowners, developers, and municipalities can take to achieve CD goals and work together in a more effective manner. While this approach places significant emphasis on the initial phases of project design, it will strengthen support for the plan and substantially reduce the time needed for preliminary and final plan review and approval.

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As stated above, the sketch plan process encouraged herein cannot be mandated by municipalities in Pennsylvania under Act 247 (Municipalities Planning Code) unless requirements for either the preliminary plan or final plan are waived. Some municipalities are doing just this by requiring sketch plans and preliminary/final plan submissions while others “strongly encourage” sketch plans in their subdivision/land development ordinances. The Chester County Planning Commission (CCPC) reviews sketch plans at no charge and highly recommends their use. Additional information on sketch plans can be found in the Chester County Planning Commission’s “Sketch Plan” eTool. Whichever approach is taken, sketch plans can be of tremendous value to the community and developer alike; in particular, sketch plans offer developers the opportunity to get municipal feedback on design prior to investing large sums in engineering design.

1. Determine Development Goals

- Define what is driving the decision to develop the property.
- Consider the site context – regional, local and site characteristics of land ownership, visual patterns, cultural patterns, roadways, vegetation, wildlife habitat, topography, etc. Consider possibilities for linking other landscapes, stream corridors, critical farmland and distinctive woodland patterns; identify or establish wildlife or recreational trail corridors, etc. Consider the natural hydrology of the site – how water flows over the land (the natural drainage patterns), where vegetation intercepts water, etc.

Note: Further consideration of these issues is suggested after a resource inventory and site analysis are performed.

- Clearly define the goals to work towards – these are the design goals for the project. Goals could be economic and/or personal/family related, as well as visual, ecological, agricultural, historical, and educational.
- Consider the project’s time schedule and that of the municipal review process.

2. Conduct an Inventory of Existing Resources - Examine the Natural/Scenic/Historic Resources and Land Use Patterns

- Determine the site context (defined above)
- Evaluate current and past land use (agriculture, wooded lot, vacant, brownfield, etc.)
- Assess wind patterns and micro-climate
- Delineate steep slopes and general topography

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- Identify existing vegetative cover conditions according to general cover type, and label specimen trees and the canopy line of existing woodlands.
- Map hydrologic features and drainage patterns (wetlands, floodplains, streams, drainage swales, etc.)
- Identify scenic viewsheds (interior and exterior)
- Consider potential historic and cultural resources
- Assess soil patterns (hydric soils, prime agricultural soils, infiltration-capable soils, etc.) and vegetation patterns (landscape texture and patterns)
- Consider local zoning regulations
- Review the site for obvious land fragmentation (agricultural, natural habitat, human use, viewsheds)
- Determine the presence of endangered/threatened species and unusual habitats, critical natural areas, etc.

Other design considerations include solar exposure (seasonal changes), light patterns (shadows), sense of space (enclosed, open, mysterious) and sense of scale.

3. Undertake a Site Analysis

- Compare/overlay/combine the natural/scenic/historic resource and land use pattern information to create a general understanding of the site's opportunities and constraints, particularly as they relate to the design goals. Some initial constraints could present opportunities. Particular emphasis should be placed on site contours and existing site hydrology, e.g., drainage patterns, infiltration capability of soils, etc.
- Prepare a site analysis map that outlines the most important opportunities and constraints. The site analysis should identify both the traditionally unbuildable areas (wet, flood-prone, or steep) and the most outstanding aspects of the remaining land (such as scenic vistas, natural meadows, hedgerows, mature woodlands, historic buildings or other structures, stone walls, etc.). It is important to note that CD places significant emphasis on soils (particularly the manner in which water moves across and through them). Disturbance of soils, disturbance of vegetation, and compaction all affect the ability of a site to manage stormwater. For example, while it is imperative that good draining soils be preserved to the maximum extent possible, areas of poor permeability that contain robust vegetation may function quite satisfactorily (a well-developed root zone in conjunction with established vegetation can significantly improve poor soil

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infiltration and permeability). Conversely, even good soils, if substantially disturbed and compacted, can become far less permeable.

Note: Although reliance on published soils data is acceptable for site analyses and conceptual planning purposes, detailed planning must include soil field sampling.

4. *Create Conceptual Designs or Sketch Plans*

- Use the site analysis to create conceptual designs. Consider the principles and objectives of Conservation Design as the basis for initially conceptualizing layouts (Note: some municipalities will have a similar design process codified in their subdivision and land development ordinance referred to as the 4-step design process). List opportunities and constraints of each design element. This component involves four steps:

- i) **Delineate conservation areas (based on the findings of the site analysis) and potential development areas.** Designing to the site, rather than grading to achieve a standardized product, is preferable because it accomplishes the goals of minimum disturbance/minimum maintenance (i.e., respecting the site's natural hydrology, minimizing grading and earth disturbance, etc.); such an approach can also substantially reduce construction costs. Additional emphasis should be given to the site's existing hydrology, such as drainage patterns, the location of natural swales and conveyances, and the infiltration capability of soils.

This step requires careful integration of stormwater management and CD concepts into the design of the site. Engineering stormwater solutions after a design has been selected fails to consider a key component of CD, i.e., design as an integral best management practice. For example, it is better to prevent runoff than to attempt to mitigate it once it is created. Approaches to the site design that can reduce the generation of stormwater from the outset are the most effective approach to stormwater management.

- ii) **Locate desired/permitted structures (housing units, buildings, etc.) on the property (as they relate to Step 1 and the design goals).** Again, Conservation Design principles should be carefully considered here. Will compact development allow for a reduction in road length? Is it possible to interconnect open space, thus permitting stormwater management close to the source of generation and creating biodiversity corridors, etc. (multiple objectives)? Can structures be located so that a majority back or front to open space?
- iii) **Connect buildings or house sites with streets (logical alignment) and trails (where appropriate).** Consider ways to reduce impervious cover (one-way streets where appropriate, planted islands in cul-de-sacs, etc.).

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iv) **Draw in lot lines for the house sites or buildings, where needed.**

- Meet with municipal officials and review plans -- what is liked, not liked, and why.
- Identify a direction for engineering and final design.

5. *Formulate A Final Design (or Sketch Plan) as the Basis for an Engineered Site Plan*

- Synthesize discussion of conceptual designs (sketch plans) and finalize design.
- Develop legal instruments necessary to realize plan objectives, e.g., conservation easements, deed restrictions, homeowners association, estate planning, etc. (Note: these concepts are considered throughout the design process).

6. *Obtain Approvals (Follow-up)*

- Obtain municipal and County buy-in of master sketch plan, and
- Proceed to Final Engineered Plan approvals.

DESIGN PRACTICES

Numerous practices and strategies can be considered where their aim is to sustain and utilize the benefits of existing site hydrology and minimize the generation of new stormwater runoff. Careful consideration of site topography and implementation of a combination of the design practices described herein may reduce the cost associated with implementing stormwater control measures. Following are brief descriptions of various practices that can be used to achieve the principles of CD and LID.

Site Layout Practices

The following site layout practices are but a few of the methods by which CD and LID can be implemented. Although municipal codes can reflect such practices, they are less functions of regimented codes and procedures than about understanding and recognizing the benefits and values that existing resources can contribute to the desired outcomes of the land development project. In many circumstances, communication among design engineers, land planning and environmental professionals, knowledgeable developers, community representatives, and regulatory authorities can promote a beneficial collective understanding about the most effective path forward to achieve optimum planning outcomes.

