

**CHAPTER 22**

**GRADING, EROSION AND  
SEDIMENT CONTROL AND  
STORMWATER MANAGEMENT  
ORDINANCE**

**EAST PIKELAND TOWNSHIP  
CHESTER COUNTY, PENNSYLVANIA**



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### APPENDICES

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## **ARTICLE I – GENERAL PROVISIONS**

### **Section 101. Short Title**

This Ordinance shall be known as the “East Pikeland Township Grading, Erosion and Sediment Control, and Stormwater Management Ordinance.”

### **Section 102. Statement of Findings**

The Governing Body of the Municipality 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 Municipality 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 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 may require the Municipality to implement a program of stormwater controls. The Municipality is required to obtain a permit from the PADEP 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 municipal or other storm sewer systems can contribute to pollution of the Waters of the Commonwealth.

**Section 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 Municipality:

- 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.
- 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. Protect adjacent and downgradient lands from adverse impacts of direct stormwater discharges.

- K. Minimize Impervious Surfaces and connected Impervious Surfaces to promote infiltration and reduce the volume and impacts of stormwater runoff.
- L. Provide proper long-term operation and maintenance of all permanent stormwater management facilities, BMPs and Conveyances that are implemented within the Municipality.
- M. Reduce the impacts of runoff from existing developed land undergoing Redevelopment while encouraging New Development and Redevelopment in urban areas and areas designated for growth.
- N. Implement an illicit discharge detection and elimination program that addresses non-stormwater discharges.
- O. Provide performance standards and design criteria based on watershed-based stormwater management planning.
- P. Provide standards to meet certain NPDES stormwater permit requirements.
- Q. 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.
- R. Implement the requirements of Total Maximum Daily Load (TMDLs) where applicable to waters within or impacted by the Municipality.
- S. Provide review procedures and performance standards for stormwater planning and management.
- T. Fulfill the purpose and requirements of PA Act 167 (PA Act 167, Section 3):
  - “(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.”

- U. Ensure any disturbance of the site does not result in damaging erosion and sedimentation control problems, either on or off site, in order to protect the health, safety, and welfare of the Township residents. These objectives will be pursued at the Township level in conjunction with state requirements for erosion and sedimentation control, as defined in the Department of Environmental Protection Chapter 102 regulations, as amended, and defined in the Erosion and Sediment Pollution Control Program Manual.
- V. Ensure that site design and preparation incorporates necessary steps to ensure the successful installation and long-term operation of erosion and sedimentation control and stormwater management facilities.
- W. Ensure any disturbance and removal of topsoil is minimized.
- X. Regulate modification of natural terrain and alteration of drainage by providing for runoff, erosion and sediment control measures, as well as to regulate the maintenance of grading excavation and fill.

**Section 104. Statutory Authority**

The Municipality 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 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 Municipality shall be subject to regulation by this Ordinance.
  2. The provisions of Article VIII, Prohibitions are applicable on a Township-wide basis to all existing as well as proposed drains, Conveyances and/or discharges.
  3. When a building 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 building permit shall be conditioned upon the issuance of a Grading Permit in adherence to the terms of this Ordinance.
  4. This Ordinance contains the stormwater management performance standards and design criteria that are necessary from a watershed-based perspective.

5. The Municipality's stormwater management Conveyance and system design criteria (e.g., inlet spacing, inlet type, collection system design and details, outlet structure design, etc.) shall be regulated by standards and design criteria contained in this Ordinance and by applicable State regulations if any.

#### 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 cumulative Proposed 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. The date of adoption of this Ordinance 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.

For example:

If, after adoption of this Ordinance, an Applicant proposes construction of a four hundred and fifty (450) square foot garage, that project would be exempted from the requirements of this Ordinance as noted in Table 106.1. If, at a later date, an Applicant proposes to construct a three hundred (300) square foot room addition on the same property, the Applicant would then be required to implement the stormwater management and plan submission requirements of this Ordinance for the cumulative total of seven hundred and fifty (750) square feet of additional Impervious Surface added to the property since adoption of this Ordinance.

**Section 106. Exemptions, Minor Stormwater Management Plan For Small Projects and Modified Requirements for Agricultural Structures**

A. Requirements for Exempt Activities

1. An exemption from certain requirements of this Ordinance shall not relieve the Applicant from implementing all other applicable requirements of this Ordinance
2. An exemption shall not relieve the Applicant from implementing such measures as are necessary to protect public health, safety, and welfare, property and water quality.
3. 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 municipal water quality protection requirements.
4. An exemption under this Ordinance shall not relieve the Applicant from complying with all other applicable municipal ordinances or regulations.

B. General Exemptions

Regulated Activities that:

1. Involve less than five hundred (500) square feet of Proposed Impervious Surfaces AND less than two thousand (2,000) square feet of Earth Disturbance; or
2. Are listed in Subsection 106.C and are exempt from those (and only those) requirements of this Ordinance that are included in the sections and articles listed in Table 106.1. Exemptions are for the items noted in Table 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.

**TABLE 106.1**

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

Ordinance Article/Section	Exemptions - Activities Listed in Subsection 106.C.	Exemptions < 500 sq. ft. of Proposed Impervious Surfaces AND < 2,000 sq. ft. of proposed Earth Disturbance	Permit Required > 1,500 sq. ft. of Proposed Impervious Surfaces OR > 5,000 sq. ft. of proposed Earth Disturbance
Article I - General Sections 101 to 110	Not Exempt	Not Exempt	Not Exempt
Article I - General Section 111	Exempt	Exempt	Not Exempt
Article II - Definitions	Not Exempt	Not Exempt	Not Exempt
Article III - SWM Sections 303 and 310	Not Exempt	Not Exempt	Not Exempt
Article III - SWM Sections 301, 302, 304 thru 309 and 311 thru 317	Exempt	Exempt	Not Exempt
Article IV - E & SC	Exempt	Not Exempt	Not Exempt
Article V - Grading	Exempt	Exempt	Not Exempt
Article VI - Inspection	Not Exempt	Not Exempt	Not Exempt
Article VII - Fees	Exempt	Exempt	Not Exempt
Article VIII - O & M	Exempt	Exempt	Not Exempt
Article IX - Prohibitions	Not Exempt	Not Exempt	Not Exempt
Article X - Enforcement	Not Exempt	Not Exempt	Not Exempt
Erosion, Sediment & Pollution Control Requirements - Article IV	Must comply with Title 25, Chapter 102 of the PA Code and other applicable State and municipal codes, including the Clean Streams Law.		

**Table 106.1 Notes:**

- Specific activities listed in Subsection 106.C are exempt from the indicated requirements, regardless of size.
- A proposed Regulated Activity must be less than BOTH the Proposed Impervious Surfaces and proposed Earth Disturbance thresholds to be eligible for exemption from the requirements listed in this table.

- See Table 106.2 for requirements for the range of Proposed Impervious Surface and Earth Disturbance between the values listed in the third and fourth columns.
- “Proposed Impervious Surface” - as defined in this Ordinance.
- “Exempt” – Regulated Activities are exempt from the requirements of listed section(s) only; all other provisions of this Ordinance apply.

### C. Exemptions for Specific Activities

The following specific Regulated Activities are exempt from those (and only those) requirements of this Ordinance that are included in the sections and articles listed in Table 106.1. All other conveyance and system design standards established by the Municipality 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 facility; upgrades, additions or other improvements are not exempt. Contact and consultation with the Municipality about the work at the earliest point and to the greatest extent possible is required. A written description of the scope and extent of any emergency work performed shall be submitted to the Municipality 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 Municipality 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 system, facility, BMP or Conveyance made in accordance with plans and specifications approved by the Municipal Engineer or Municipality.
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).
  - 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 as filed with the Municipality 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 requirements of 25 PA Code Chapter 102 and meets the erosion and sediment control standards of Article IV of this Ordinance.
7. Maintenance of Existing Paved Surfaces - Replacement of existing paved surfaces shall meet the erosion and sediment control requirements of 25 PA Code Chapter 102 and Article IV of this Ordinance, and is exempt from all other requirements of this Ordinance listed in Subsection 106.C above. Resurfacing of existing paved surfaces is exempt from the requirements of this Ordinance listed above. Construction of new or additional Impervious Surfaces shall comply with all requirements of this Ordinance as indicated in Table 106.1.
8. Municipal Roadway Shoulder Improvements - Shoulder improvements conducted within the existing roadway cross-section of municipal 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 unless there is a known stormwater management problem, as determined by the Township, that must be addressed.
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 unless there is a known stormwater management problem, as determined by the Township, that must be addressed.