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. Unfortunately, some common land development practices encourage just the opposite pattern -- streets and adjacent storm

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sewers typically are located in the natural headwater valleys and swales, thereby replacing natural drainage functions with an impervious system. As a result, runoff and pollutants generated from impervious surfaces flow directly into storm sewers with no opportunity for attenuation, infiltration, or filtration. Designing developments to fit site topography retains much of the natural drainage function. In addition, designing with the land minimizes the amount of site grading, reduces the amount of compaction that can alter site infiltration characteristics, and can result in cost savings to the developer.

Protecting Natural Depression Storage Areas. Depressional storage areas have no surface outlet or drain very slowly following a storm event. They can be commonly seen as ponded areas in fields during the wet season or after large storm events. Some development practices eliminate these depressions by filling or draining, thereby eliminating 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 to assist in reducing runoff volumes and reducing runoff rates. Designing around the depression or incorporating its storage as additional capacity in required detention facilities, treats this area as a site amenity rather than a detriment.

Avoiding Introduction of Impervious Areas. Reduction of impervious cover is one of the greatest benefits of CD. The combined benefits of setting aside more than half of the buildable land as open space, coupled with the resulting shorter road lengths, result in less impervious cover and less compacted soil. Building footprints, sidewalks, driveways, and other features producing impervious surfaces should be evaluated to minimize impacts on runoff. Designing a site to reduce the overall length and area of roads not only reduces total impervious cover, but also lowers municipal road maintenance and snow removal costs. **In many instances, municipalities have the ability to reduce impervious cover by providing incentives or opportunities in their zoning and subdivision/ land development ordinances to reduce road width, reduce or modify cul-de-sac dimensions, reduce or modify curbing requirements, and reduce or modify sidewalk requirements.** For example, curbing contributes to impervious cover and channels storm flows to inlets, thus further concentrating runoff. An alternative is to consider bioswales and/or infiltration trenches that can treat and attenuate flows coming off roadways. Where curbs are desirable, simply providing curb breaks or openings of 6-12 inches every 2-4 feet can disconnect flows and reduce concentration of runoff. Cul-de-sacs can be replaced with “hammerheads” or be designed with planted islands to reduce impervious cover (both of which can be designed to allow sufficient turning radius for emergency vehicles). In fact, planted islands in cul-de-sacs can be designed to intercept road runoff and contribute to infiltration.

Disconnecting 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 roof runoff over lawns and reducing the use of storm sewers. Site grading should promote increasing travel time of stormwater runoff from these sources and should help reduce concentration of runoff to a single point within the project site. Along roadways, where feasible, low velocity runoff (i.e., 1-to-2-year storms) can be infiltrated in grass swales.

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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 “driveway-to-street-to-storm sewers” or parking lots. The practice also discourages sloping driveways and parking lots to the street. Crowning the driveway, to run off to the lawn, uses the lawn as a filter strip.

Reducing Street Widths. Street widths can be reduced by either eliminating on-street parking (where conditions warrant) and/or by designing roads to meet actual demand. Designers should consult with municipal officials and staff to select the narrowest practical street width for the design conditions (speed, curvature, housing density, need for on-street parking, etc.). For example, permitting one-way streets for small loop roads can reduce overall road width. Reduced street widths also can lower maintenance needs and costs. Municipalities should review their ordinances to ensure that their street requirements are not over or under designed. Although there are some situations, such as with higher density development, where on-street parking may be needed, the amount of on-street parking, and hence overall street width, should be gaged to need. For further information, see the Multi-modal Circulation Handbook prepared by the CCPC (or consult other smart street publications). Narrower neighborhood streets should be considered and encouraged under select conditions.

Reducing or Modifying Sidewalk Requirements. 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 as an alternative to reduced sidewalks, where appropriate. Where used, consideration should be given to constructing trails with pervious materials.

Reducing or Modifying Parking Requirements. Parking standards, particularly for nonresidential development, can be excessive. Reducing spaces to match actual demand makes sense and can significantly reduce impervious cover. In addition to or in lieu of reductions, alternatives such as shared or reserve parking should be considered. Where appropriate, stall size should also be considered and modified as needed.

Reducing Building Setbacks. Reducing building setbacks (from streets) reduces the size of impervious areas of driveways and entry walks and is most readily accomplished along low-traffic streets where traffic noise is not a problem.

Minimum Disturbance/ Minimum Maintenance. Reducing site disturbance and grading can go a long way towards reducing runoff. Sensitive site design conducive to the natural features of the site, including natural site contours, can reduce the amount of land disturbed during actual development. Often referred to as “fingerprinting,” this approach identifies the limits of disturbance, which are flagged in the field. As is often the case, development sites need some grading in order to achieve development objectives. In these cases, there are often opportunities to make grading part of the solution, rather than part of the problem. Careful grading can capitalize on natural site functions to achieve stormwater management objectives. For example, grading that does occur can be incorporated into terracing or berming near existing vegetation to aid in infiltration, stormwater management and

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pollutant filtering.

Constructing Compact Developments using Conservation Design Principles: Lower impact, compact CD can reduce the amount of impervious area for a given number of lots. Reductions in overall infrastructure, including reduced street length, width, curbing, and parking, among others, can contribute to a reduction in development and long-term maintenance costs. Reduced site disturbance and preservation of open space help buffer sensitive natural areas and retain more of a site's natural hydrology. Development can be designed so that areas of high infiltration soils are reserved as stormwater infiltration areas. Construction activity can be focused onto less sensitive areas without affecting the gross density of development. One impediment to the use of smaller lots is where lot area impervious cover standards (as opposed to total impervious cover standards) make it difficult to locate houses, driveways, pools, septic, etc., on small lots. Where this issue arises, municipalities may want to consider reductions in, or waivers to, lot area impervious cover standards where it can be shown that total impervious cover standards can be met and a stormwater management report indicates that the coverage proposed can be managed appropriately on the site.

LID Practices and Stormwater Control Measures

Stormwater Control Measures (SCMs) are intended to supplement natural hydrology site design techniques where needed. Structural in nature, such practices include bioretention facilities, rain gardens, swales, and other engineered stormwater BMPs. Listed here are techniques intended to help manage stormwater predominantly at or near the source, rather than traditional techniques that largely release runoff over an extended period of time to adjacent properties and streams. This list, in no way exhaustive, gives examples of a few of the most common practices. It should be noted that LID aims to mimic the predevelopment site hydrology by using site design techniques that store, infiltrate, evaporate, and detain runoff. Use of these techniques helps to reduce off-site runoff and ensure adequate groundwater recharge. Since every aspect of site development affects the hydrologic response of a site, LID control techniques focus mainly on-site hydrology. LID strives to conserve existing site resources, minimize site impacts, maintain (and even extend) the time of concentration of runoff, utilize distributed management practices, and prevent pollution.

Bioretention. This type of BMP combines open space with stormwater treatment. Soil and plants, rather than sand filters, treat and store runoff. Infiltration and evapotranspiration are achieved, often coupled with an underdrain to collect water not infiltrated or used in the root zone.

Rain Gardens. Typically, rain gardens are shallow depression areas containing a mix of water tolerant native plant species. The intent is to capture runoff for storage and use in the root zone of plants. Intended largely as a way of managing stormwater through evapotranspiration (ET), rain gardens often function as infiltration facilities as well.