D. Minor Stormwater Management Plan for Small Projects

1. Regulated Activities that involve between 500 and 1500 square feet of proposed Impervious Surfaces OR between 2000 and 5000 square feet of proposed Earth Disturbance may apply the Minor Stormwater Management Plan presented in Appendix A to comply with the requirements of Article III, Article IV, Article V, Article VI, Article VII and Article VIII of this Ordinance (as shown in Table 106.2).
2. The Applicant shall contact the Zoning Officer to:
  - a. confirm that the proposed project is eligible for use of the Minor Stormwater Management Plan and is not otherwise exempt from these Ordinance provisions;

- b. determine what components of the proposed project are to be considered as Impervious Surfaces;
  - c. determine if other known Site or local conditions exist that may preclude the use of any techniques included in the Minor Stormwater Management Plan; and
  - d. discuss any other issues or questions related to the use of the Minor Stormwater Management Plan.
3. Appendix A includes instructions and procedures for preparation, submittal, review and approval of documents required when using the Minor Stormwater Management Plan and shall be adhered to by the Applicant.

#### E. Modified Requirements for Agricultural Structures

It is the declared policy of the Commonwealth to conserve and protect and to encourage the development and improvement of its agricultural lands for the production of food and other agricultural products. Municipalities must encourage the continuity, development and viability of agricultural operations within its jurisdiction. Except as necessary to protect the public health, safety and welfare, Regulated Activities involving proposed new or expanded Impervious Surfaces associated with Agricultural Activities are exempt from certain requirements of this Ordinance as listed in Table 106.2 only when it has been demonstrated to the satisfaction of the East Pikeland Township that the proposed project will comply with all of the requirements listed below. All other provisions of this ordinance shall apply. To be eligible for exemption from the Ordinance provisions stated above and in Table 106.2, the proposed Regulated Activity shall:

1. Be directly associated with an Agricultural Activity (as defined in Article II);
2. Include less than ten thousand (10,000) square feet of proposed new or expanded Impervious Surface (excluding adjoining vehicle parking and movement areas) and not more than an additional five thousand (5,000) square feet of adjoining vehicle parking and movement area;
3. Be installed on a farm or mushroom operation that has a current Mushroom Farm Environmental Minor Stormwater Management Plan (MFEMP) reviewed and deemed adequate by the Conservation District, or an Agricultural Erosion and Sediment Control Plan or Conservation Plan (as defined in Article II) that complies with the requirements of 25 PA Code 102;
4. Divert runoff from the proposed new or expanded Impervious Surfaces (including vehicle parking and movement area) entirely away from animal management, waste management and crop farming areas and any other source of pollutants;

5. Include BMP(s) that will permanently retain at least one (1) inch of rainfall runoff from the total area of proposed new or expanded Impervious Surfaces and vehicle parking and movement areas demonstrated by following the requirements for a Minor Stormwater Management Plan for Small Projects as presented in Appendix A;
6. Be designed so that any point of discharge of runoff from the proposed new or expanded Impervious Surface (excluding vehicle movement area):
  - a. Is not directly connected to, and is not directly connected to any constructed Conveyance that is connected to, a municipal Separate Storm Sewer System or public roadway;
  - b. Is located at least one hundred fifty (150) feet from any municipal Separate Storm Sewer System or public roadway, or any constructed Conveyance connected to any municipal Separate Storm Sewer System or public roadway.
7. Either:
  - a. Have all proposed new or expanded Impervious Surfaces and proposed vehicle parking and movement areas and BMP(s) included within the current MFEMP or current Agricultural Erosion and Sediment Control Plan or a Conservation Plan for the farm or mushroom operation;  
OR
  - b. Be constructed per design plans prepared and sealed by a Licensed Professional in conformance with the PADEP “Best Practices for Environmental Protection in the Mushroom Farm Community” (2003 or as amended), or per design plans prepared and sealed by a Licensed Professional (or Conservation District staff person designated by NRCS) that comply with USDA NRCS standards and specifications, and for which completion of construction will be certified by the Licensed (or NRCS-designated design) Professional responsible for the design;
8. Not be eligible for exemption if an NPDES permit is required; and
9. Obtain a Grading Permit from the municipality in accordance with Section 111.

**TABLE 106.2**

**Thresholds for Regulated Activities that are Eligible for the Simplified Requirements for the Provisions of this Ordinance that are Listed Below**