Vegetated Open Channel Conveyances. By reducing the use of storm sewers to drain streets, parking lots, and back yards, the potential for accelerating runoff from development

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can be greatly reduced. This practice requires greater use of natural or vegetated drainage 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, who may expect runoff to disappear shortly after a rainfall event.

Permeable Paving Materials. These materials include permeable interlocking concrete paving blocks or porous bituminous concrete, among others. 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. Surfaces for which seal coats may be applied should refrain from using permeable paving materials. Note: ongoing maintenance is required for some surfaces to minimize potential for clogging.

Residents and municipal officials of communities that utilize LID and other green technology practices often need to be informed of the benefits of such facilities. LID practices can offer enhanced stormwater control in a more naturalized setting, reduce maintenance needs and costs, provide more attractive management options, and provide opportunities for wildlife habitat. Descriptions of the benefits of such practices should be included in homeowners association documents (and conveyed to homeowners in other ways) and signage should be used to convey helpful information about the function and value of such practices.

BENEFITS OF CONSERVATION DESIGN

Studies over the past 25 years have shown that development planned according to CD principles yields significant benefits to homeowners, developers, municipalities, and local communities. Homeowners see tremendous value in the preservation of open space and the protection of natural features, even if it does not exist on their lots (National Association of Home Builders, 1991; DVRPC, 2011). Developers experience reduced construction costs and enjoy the improved marketability. Municipalities see a reduced demand for new municipal parks and receive additional revenue from improved property values. Areas preserved as open space allow for passive and active recreational opportunities and help to preserve the unique character of the site. Common open spaces also help to foster social cohesion by providing residents with opportunities to get outside and interact with neighbors without having to drive. Ultimately, communities designed using CD planning principles are more desirable places to live, work, and play.

Given the improved sense of place and community, dollar appreciation of conservation subdivisions outpaces conventional development by upwards of 12% (The Conservation Fund, 2001). In Indiana, the use of conservation subdivision design added \$20,000 in worth to each lot without decreasing the total number of lots (ConservationTools.org). Even more compact development (quarter-acre lots) sells for more than half-acre and larger lots where open space exists. Over a 20-year period, the conservation development homes built on quarter-acre lots sold for an average \$17,000 more than their counterparts built on half-acre lots (Northeastern Illinois Planning Commission, 2003). Analyses completed as a part of Chester County’s *Return on Environment* report note that in Chester County, average

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property values have increased by more than \$11,000 per lot for those homes located near open space (*Return on Environment*, Chester County, 2019). Furthermore, this same report identifies the reduced need for stormwater infrastructure as a major cost savings for conservation design subdivisions.

Developers see value through reduced development costs and increased unit values. In Texas, respect for the natural terrain and existing resources allowed the developer of an 80-lot development to reduce grading costs by 83% (\$250,000) compared to a conventionally-engineered plan (Growing Greening, ConservationTools.org). CD subdivisions typically cost upwards of \$7,400 less per lot to build (Environmental Law and Policy Center, 2011). Examples of cost savings to developers include:

- Reduced Site preparation costs
 - Elimination of mass re-grading
 - Decrease in erosion and sediment control measures
- Reduced Infrastructure costs
 - Reduced need for storm water basins
 - Reduced roadway lengths
 - Reduced drainage pipe installations
- Increased value of units
 - Located adjacent to open space
 - Positioned to coexist with natural resource areas

Conventional development places tremendous burdens on infrastructure and typically does not pay for itself in services provided. CD and compact development reduce the costs of infrastructure and construction, preserve open space, increase the inherent value of units over conventional development, pose greater opportunities for cost efficient housing, and offer greater protection to the environment and our waterways. And while costs to develop go down, value to homeowners and municipalities goes up.

It should also be noted that there is a distinct climate benefit to be gained from the principles of conservation design, among them: providing open land for stormwater infiltration, landscape restoration, wildlife habitat, heat mitigation, and storm resilience, among others. The tools and techniques described herein offer important techniques by which to implement climate action plans published at the local, county and state levels (see also Chester County's Climate Action Plan and the Pennsylvania Department of Conservation and Natural Resources Climate Change Adaptation and Mitigation Plan).

CONCLUSION

The use of Conservation Design (CD), Low Impact Development (LID), and green infrastructure offers municipalities and developers opportunities to protect and enhance the hydrology of development sites, as well as address other environmental and social issues related to development. In conclusion, development designed using these principles results

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in a more desirable place to live.

As noted above, land development sites can be evaluated through a consensus-driven stakeholder process that seeks to determine development goals, conduct a resource inventory, undertake a site analysis, create conceptual designs (sketch plans), formulate final designs, and obtain government buy-in and approval. Flexibility by all parties allows each site to be evaluated for its unique resources and potential. Solutions emerge from early and on-going engagement among all stakeholders in a project.

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ORDINANCE APPENDIX B

RUNOFF COEFFICIENTS AND CURVE NUMBERS

TABLE B-1. RUNOFF CURVE NUMBERS

Source: Table 2-2a, Table 2-2b, and Table 2-2c from U. S. Department of Agriculture, Natural Resources Conservation Service, June 1986, Urban Hydrology for Small Watersheds, Technical Release No. 55 (TR-55), Second Edition.

TABLE B-2. RATIONAL RUNOFF COEFFICIENTS

Source: Table F.2 from Delaware County Planning Department, December 2011, Crum Creek Watershed Act 167 Stormwater Management Plan.

TABLE B-3. MANNING'S 'n' VALUES

Source: Table 3-1 from United States Army Corps of Engineers, January 2010, HEC-RAS River Analysis System, Hydraulic Reference Manual, Version 4.1.

TABLE B-1. RUNOFF CURVE NUMBERS

(3 pages)

Source: Table 2-2a, Table 2-2b, and Table 2-2c from U. S. Department of Agriculture, Natural Resources Conservation Service, June 1986, Urban Hydrology for Small Watersheds, Technical Release No. 55 (TR-55), Second Edition.

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Chapter 2

Estimating Runoff

Technical Release 55
Urban Hydrology for Small Watersheds

Table 2-2a Runoff curve numbers for urban areas ^{1/}

Cover description Cover type and hydrologic condition	Average percent impervious area ^{2/}	Curve numbers for hydrologic soil group			
		A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.) ^{3/} :					
Poor condition (grass cover < 50%).....		68	79	86	89
Fair condition (grass cover 50% to 75%).....		49	69	79	84
Good condition (grass cover > 75%).....		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way).....		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way).....		98	98	98	98
Paved; open ditches (including right-of-way).....		83	89	92	93
Gravel (including right-of-way).....		76	85	89	91
Dirt (including right-of-way).....		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) ^{4/}		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders).....		96	96	96	96
Urban districts:					
Commercial and business.....	85	89	92	94	95
Industrial.....	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses).....	65	77	85	90	92
1/4 acre.....	38	61	75	83	87
1/3 acre.....	30	57	72	81	86
1/2 acre.....	25	54	70	80	85
1 acre.....	20	51	68	79	84
2 acres.....	12	46	65	77	82
<i>Developing urban areas</i>					
Newly graded areas (pervious areas only, no vegetation) ^{5/}		77	85	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

^{1/} Average runoff condition, and $I_a = 0.25$.