<b>Ordinance Article/Section</b>	<b>Activities listed in Subsection 106.D (Minor Stormwater Management Plan for Small Projects) and 106.E (Modified Requirements for Ag Structures)</b>
Article I - General	Not Exempt/All Applicable Provisions Apply
Article II - Definitions	Not Exempt/All Applicable Provisions Apply
Article III - SWM Sections 303 and 310	Not Exempt/All Applicable Provisions Apply
Article III - SWM Sections 301, 302, 304, thru 309, 311, thru 317	Exempt if Applicable Requirements of Subsections 106.D and/or 106.E are Satisfied
Article IV - E & SC	Not Exempt/All Applicable Provisions Apply
Article V - Grading	Not Exempt/ All Applicable Provisions Apply
Article VI -Inspection	Exempt if Applicable Requirements of Subsections 106.D and/or 106.E are Satisfied
Article VII - Fees	Not Exempt/All Applicable Provisions Apply
Article VIII - O & M	Exempt if Applicable Requirements of Subsections 106.D and/or 106.E are Satisfied
Article IX - Prohibitions	Not Exempt/All Applicable Provisions Apply
Article X - Enforcement	Not Exempt/All Applicable Provisions Apply
Other Erosion, Sediment and Pollution Control Requirements	Must comply with Title 25, Chapter 102 of the PA Code and other applicable State and municipal codes, including the Clean Streams Law.

Table 106.2 Notes:

- “Modified Requirements” – Regulated Activities listed within the Subsections of this Ordinance noted in Table 106.2 are eligible for exemption only from the indicated sections and subsections of this Ordinance and only if either the Minor Stormwater Management Plan of Subsection 106.D and/or the Modified Requirements for Agricultural Structures of Subsection 106.E as applicable are met to the satisfaction of the Municipality.

### **Section 107. Repealer**

Any ordinance or ordinance provision of the Municipality inconsistent with any of the provisions of this Ordinance are hereby repealed to the extent of the inconsistency only.

### **Section 108. Severability**

If any sentence, clause, section or part of this Ordinance is for any reason found to be unconstitutional, illegal or invalid, such unconstitutionality, illegality or invalidity shall not affect or impair any of the remaining provisions, sentences, clauses, sections or parts of this Ordinance. It is hereby declared the intent of the Governing Body of the Municipality that this Ordinance would have been adopted had such unconstitutional, illegal or invalid provision, sentence, clause, section or part thereof not been included herein.

### **Section 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 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. The requirements of this Ordinance shall supersede any conflicting requirements in other Municipal ordinances or regulations.

### **Section 110. 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 Municipality may approve measures other than those in this Ordinance, subject to Subsections 110.B and 110.C.
- B. Waiver Procedures
  - 1. A request for a waiver(s) or modification shall be in writing and accompany the SWM Site Plan submission.
  - 2. The waiver 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.

3. The Governing Body 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 waiver or modification will not be contrary to the public interest and that the purpose and intent of the Ordinance is observed. In granting a waiver, the Board of Supervisors may impose such conditions as will, in its judgment, secure substantially the objectives of the standard or requirements so waived.
  4. Waiver or 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.
  5. Cost or financial burden by itself shall not be considered a hardship.
- C. PADEP Approval Required. For any proposed Regulated Activity involving Earth Disturbance equal to or greater than one (1) acre, the Municipality may approve measures for minimum volume and infiltration control other than those required in this Ordinance only after consultation with and evaluation by PADEP that the alternate Site design meets State water quality requirements and does not conflict with State law, including, but not limited to, the PA Clean Streams Law, 35 P.S. Section 691.1, et seq.

### **Section 111. Requirements for a Municipal Grading Permit**

#### **A. Permits Required.**

No Person (as defined herein) shall commence or perform any grading, excavation or fill or any Earth Disturbance or any Regulated Activity without first having obtained a Stormwater Management, Erosion and Sediment Control and Grading Permit (Grading Permit) from East Pikeland Township unless exempt under Section 106. A separate grading permit shall be required for each site.

1. It shall be unlawful for any Person to commence any Earth Disturbance Activity, pave, fill, strip, or change the existing grade of any land within the Township without first securing a Grading Permit from the Township.
2. It shall be unlawful for any Person to disturb, modify, block, divert, or affect the natural overland or subsurface flow of stormwater within the Township without first securing a Grading Permit from the Township.
3. It shall be unlawful for any Person to construct, erect or install any dam, ditch, culvert, drain pipe, bridge or any other structure or obstruction affecting the drainage of his or her property or any other property without first securing a Grading Permit.

B. Application for Grading Permit.

1. Any person, company, or entity proposing to engage in activity requiring a Grading Permit hereunder shall apply by written application to the Township Designated Official, which shall include the applicant's agreement to comply with the regulations in Section 111.F hereof upon issuance of the Grading Permit.
2. The applicant should consult the Zoning Ordinance, the Comprehensive Plan, and the Subdivision and Land Development Ordinance which plan for and regulate the development of land within the Township. The applicant is encouraged to consult with surrounding municipalities which can be affected by, or can affect, the proposed land development.
3. A separate application shall be required for each Earth Disturbance Activity operation. Three copies of all the documents referred to in Section 111.C hereof shall be submitted with each application, one of which at the discretion of the Township Designated Official, shall be submitted at the applicant's expense to the Chester County Conservation District for review and comment.