^{2/} The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

^{3/} CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

^{4/} Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

^{5/} Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

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Table 2-2b Runoff curve numbers for cultivated agricultural lands ^{1/}

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment ^{2/}	Hydrologic condition ^{3/}	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
		Poor	65	73	79	81
C&T+ CR	Good	61	70	77	80	
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
	C&T+ CR	Poor	60	71	78	81
		Good	58	69	77	80
	Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85
Good			58	72	81	85
C		Poor	64	75	83	86
		Good	55	69	78	83
C&T		Poor	63	73	80	83
		Good	51	67	76	80

^{1/} Average runoff condition, and $I_p=0.25$

^{2/} Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

^{3/} Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good $\geq 20\%$), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

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Chapter 2

Estimating Runoff

Technical Release 55
Urban Hydrology for Small Watersheds

Table 2-2c Runoff curve numbers for other agricultural lands ^{1/}

Cover description Cover type	Hydrologic condition	Curve numbers for hydrologic soil group			
		A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. ^{2/}	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.	—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. ^{3/}	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 ^{4/}	48	65	73
Woods—grass combination (orchard or tree farm). ^{5/}	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. ^{6/}	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 ^{4/}	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

^{1/} Average runoff condition, and $I_a = 0.25$.

^{2/} *Poor*: <50% ground cover or heavily grazed with no mulch.

Fair: 50 to 75% ground cover and not heavily grazed.

Good: > 75% ground cover and lightly or only occasionally grazed.

^{3/} *Poor*: <50% ground cover.

Fair: 50 to 75% ground cover.

Good: >75% ground cover.

^{4/} Actual curve number is less than 30; use CN = 30 for runoff computations.

^{5/} CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.

^{6/} *Poor*: Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.

Fair: Woods are grazed but not burned, and some forest litter covers the soil.

Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

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TABLE B-2. RATIONAL RUNOFF COEFFICIENTS
(1 page)

Source: Table F.2 from Delaware County Planning Department, December 2011, Crum Creek Watershed Act 167 Stormwater Management Plan.

**TABLE F-2
RATIONAL RUNOFF COEFFICIENTS**

LAND USE DESCRIPTION	HYDROLOGIC SOIL GROUP			
	A	B	C	D
Cultivated land : without conservation treatment	.49	.67	.81	.88
: with conservation treatment	.27	.43	.61	.67
Pasture or range land: poor condition	.38	.63	.78	.84
: good condition	---*	.25	.51	.65
Meadow: good condition	---*	---*	.44	.61
Woods: thin stand, poor cover, no mulch	---*	.34	.59	.70
: good cover	---*	---*	.45	.59
Open spaces, lawns, parks, golf courses, cemeteries				
Good condition: grass cover on 75% or more of the area	---*	.25	.51	.65
Fair condition: grass cover on 50% to 75% of the area	---*	.45	.63	.74
Commercial and business areas (85% impervious)	.84	.90	.93	.96
Industrial districts (72% impervious)	.67	.81	.88	.92
Residential:				
Average lot size Average % impervious				
1/8 acre or less 65	.59	.76	.86	.90
1/4 acre 38	.25	.49	.67	.78
1/3 acre 30	---*	.49	.67	.78
1/2 acre 25	---*	.45	.65	.76
1 acre 20	---*	.41	.63	.74
Paved parking lots, roofs, driveways, etc.	.99	.99	.99	.99
Streets and roads:				
Paved with curbs and storm sewers	.99	.99	.99	.99
Gravel	.57	.76	.84	.88
Dirt	.49	.69	.80	.84

Notes: Values are based on SCS definitions and are average values.
Values indicated by ---* should be determined by the design engineer based on site characteristics.

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

TABLE B-3. MANNING'S 'n' VALUES

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(3 pages)

Source: Table 3-1 from United States Army Corps of Engineers, January 2010, *HEC-RAS River Analysis System, Hydraulic Reference Manual*, Version 4.1.

Chapter 3– Basic Data Requirements

Table 3-1 Manning's 'n' Values

Type of Channel and Description	Minimum	Normal	Maximum
A. Natural Streams			
1. Main Channels			
a. Clean, straight, full, no rifts or deep pools	0.025	0.030	0.033
b. Same as above, but more stones and weeds	0.030	0.035	0.040
c. Clean, winding, some pools and shoals	0.033	0.040	0.045
d. Same as above, but some weeds and stones	0.035	0.045	0.050
e. Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
f. Same as "d" but more stones	0.045	0.050	0.060
g. Sluggish reaches, weedy, deep pools	0.050	0.070	0.080
h. Very weedy reaches, deep pools, or floodways with heavy stands of timber and brush	0.070	0.100	0.150
2. Flood Plains			
a. Pasture no brush			
1. Short grass	0.025	0.030	0.035
2. High grass	0.030	0.035	0.050
b. Cultivated areas	0.020	0.030	0.040
1. No crop	0.025	0.035	0.045
2. Mature row crops	0.030	0.040	0.050
3. Mature field crops	0.030	0.040	0.050
c. Brush			
1. Scattered brush, heavy weeds	0.035	0.050	0.070
2. Light brush and trees, in winter	0.035	0.050	0.060
3. Light brush and trees, in summer	0.040	0.060	0.080
4. Medium to dense brush, in winter	0.045	0.070	0.110
5. Medium to dense brush, in summer	0.070	0.100	0.160
d. Trees			
1. Cleared land with tree stumps, no sprouts	0.030	0.040	0.050
2. Same as above, but heavy sprouts	0.050	0.060	0.080
3. Heavy stand of timber, few down trees, little undergrowth, flow below branches	0.080	0.100	0.120
4. Same as above, but with flow into branches	0.100	0.120	0.160
5. Dense willows, summer, straight	0.110	0.150	0.200
3. Mountain Streams, no vegetation in channel, banks usually steep, with trees and brush on banks submerged			
a. Bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
b. Bottom: cobbles with large boulders	0.040	0.050	0.070

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Chapter 3- Basic Data Requirements

Table 3-1 (Continued) Manning's 'n' Values

Type of Channel and Description	Minimum	Normal	Maximum
B. Lined or Built-Up Channels			
1. Concrete			
a. Trowel finish	0.011	0.013	0.015
b. Float Finish	0.013	0.015	0.016
c. Finished, with gravel bottom	0.015	0.017	0.020
d. Unfinished	0.014	0.017	0.020
e. Gunite, good section	0.016	0.019	0.023
f. Gunite, wavy section	0.018	0.022	0.025
g. On good excavated rock	0.017	0.020	
h. On irregular excavated rock	0.022	0.027	
2. Concrete bottom float finished with sides of:			
a. Dressed stone in mortar	0.015	0.017	0.020
b. Random stone in mortar	0.017	0.020	0.024
c. Cement rubble masonry, plastered	0.016	0.020	0.024
d. Cement rubble masonry	0.020	0.025	0.030
e. Dry rubble on riprap	0.020	0.030	0.035
3. Gravel bottom with sides of:			
a. Formed concrete	0.017	0.020	0.025
b. Random stone in mortar	0.020	0.023	0.026
c. Dry rubble or riprap	0.023	0.033	0.036
4. Brick			
a. Glazed	0.011	0.013	0.015
b. In cement mortar	0.012	0.015	0.018
5. Metal			
a. Smooth steel surfaces	0.011	0.012	0.014
b. Corrugated metal	0.021	0.025	0.030
6. Asphalt			
a. Smooth	0.013	0.013	
b. Rough	0.016	0.016	
7. Vegetal lining			
	0.030		0.500

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Chapter 3- Basic Data Requirements

Table 3-1 (Continued) Manning's 'n' Values

Type of Channel and Description	Minimum	Normal	Maximum
<i>C. Excavated or Dredged Channels</i>			
1. Earth, straight and uniform			
a. Clean, recently completed	0.016	0.018	0.020
b. Clean, after weathering	0.018	0.022	0.025
c. Gravel, uniform section, clean	0.022	0.025	0.030
d. With short grass, few weeds	0.022	0.027	0.033
2. Earth, winding and sluggish			
a. No vegetation	0.023	0.025	0.030
b. Grass, some weeds	0.025	0.030	0.033
c. Dense weeds or aquatic plants in deep channels	0.030	0.035	0.040
d. Earth bottom and rubble side	0.028	0.030	0.035
e. Stony bottom and weedy banks	0.025	0.035	0.040
f. Cobble bottom and clean sides	0.030	0.040	0.050
3. Dragline-excavated or dredged			
a. No vegetation	0.025	0.028	0.033
b. Light brush on banks	0.035	0.050	0.060
4. Rock cuts			
a. Smooth and uniform	0.025	0.035	0.040
b. Jagged and irregular	0.035	0.040	0.050
5. Channels not maintained, weeds and brush			
a. Clean bottom, brush on sides	0.040	0.050	0.080
b. Same as above, highest stage of flow	0.045	0.070	0.110
c. Dense weeds, high as flow depth	0.050	0.080	0.120
d. Dense brush, high stage	0.080	0.100	0.140

Other sources that include pictures of selected streams as a guide to n value determination are available (Fasken, 1963; Barnes, 1967; and Hicks and Mason, 1991). In general, these references provide color photos with tables of calibrated n values for a range of flows.

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ORDINANCE APPENDIX C

WEST NILE VIRUS DESIGN GUIDANCE

WEST NILE VIRUS GUIDANCE

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

**Monroe County Conservation District Guidance:
Stormwater Management and West Nile Virus**

**Source: Brodhead McMichaels Creeks Watershed Act 167 Stormwater
Management Ordinance Final Draft 2/23/04**

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

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

Although constructed wetlands and ponds are desirable from a water quality perspective, there may be concerns about the possibility of these stormwater management structures becoming breeding grounds for mosquitoes. The Conservation District feels that

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although it may be a valid concern, **municipalities should not adopt ordinance provisions prohibiting wet basins for stormwater management.**

Mosquitoes

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

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

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

Stormwater Facilities

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

The design of a stormwater wetland must include the selection of hydrophytic plant species for their pollutant uptake capabilities and for not contributing to the potential for vector mosquito breeding. In particular, species of emergent vegetation with little submerged growth are preferable. By limiting the vegetation growing below the water

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surface, larvae lose protective cover, and there is less chance of anaerobic conditions occurring in the water.

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

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

Conclusion

The Conservation District understands the pressure faced by municipalities when dealing with multifaceted issues such as stormwater management and encourages the incorporation of water quality management techniques into stormwater designs. As Monroe County continues to grow, conservation design, infiltration, and constructed wetlands and ponds should be among the preferred design options to reduce the impacts of increases in impervious surfaces. When designed and constructed appropriately, the runoff mitigation benefits to the community from these design options will far outweigh their potential to become breeding grounds for mosquitoes.

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ORDINANCE APPENDIX D

STORMWATER
BEST MANAGEMENT PRACTICES
AND CONVEYANCES
OPERATION AND MAINTENANCE AGREEMENT

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East Bradford Township
Chester County, Pennsylvania
Individual On-Lot Stormwater Management Facilities
Maintenance Agreement

THIS MAINTENANCE AGREEMENT ("Maintenance Agreement") is executed the ____ day of _____ 20 __, by and between _____ ("Owner") and EAST BRADFORD TOWNSHIP (the "Township").

BACKGROUND

A. The Owner is the owner of a certain tract of ground located in East Bradford Township, Chester County, Pennsylvania (the "Property") on which it intends to develop _____ (the "Development") in accordance with a plan known as _____ prepared for the Owner by _____, dated _____ and last revised _____ (the "Plan"). The Plan is attached to this agreement and marked "Exhibit A".

B. The Plan depicts the construction of certain buildings and improvements, including the installation of certain Stormwater Management Facilities, as defined in Chapter 94, Article II of the Township Code, including but not limited to components to control the quantity and quality of storm water discharge all as depicted on Sheet(s) _____ of the Plan. Specifically, the lot contains a stormwater facility/system designed to regulate the rate of stormwater runoff discharged from the Property. Stormwater Management Facilities such as these must have routine inspection and maintenance during the life of the facility and replacement of the facility at the end of the lifespan of the facility. The principal maintenance objective is to prevent clogging of the Stormwater Management Facility, which may lead to advanced system failure. The Owner is required to and intends to install and maintain the Stormwater Management Facility in accordance with the Plan, Chapter 94 of the Township Code and any conditions of approval adopted by the Township Board of Supervisors and/or Township Zoning Hearing Board for approval of the subdivision and/or land development, or individual Property improvement project.

C. Chapter 94, Article VII of the Township Code requires the Owner to enter into a maintenance agreement requiring that the Owners of the Stormwater Management Facility be responsible for proper maintenance during and after development of all required Stormwater Management Facilities required by the Plan.

D. Owner desires to execute and record this Maintenance Agreement in order to satisfy its obligations under Chapter 94, Article VII referred to above.

GRANTS AND TERMS

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NOW, THEREFORE, the Owner, for itself, its successors-in-interest, successors-in-title, grantees and assigns, for good and valuable consideration, the receipt and sufficiency whereof being hereby acknowledged, and intending to be legally bound hereby, hereby covenants, declares, agrees, confirms and provides as follows:

1) Incorporation of Background. Background Paragraphs A through D herein above are incorporated as part of the terms of this Maintenance Agreement.

a) Maintenance and Replacement. Owner shall continuously and perpetually maintain and/or replace the Stormwater Management Facility(ies) in accordance with the conditions of approval, the Plan, and with manufacturers specifications. Routine maintenance shall be performed after a 10-year return frequency storm (also known as the 10 percent chance storm) as determined by the Township Engineer via averaging the rainfall totals for all rain gauges located within the Township and comparing the average to the generally accepted average value for such a storm within the Township as determined by the National Oceanic and Atmospheric Administration (NOAA):

(i) Inlet drains, gutters and downspouts shall be kept clear of accumulated debris such as leaves, grass clippings, sticks and trash. Roof runoff exiting the downspout emergency tee is a potential indicator that there is a clog in the Stormwater Management Facility(ies).

(ii) Inspect all outlet devices that are located within the Stormwater Management Facility(ies) to ensure they are free and clear of debris and are structurally intact. If debris exists, it must be cleared immediately. If the structural failures or leaks exist, the Owner shall contact the Township immediately to report the problem, receive initial instructions on the type of personnel to contact to correct the problem and schedule an inspection for the necessary repair work.

(iii) The Stormwater Management Facility impoundment device (earthen berm or retaining wall) must be inspected for structural integrity, leaks and proper stabilization (adequate vegetation in the case of an earthen berm). If structural failures or leaks exist, the Owner shall contact the Township immediately to report the problem, receive initial instructions on the type of personnel to contact to correct the problem and schedule an inspection for the necessary repair work.