C. Data Required for Grading Permit. - The application for a grading permit shall be accompanied by the following:

1. When a Regulated Activity is not exempt but qualifies for submittal under Section 106.D - Minor Stormwater Management Plan for Small Projects or Section 106.E - Modified Requirements for Agricultural Structures, the following shall be submitted:
  - a. a completed copy of a Grading Permit Application per Appendix F;
  - b. application fee as established by Township resolution;
  - c. a Simplified Stormwater Management Site Plan/Sketch Plan containing the features described in Section 1, Step 1 of Appendix A.2;
  - d. completed Minor Stormwater Management Plan Worksheets of Appendix A.2; and
  - e. a completed Operations and Maintenance Agreement per Appendix A.3.
2. When a Regulated Activity is not exempt nor does it qualify for submittal under Section 106.D - Minor Stormwater Management Plan for Small Projects or Section 106.E - Modified Requirements for Agricultural Structures, the following shall be submitted:
  - a. a completed copy of a Grading Permit Application per Appendix F;
  - b. application fee as established by Township resolution;
  - c. a stormwater management site plan including all information required by Article III;

- d. an erosion and sediment control plan including all information required by Article IV; and
- e. a time schedule indicating anticipated starting and completion dates of the development sequence, the expected date of completion of construction of each of the proposed BMPs, and the time of exposure of each area prior to the completion of such measures.

However, when a Regulated Activity is part of a subdivision or land development a separate application for and approval of a Grading Permit shall not be needed. Instead, the application for the subdivision or land development plan approval shall include the review and approval of all necessary stormwater management and erosion and sediment pollution control measures and accompanying data as required by this ordinance.

Further, when the scope of a Regulated Activity is less than one (1) acre of Earth Disturbance and the activity does not require subdivision and land development approval, at the discretion of the Township Engineer, reduced provisions may be established from those in Articles III and IV to show compliance with the requirements of this Ordinance.

3. Any submission that is found to be incomplete shall not be accepted for review and shall be returned to the Applicant within ten (10) regular business days with a notification in writing of the specific manner in which the submission is incomplete.

#### D. Approval of Grading Permit.

1. The Township Designated Official or her/his delegated agent shall issue all Grading Permits in letter form. The Township Designated Official may request the assistance of any appointed Township consultant.
2. Any submission deemed inconsistent or noncompliant may be revised and resubmitted with the revisions addressing the concerns of the Township Designated Official or her/his delegated agent.

#### E. Expiration of Grading Permit.

Every Grading Permit shall expire by limitation and become null and void if the work authorized by such Grading Permit has not been commenced within six (6) months or is not completed within one (1) year from the date of issue, provided that the Township Designated Official may, if the Grading Permit holder presents satisfactory evidence that unusual difficulties have prevented work being started or completed within the specific time limits, grant a reasonable extension of time, and, provided, further, that the application for the extension of time is made before the date of expiration of the Grading Permit.

#### F. Regulations for Grading Permit Holders and Others.

1. The Grading Permit holder is responsible for any on-site or off-site property damage or personal injury caused by his activity authorized by the Grading Permit.

2. No person, company, or entity shall modify, fill, excavate, pave, grade or regrade land in any manner as to endanger or damage public or private property, or to cause physical damage or personal injury. All precautions will be taken to prevent any damage to adjoining streets, sidewalks, buildings, structures, and other on-site or off-site property which could be caused by settling, cracking, erosion or sediment.
3. No person, company, or entity shall fail to adequately maintain in good operating order any drainage facility on his premises. All watercourses, drainage ditches, culverts, drain pipes and drainage structures shall be kept open and free flowing at all times.
4. No person, company, or entity shall deposit or place any debris or other material in any watercourses, drainage ditch or structure in such a manner as to obstruct free flow unless specifically intended to reduce erosion and approved by the Chester County Conservation District and proper permits from the Pennsylvania Department of Environmental Protection if required are obtained.
5. The owner of any property on which any work has been done pursuant to a Grading Permit granted under this chapter shall continually maintain and repair all graded surfaces and anti-erosion devices such as retaining walls, drainage structures or means, plantings and ground cover, installed or completed. Each Grading Permit holder shall advise transferees of property covered by a Grading Permit in writing of the requirements of this section, prior to entry of a binding agreement of sale for such property. Information pertaining to stormwater management facilities shall be included in the deed of any parcel being transferred.
6. All graded surfaces shall be seeded, sodded, planted or otherwise protected from erosion within one (1) day of the temporary or permanent cessation of earthmoving activities, weather permitting, and shall be watered, tended, and maintained until growth is well established.
7. Precautions shall be taken to prevent the unnecessary removal of trees and provide for their protection by suitable tree wells, as determined by the Township Designated Official.
8. When required, adequate provisions shall be made for dust control measures as determined by the Township Designated Official.
9. All plans and specifications accompanying applications for Grading Permits shall include provisions for both temporary and permanent erosion and sediment control.
10. The design, installation and maintenance of erosion and sediment control measures shall be accomplished in accordance with standards and specifications established by this chapter and the Pennsylvania Department of Environmental Protection and the Chester County Conservation District.