(iv) The Stormwater Management Facility impoundment area must be inspected for debris, accumulated sediments and inadequate vegetation/erosion. All sediments and debris must be removed promptly and the impoundment area must be maintained in a stable condition (adequate vegetation or similar landscaping, or hardscaping that accomplishes stabilization of the underlying soils).

(v) Inspect all inlets that are located within the Stormwater Management Facility(ies). These inlets serve as observation units. Look for standing water at the bottom of the inlets. Check the inlets daily until standing water is not observed.

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The standing water should drain down in less than three days. If drain down does not occur the bed may be clogged and require excavation and cleaning. The Owner shall contact the Township immediately to report the problem, receive initial instructions on the type of personnel to contact to correct the problem and schedule an inspection for the necessary repair work.

(vi) Areas of porous pavement, porous concrete, porous paver blocks and similar porous hardscaping must be maintained per manufacturer's recommendations and/or generally accepted maintenance practices as described on the Owner's plans and attached to this agreement as "Exhibit B"

b) The Owner or Owner's designee shall inspect the Stormwater Management Facility(ies) according to the following frequencies, at a minimum, to ensure the facility continues to function as intended:

(i) Annually for the first 5 years;

(ii) Once every 3 years thereafter; and

(iii) During or immediately after the cessation of a 10-year or greater storm, as determined by the Township Engineer. Inspection reports for inspections during or after the cessation of a 10-year or greater storm event are only required to be submitted if requested by the Township or Township Engineer

Inspections shall be conducted during or immediately following precipitation events or in dry weather conditions if the BMP design parameters include dewatering within a specified period of time.

c) Owner shall fill out and submit the written inspection report, in the form attached hereto, to document each inspection. The inspection report shall contain the date and time of the inspection, the individual(s) who completed the inspection, the location of the BMP, Stormwater Management Facility(ies) or structure inspection, observations on performance, and recommendations for improving performance, if applicable. If the Stormwater Management Facility malfunctioned during the previous year, the report shall include photographic evidence of the malfunction and subsequent repair. Inspection reports shall be submitted to the Township within 30 days following completion of the inspection.

d) All materials collected by the Stormwater Management Facility(ies), including but not limited to oil and sediment, shall be disposed of in accordance with the United States Environmental Protection Agency, Pennsylvania Department of Environmental Protection, and any other applicable regulations. The annual report shall include a list of all materials disposed and certification of regulatory compliance with disposal requirements.

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e) Should a Stormwater Management Facility not function properly, the Township shall be notified in writing within 10 days of the discovery of the malfunction and the proposed maintenance, repairs or modifications necessary to resolve the malfunction. All maintenance, repairs or modifications shall be made in accordance with the specifications of the manufacturer or designer of the device. If a repair or modification is made not within manufacturer or designer's specifications, said repair or modification shall be approved in writing by the manufacturer or designer, and a copy of the approval shall be filed with the Township. The maintenance, repair, or modification maintenance must be completed within 30 days of discovery of the malfunction, or immediately upon discovery if the malfunction poses a threat to the public health or safety

f) The Township reserves the right to require additional devices if the Stormwater Management Facility(ies) as designed do not function properly, to assure the appropriate quantity and quality of the stormwater leaving the facility meets the intent of the original design approved by the Township.

2) Prohibition of Alteration or Removal. The Owner shall not alter or remove any Stormwater Management Facilities depicted on the Plan unless prior written approval is obtained from the Township.

3) Township Inspection. The Owner hereby grants permission to the Township, its authorized agents and employees, to enter upon the Property, at reasonable times and upon presentation of proper identification, to inspect the Stormwater Management Facility(ies) whenever the Township deems necessary. Whenever possible, the Township shall notify the Owner a minimum of 72 hours prior to entering the Property.

4) Failure to Maintain Facilities. In the event the Owner fails to operate and maintain the Stormwater Management Facility(ies) as shown on the Plan in good working order acceptable to the Township, the Township or its representatives may enter upon the Property and take whatever action is deemed necessary to maintain said facility(ies). This provision shall not be construed to allow the Township to erect any permanent structure on the land of the Owner. It is expressly understood and agreed that the Township is under no obligation to maintain or repair said Stormwater Management Facility(ies), and in no event shall this Agreement be construed to impose any such obligation on the Township.

5) Township Maintenance Reimbursement. In the event the Township, pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Owner shall reimburse the Township for all expenses (direct and indirect) incurred within 30 calendar days of receipt of invoice from the Township.

6) Liability. The intent and purpose of this Agreement is to ensure the proper maintenance of the onsite Stormwater Management Facility(ies) by the Owner; provided, however, that this Agreement shall not be deemed to create or effect any additional liability of any party for damage alleged to result from or be caused by stormwater runoff.

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7) Township Indemnification. The Owner, its executors, administrators, assigns, and other successors in interests, shall release the Township employees and designated representatives from all damages, accidents, casualties, occurrences or claims which might arise or be asserted against said employees and representatives from the construction, presence, existence, or maintenance of the Stormwater Management Facility(ies) by the Owner or the Township. In the event that a claim is asserted against the Township, its designated representatives, and/or employees, the Township shall promptly notify the Owner, and the Owner shall defend, at his own expense, any suit based on the claim. If any judgment or claims against the Township, employees, and/or designated representatives shall be allowed, the Owner shall pay all costs and expenses regarding said judgment or claim.

8) Default; Cure. In the event Owner fails to comply with the terms of this Maintenance Agreement, the Township shall send written notice to Owner specifying the areas of noncompliance (“Deficiencies”) and the steps that must be taken to comply. In the event that the Owner does not comply with the terms of the notice within 30 days of the date thereof, or diligently pursue compliance in circumstances where compliance is not possible within 30 days due to weather conditions or otherwise, the Township shall have the right, but not the obligation, to enforce this Maintenance Agreement at law or in equity, and/or to enter upon the Property and correct the Deficiencies, and collect the cost thereof from Owner by municipal lien against the Property or otherwise.

9) Use and Occupancy Permit. The requirements of this Maintenance Agreement are part of the conditions for issuance of the Township Use and Occupancy Permit for the development depicted on the Plan and the Property, and it is the Owner’s responsibility to comply with the requirements of this Maintenance Agreement. Should the Owner fail to comply, the Township reserves the right to revoke the Use and Occupancy Permit after providing the Deficiency notice and cure period as set forth in Paragraph 4 herein above.

10) Covenants Running with the Land; Successors and Assigns Bound. This Maintenance Agreement and the provisions hereof (1) shall run with the land, and be appurtenant to title to the Property and every portion thereof; and (2) shall be binding upon and inure to the benefit of the Owner, and each and all of its respective successors and assigns, and successors in title to the Property and every portion thereof. Any and all conveyances, leases or encumbrances of any part of the Property shall be subject to the provisions hereof.

11) Recording. This Agreement shall be recorded in the Office of the Recorder of Deeds of Chester County, Pennsylvania.

12) Notices. Any notice required to be given by the Township to Owner under the terms of this Maintenance Agreement shall be sufficiently given if sent by United States certified mail, return receipt requested, postage prepaid, addressed to the then owner of the Property and to the address as set forth in the records for the Property maintained by the Chester County Board of Assessment.

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13) Miscellaneous Provisions.

- a) Severability. If any provision of this Maintenance Agreement shall to any extent be invalid or unenforceable, the remainder of this Maintenance Agreement (or the application of such provision to persons or circumstances other than those in respect of which it is invalid or unenforceable) shall not be affected thereby, and each provision of this Maintenance Agreement, unless specifically conditioned upon such invalid or unenforceable provision, shall be valid and enforceable to the fullest extent permitted by law.

- b) Amendment. This Maintenance Agreement may not be amended except by written instrument signed and acknowledged by the Owner, its successors and assigns, and the Township, and recorded in the Office of the Recorder of Deeds of Chester County, Pennsylvania.

- c) Governing Laws. This Maintenance Agreement shall be construed and governed by the laws of the Commonwealth of Pennsylvania.

- d) Integration. This Maintenance Agreement sets forth the entire agreement between the Owner and the Township with respect to the subject matter hereof.

IN WITNESS WHEREOF, being duly authorized and empowered to do so, the Owner and the Township have duly executed and delivered this Agreement as of the date and year first above written.

WITNESS:

For Owner

OWNER(S):

By: _____
Owner

OWNER:

By: _____
Owner

East Bradford Township executes this Maintenance Agreement to acknowledge its rights and obligations set forth above.

EAST BRADFORD TOWNSHIP:

Attest: _____

By: _____

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Township Engineer

Township Manager

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COMMONWEALTH OF PENNSYLVANIA :
 : ss
COUNTY OF CHESTER :

On this, the ____ day of _____, 20___, before, the
undersigned notary public, personally appeared _____ and
_____ who acknowledged themselves to be the owner(s),
respectively, of _____ and as such they did sign
the foregoing instrument for the purposes therein contained.

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

Notary Public
(Notarial Seal)
My Commission Expires:

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COMMONWEALTH OF PENNSYLVANIA :
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COUNTY OF CHESTER :

On this, the _____ day of _____, 20__, before, the undersigned notary public, personally appeared _____ who acknowledged himself/herself to be the Township Manager of East Bradford Township and as such he/she did sign the foregoing instrument on the Township's behalf for the purposes therein contained.

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

Notary Public
(Notarial Seal)
My Commission Expires

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On-lot Stormwater Management Facilities
Homeowner Annual Inspection Report

Instructions: All of the following questions must be completed to satisfy your annual inspection report requirements. If the Stormwater Management Facility(ies), as defined by Chapter 94, Article II of the East Bradford Township Code, on your property do not contain some of the items mentioned in the questions, simply indicate so by writing N/A at the end of the question. Attach additional sheets and/or photographs where directed and/or where further explanation is necessary. For information on how to conduct the testing required to complete the Annual Absorption Performance Observation section, refer to the GRANTS AND TERMS section of the Maintenance Agreement, paragraph 1) a) (ii).

General Information

Name _____
Address _____
Telephone Number _____
Email address _____
Date of annual inspection _____
Date report submitted to the Township (due September 1st) _____

Routine Maintenance

1. Have all roof gutters and downspouts been inspected and kept clear of debris throughout the reporting year (circle one)?

Yes

No

1. A. If yes, provide the approximate date of the latest cleaning. If no, provide the nearest intended date of cleaning (for example, Spring, year is sufficient)

2. Have all yard drains (including those within the stormwater facility) been kept clear of debris during the reporting year (circle one)?

Yes

No

2.A. If yes, provide the approximate date of the latest cleaning. If no, provide the nearest intended date of cleaning (for example, Spring, year is sufficient)

3. Has the basin impoundment area been kept clear of sediments and debris during the reporting year (circle one)?

Yes

No

3.A. If yes, provide the approximate date of the latest cleaning. If no, provide the nearest intended date of cleaning (for example, Spring, year is sufficient)

4. Does the basin embankment and/or retaining wall appear to be free of deterioration, leaks, structurally sound and properly vegetated (circle one)?

Yes

No

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4.A. If no, briefly describe any problems noted and the maintenance/repairs employed.

5. Have areas of porous pavement, porous concrete and porous hardscaping been vacuumed and/or maintained per manufacturer's recommendations?

Yes

No

5.A. Provide a brief explanation of the maintenance activity, or why the maintenance activity was not completed.

6. Circle all materials cleaned from the items mentioned in 1, 2, 3 and 4 above and disposed of.

Leaves

Lawn clippings

Twigs/branches

Trash

Sediments/Dirt

Gravel/grit

Other (please specify) _____

7. Indicate how the materials removed from the facilities indicated in Question 3 were disposed of (circle all that apply).

Removed by contractor/landscaper

Placed in home trash receptacle

Taken to municipal trash/brush recycling program

Deposited on property

Other (please specify) _____

Annual Absorption Performance Observation

1. Indicate the date of the storm when stormwater was observed entering the stormwater facility/system or inlets.

2. Indicate the amount of rainfall experienced from the storm observed (check local news, internet at [NOAA Global Historical Climatology Network](http://www.noaa.gov/global-historical-climatology-network) or contact the Township).

_____ inches in 24 hours

3. Indicate the number of hours starting from the time the storm ended that the stormwater inlets within the stormwater facility/system (or simply the facility itself) contained stormwater before all rainfall was absorbed into the ground or discharged from the site.

_____ hours

Significant Annual Maintenance

Describe any major maintenance activities partaken in the past year beyond the items mentioned in the Routine Maintenance section requirements above (this usually would be related to a system malfunction). If no major maintenance occurred, simply indicate "None". Attach extra sheets if necessary, and photographs if required by the maintenance agreement. Also, please provide the contact information for any engineers, contractors or other personnel that may have aided in the significant maintenance activity.

Certification

The following statement must be signed and dated.

I/We hereby certify that we are the owners of the referenced property and to the best of my/our knowledge, the aforementioned information provided is accurate and correct.

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Owner Signature Date

Print Name

Co-owner Signature Date

Print Name

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Ordinance Appendix E

**PADEP Management of Swimming Pool, Hot Tub, and
Spa Water Discharges Fact Sheet**

MANAGEMENT OF SWIMMING POOL, HOT TUB, AND SPA WATER DISCHARGES

This fact sheet addresses the discharge of water from swimming pools, hot tubs, and spas that are disinfected using chlorine, bromine, or "salt water disinfection," and that also may contain residual amounts of other treatment chemicals including algaecides. Servicing of a pool, hot tub, or spa often involves discharging all or a portion of the water or backwash water from filters, both of which may contain residual chlorine at levels that could be damaging to the environment. As such, these waters may be considered "polluted" (i.e., "wastewater"), and must be managed to protect public health and to prevent pollution to waters of the commonwealth such as rivers, streams, lakes, and including storm sewers. The purpose of this fact sheet is to describe acceptable methods of managing discharges from swimming pools, hot tubs, and spas to avoid causing pollution. Pool, hot tub, and spa water should not be allowed to directly or indirectly discharge to waters of the commonwealth, including storm sewers.

What substances in pools, hot tubs, or spas could cause pollution?

Chlorine and/or other disinfectants are typically added in sufficient amounts to kill potentially harmful bacteria. These disinfectants also react with other organic matter such as dirt, sweat, skin cells, leaves, and organisms creating potentially harmful disinfection byproducts. Other contaminants are added from the users, such as oil and grease from natural body oils and applied lotions and sunscreens. Chemicals commonly used in maintaining these systems, such as salt, borax, algaecides, phenols, caustic, and acid solutions, can be deadly to fish and other aquatic life. Backwashing of pool filters also contributes accumulated debris. All of these chemicals and materials have the potential to cause pollution and adversely affect public health and waters of the commonwealth.