11. Wherever load bearing fill matter is to be used, each layer of compacted fill shall be tested to determine its dry density per ASTM D 1556. The density of such layer shall not be less than 95% of maximum dry density as determined by ASTM D 1557.
12. Inspections shall be conducted in accordance with the general procedure outlined in Section 601.
13. Compaction test reports shall be kept on file at the site and be subject to review at all times by the Township Designated Official.

G. Erroneous Grading Permit.

Any Grading 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 Grading Permit or other authorization is unlawful.

**Section 112. Financial Security/Performance Bond.**

- A. For all activities requiring submittal of a Stormwater Management (SWM) Site Plan, Grading Plan or Erosion and Sediment Control Plan that involve subdivision or land development, the Applicant shall post financial security to the Municipality for the timely installation and proper construction of all stormwater management facilities as required by the approved SWM Site Plan, Grading Plan or Erosion and Sediment Control Plan and this Ordinance, and such financial security shall:
  1. 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 include a 10% contingency amount and an amount to cover municipal legal and consulting fees;

AND

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

- B. For all other activities, before issuing a Grading Permit for a project, the Township may require a cash bond or corporate surety bond in a form satisfactory to the Township Board of Supervisors conditioned upon the faithful performance of the control measures and other conditions specified in the Grading Permit within the time specified, or within any extension thereof granted by the Township Board of Supervisors in the amount of the total estimated cost of all control measures and safeguards for adjoining properties plus 15% for inspection, engineering, legal and 10% for contingencies, including any damages occurring on or off the development site. Said bond may be combined with a bond filed under Subdivision and Land Development. Each bond shall be maintained and renewed annually and shall be executed by a surety or guaranty company qualified to transact business in the state.
- C. Township reserves the right given to it by the Pennsylvania Municipalities Planning Code to have a developer increase the amount of the financial security established hereunder at any time that, in the sole opinion of the Township, the funds remaining in the account are insufficient either to complete the improvements required or to provide the maintenance bond necessary under the Pennsylvania Municipalities Planning Code or any Township ordinances, either as a result of additional requirements required by the Township Engineer and which may be legally imposed on developer by the Township, interruptions in construction, inflationary increases in costs, or any other foreseen or unforeseen factor that may arise at any time to the completion of said improvements. Any such request to increase the amount in the financial security shall be made in writing by Township to developer after the approval by the Township at a regular meeting of the Board, and said additional amount shall be posted within thirty (30) days of the date of said written request; in the event that developer fails to post the additional security in the time period provided herein, said failure shall be tantamount to a failure to complete and Township shall be entitled to all remedies provided by law, including all remedies set forth in Township ordinances.
- D. Upon or before final release of financial security and completion of subdivision or land development improvements, the permanent stormwater management system for a tract shall be fully installed and functional in accordance with the approved Stormwater Management Site Plan. Temporary sediment trapping facilities in detention basins, upon inspection and approval by the Township Engineer, shall be converted into permanent stormwater management basins; additional facilities designed to serve more than an individual lot shall begin operation. All such work shall be specified in the approved plan.



## **ARTICLE II – DEFINITIONS**

### **Section 201. Interpretation**

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

- A. Words used in the present tense include the future tense; the singular number includes the plural, and the plural number includes the singular; words of masculine gender include feminine gender; and words of feminine gender include masculine gender.
- B. The word “includes” or “including” shall not limit the term to the specific example, but is intended to extend its meaning to all other instances of like kind and character.
- C. The word “person” includes an individual, partnership, public or private association or corporation, firm, trust, estate, municipality, 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 municipality.
- D. The words “shall” and “must” are mandatory; the words “may” and “should” are permissive.
- E. The words “used” or “occupied” include the words “intended, designed, maintained, or arranged to be used, occupied, or maintained.”
- F. The definitions in this Ordinance are for the purposes of enforcing the provisions of this Ordinance and have no bearing on other municipal regulations or ordinances.

### **Section 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 Municipality 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 Municipality at the completion of the project, as per the requirements of Section 602 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 refer to operational and/or behavior-related practices that attempt to minimize the contact of pollutants with stormwater runoff whereas structural BMPs or measures are those that consist of a physical device or practice that is installed to capture and treat stormwater runoff. Structural BMPs include, but are not limited to, a wide variety of practices and devices from large-scale retention ponds and constructed wetlands to small-scale underground treatment systems, infiltration facilities, filter strips, low impact design, bioretention, wet ponds, permeable paving, grassed swales, riparian or forested buffers, sand filters, detention basins, and manufactured devices. Structural stormwater BMPs are permanent appurtenances to the Site.

**Board of Supervisors** – the Board of Supervisors of East Pikeland 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.

**Comprehensive Plan** – The Comprehensive Plan of East Pikeland Township, Chester County, PA, as amended.

**Conservation District** – The Chester County Conservation District.

**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 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 who seeks to undertake any Regulated Activities at a Site in the Municipality.

**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 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; 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, gravity, chemical action or other natural forces.

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

**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. 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 one hundred (100)-year 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.

**Governing Body** – the Board of Supervisors of East Pikeland Township.

**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.

**Grading Permit** – A permit issued under the terms of this Ordinance for any Earth Disturbance and/or Regulated Activity, and/or Regulated Earth Disturbance Activity.

**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).

**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.

**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; other solid, paved or concrete areas such as streets, driveways, sidewalks, parking lots, patios, tennis or other paved courts, or athletic playfields comprised of synthetic turf materials. For the purposes of determining compliance with this Ordinance, compacted soils or stone surfaces used for vehicle parking and movement shall be considered impervious. Surfaces that were designed to allow infiltration (i.e. areas of porous pavement) will be considered on a case-by-case basis by the Municipal Engineer, based on appropriate documentation and condition of the material, etc. Decks and swimming pools do not constitute impervious surfaces.

**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 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, Registered Landscape Architect, Registered Professional Land Surveyor, or Registered Professional Geologist, or any person licensed by the Pennsylvania Department of State and/or qualified by law 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.

**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 facility or system.

**Municipal Engineer** – A professional engineer licensed as such in the Commonwealth of Pennsylvania, duly appointed as the engineer for a Municipality, planning agency, or joint planning commission.

**Municipality** – East Pikeland Township, Chester County, Pennsylvania.

**NOAA** - National Oceanic and Atmospheric Administration.

**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 municipal 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 (PADEP BMP Manual)** - Document Number 363-0300-002 (December 2006, and as subsequently amended).

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

**Planning Commission** – The Planning Commission of East Pikeland 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 Municipality are completed.

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

**Replacement** – The act of putting back into a former position or place, or the act of filling the place of something in identical fashion.

**Resurfacing** – The act of covering a preexisting impervious surface with a new surface.

**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 may 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) 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, municipal 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 Municipality 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/Event** – (see Return Period).

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

**Stormwater Management, Erosion and Sediment Control and Grading Permit** – see Grading Permit.

**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. Typical stormwater management facilities include, but are not limited to, detention and retention basins, open channels, storm sewers, pipes, and Infiltration Facilities.

**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 Stormwater 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** – the Subdivision and Land Development Ordinance of East Pikeland 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.

**Township Designated Official** – Person or persons designated by the Township Board of Supervisors to carry out the responsibilities of this Chapter.

**Township** – East Pikeland 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 ten (10) 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.

**Zoning Officer** – The duly appointed Zoning Officer of East Pikeland Township.

**Zoning Ordinance** – The Zoning Ordinance of East Pikeland Township, Chester County, PA, as amended.



## **ARTICLE III – STORMWATER MANAGEMENT (SWM) STANDARDS AND SITE PLAN REQUIREMENTS**

### **Section 301. Goals and Purpose**

A. Goals. The goals for stormwater management in East Pikeland Township are:

1. To protect the health, safety, and general welfare of the Township residents by protecting the surface and groundwaters of the Township through effective stormwater management and control of sedimentation and erosion, as provided in this chapter.
2. To limit the negative impacts of development that occur with inadequately managed stormwater. These negative impacts include but are not limited to altered hydrology, lowering of the groundwater table, physical stream impacts, and biological impacts to nonpoint source pollutants.