What are acceptable methods for managing swimming pool, hot tub, and spa waters?

The best approach for managing these wastewaters is disposal into a public sewer system or at a sewage treatment facility, with authorization of the sewer system owner. A permit is generally not necessary to reuse or recycle pool wastewaters, but approval from the owner of a sewer system or sewage treatment facility is typically required. Some municipalities have enacted additional requirements related to discharges from pools. Contact your municipality if you're unsure whether additional guidelines exist.

What if no public sewer is available?

The wastewater can be drained and allowed to infiltrate into a vegetated area or used for on-site irrigation after these guidelines are met:

1. Shut off the chlorination/chemical feed system if there is one, or stop adding chlorine and chemicals.
2. Shut off the heating system, if there is one.
3. Hold the water in the pool or hot tub to reduce the chlorine level to 0.5 mg/L or less (if applicable), and the temperature to an acceptable level (generally within 10° F of the air temperature).
4. Test frequently – the water may need to be held for 10 days or more depending on the surrounding conditions. Recirculating the water may help to speed up this process.
5. Adjust the pH, if necessary, to between 6.0 and 9.0 standard units.
6. Never drain the pool on a rainy day or if the soil is saturated.

When discharging on-site for infiltration or using the water for irrigation, ensure that:

- The water will not flow into a storm sewer or other water of the commonwealth.
- The water does not run off the property.
- Nuisances such as prolonged ponding, odors, and mosquito breeding conditions are prevented.
- The flow rate is slow enough to allow infiltration and does not cause erosion.
- Solids are captured by attaching a filter bag to the end of the discharge hose, if needed.

May water from swimming pools, hot tubs, or spas be discharged to onlot septic systems?

No, pool water should not be discharged into or on the surface of onlot systems because the system is not designed for the additional flow and the contaminants could impact the operation.

May chemicals (e.g., strong acids or caustics) be used to clean my pool, hot tub, or spa?

Yes, as long as the wastewater is captured or collected, properly treated and disposed of, and prevented from entering waters of the commonwealth, including storm sewers.

How should wastewater from cleaning my pool be handled, properly treated and disposed of?

Cleaning wastewaters that contain acid, caustics, or chlorine rinses used to clean pool surfaces should be treated prior to discharge. All wastewaters, but especially cleaning wastewater, must be neutralized to a pH between 6.0 and 9.0 standard units. Chlorine rinses can be dechlorinated or should stand for a period of 10 days to allow chlorine degradation to a residual of 0.5 mg/L or less prior to discharge.

Any pool wastewaters that have unnatural cloudiness, color, oil film, solids, foam, debris, vegetation, algae, or are not or cannot be properly treated, should be collected and hauled to a treatment facility in accordance with the facility's guidelines.

What should be done with standing water that has accumulated in a pool?

Standing water, accumulated rainfall, or pool water from the previous season should be pumped from the top, but only if the chlorine residual and pH values are acceptable, to avoid disturbing solids on the pool bottom, which should not be discharged. After the water has been pumped, manually clean out the solids.

Could someone who causes pollution by discharging water from swimming pools, hot tubs, or spas be penalized?

If DEP determines that the management of swimming pool, hot tub, and spa wastewaters has caused pollution to waters of the commonwealth, the responsible party could be liable for civil penalties up to \$10,000 per day under the Clean Streams Law.

For questions and additional information, contact the Clean Water Program in DEP's regional offices:

Northwest Regional Office

230 Chestnut St.
Meadville, PA 16335-3481
Main Telephone: 814-332-6945
24-Hour Emergency: 800-373-3398
Counties: *Butler, Clarion, Crawford, Elk, Erie, Forest, Jefferson, Lawrence, McKean, Mercer, Venango, and Warren*

North-central Regional Office

208 W. Third St., Suite 101
Williamsport, PA 17701-6448
Main Telephone: 570-327-3636
24-Hour Emergency: 570-327-3636
Counties: *Bradford, Cameron, Clearfield, Centre, Clinton, Columbia, Lycoming, Montour, Northumberland, Potter, Snyder, Sullivan, Tioga, and Union*

Northeast Regional Office

2 Public Square
Wilkes-Barre, PA 18701-1915
Main Telephone: 570-826-2511
24-Hour Emergency: 570-826-2511
Counties: *Carbon, Lackawanna, Lehigh, Luzerne, Monroe, Northampton, Pike, Schuylkill, Susquehanna, Wayne, and Wyoming*

Southwest Regional Office

400 Waterfront Drive
Pittsburgh, PA 15222-4745
Main Telephone: 412-442-4000
24-Hour Emergency: 412-442-4000
Counties: *Allegheny, Armstrong, Beaver, Cambria, Fayette, Greene, Indiana, Somerset, Washington, and Westmoreland*

South-central Regional Office

909 Elmerton Ave.
Harrisburg, PA 17110-8200
Main Telephone: 717-705-4700
24-Hour Emergency: 866-825-0208
Counties: *Adams, Bedford, Berks, Blair, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Juniata, Lancaster, Lebanon, Mifflin, Perry, and York*

Southeast Regional Office

2 East Main St.
Norristown, PA 19401-4915
Main Telephone: 484-250-5900
24-Hour Emergency: 484-250-5900
Counties: *Bucks, Chester, Delaware, Montgomery, and Philadelphia*

For more information, visit www.dep.pa.gov.

Chapter 94
Stormwater Management Ordinance

Section 2. Severability. If any sentence, clause, section or part of this Chapter is for any reason found to be unconstitutional, illegal, or invalid, such unconstitutionality, illegality, or invalidity shall not affect or impair any of the remaining provisions, sentences, clauses, sections, or parts hereof. It is hereby declared as the intent of Board of Supervisors of East Bradford Township that this Ordinance would have been adopted had such unconstitutional, illegal, or invalid sentence, clause, section or part thereof not been included therein.

Section 3. Repealer. All Ordinances or parts of Ordinances conflicting with any provision of this Ordinance are hereby repealed insofar as the same affects this Ordinance.

Section 4. Renumbering. The location and numerical designation of this Chapter and the Sections included herein shall be delegated to the discretion of the General Code Publishers, which may format and number this Chapter and Sections as necessary to accommodate this amendment.

Section 5. Effective Date. This Ordinance shall become effective upon enactment as provided by law.

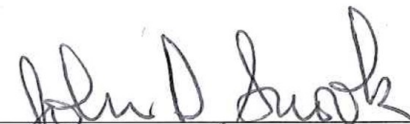
ENACTED AND ORDAINED this 13 day of December, 2022.

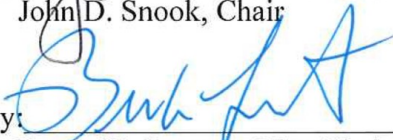
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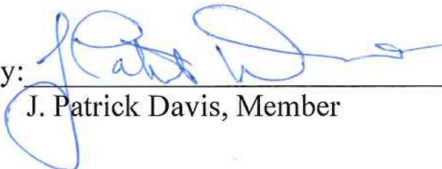


SECRETARY

BOARD OF SUPERVISORS
EAST BRADFORD TOWNSHIP

By: 
John D. Snook, Chair

By: 
Bruce W. Lavery, Vice Chair

By: 
J. Patrick Davis, Member