B. Purpose. The purpose of stormwater management in East Pikeland Township is:

1. To maintain the predevelopment water balance in watershed and sub-watersheds containing first-order and other especially sensitive streams in the Township, and to work to restore natural hydrologic regimes wherever possible throughout the stream system;
2. To maintain the predevelopment volume of groundwater recharge;
3. To prevent increase in surface runoff volumes, predevelopment to postdevelopment, thereby mitigating flooding downstream in the watershed, enlarging floodplains, eroding streambanks, and creating other flood-related health, welfare, property losses, and to work to reduce runoff volumes to natural levels;
4. To maintain predevelopment peak rates of discharge, site-by-site, so as not to worsen flooding adjacent to downstream sites, and to work to restore peak runoff rates to natural levels;
5. To minimize nonpoint source pollutant loading to groundwaters and surface waters generally throughout East Pikeland Township;
6. To minimize impacts on stream temperatures;
7. To minimize aesthetic impacts; and
8. To manage stormwater through approaches and practices that rely on natural process to the greatest extent possible and require a minimum of structures.

## **Section 302. General Requirements**

- A. Applicants proposing Regulated Activities in the Municipality which are not exempt under Section 106 shall submit a Stormwater Management Site Plan (SWM Site Plan) to the Municipality for review and approval in accordance with Articles III and IV. SWM Site Plans approved by the Municipality 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 Municipality shall commence until:
  - 1. The Municipality issues 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 Municipality 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 304.C and Appendix B 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.
- G. Existing drainage peak rate discharges up to and including the one hundred (100)-year storm onto or through adjacent property(ies) or downgradient property(ies), including diffuse drainage discharge, that do not discharge to a Water of the Commonwealth on the Site, shall not be altered in any manner without written permission from, and, where applicable as determined by the Municipality an easement and agreement with, the affected Landowner(s) for conveyance of discharges onto or through their property(ies). Such discharge shall be subject to any applicable discharge criteria specified in this Ordinance.

- 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 this Article. 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 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 Municipal 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 Municipality, 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 Municipality. The Municipality 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.
- N. Hotspots Runoff Controls –

Specific structural or pollution prevention practices may be required, as determined to be necessary by the Municipal 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. Marina/Boat 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 Municipality.

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 Municipal 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 -

The Municipality 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 Municipal 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. When a Regulated Activity is not part of a subdivision or land development proposal and is less than one (1) acre of Earth Disturbance, at the discretion of the Township Engineer, reduced provisions may be established from those listed above in order to achieve compliance with the requirements of this Ordinance.
- S. The choice and design of stormwater management systems are to be developed through a procedure that selects and locates Best Management Practices, viewing components in the following priority:
1. Seeking to control runoff at its source through infiltration;
  2. Improving the quality of the stormwater during conveyance;
  3. Providing for detention.
- T. The selection of a competent and creative design engineer by the applicant clearly is critical to the success of an approach that emphasizes the use of Best Management Practices. In order to achieve the standards and construction and maintenance cost reductions which are intended in this chapter, additional time and money is required in the process in preliminary engineering and design. Review and approval of the Stormwater Management Plan will be heavily dependent on the technical review by the Township Engineer and compliance with this chapter.
- U. The applicant or applicant's agent shall design, construct and/or install drainage facilities to prevent soil erosion, damage and siltation, and to manage stormwater in order to prevent the impairment of public safety or physical damage due to concentration of the stormwater runoff onto adjacent properties in accordance with this chapter and applicable rules and regulations of the Pennsylvania Department of Environmental Protection, and the Chester County Conservation District. All land areas shall be graded to secure proper drainage away from buildings, on-site sewage disposal systems, and to prevent the uncontrolled collection of stormwater in pools. The system shall be designed to collect and recharge water to the greatest extent possible.
- V. The rate of stormwater runoff from any proposed subdivision, land development or Regulated Activity that is not exempt per Section 106, shall not exceed the rate of runoff prior to development. Requirements for design of stormwater management systems that incorporate groundwater recharge as an essential element in order to control quantity of discharge is outlined in this chapter. The distribution of drainage discharge from the developed properties shall replicate that of before development conditions to the maximum extent possible. The methodology and facilities used shall be based on the anticipated flows and conditions of each particular site.

- W. The Stormwater Management Site Plan for each subdivision, land development or Regulated Activity that is not exempt per Section 106 shall take into account and provide for the peak rate and volume flows of other areas in the watershed to ensure that cumulative problems are not increased as a result of flows from the proposed project. This analysis shall also explore possibilities to share stormwater management facilities with other areas in the watershed, in which case, consultation with the Township shall be required prior to design.
- X. Recharge facilities, detention facilities, storm sewers, culverts, bridges and related drainage installation shall be designed and constructed to meet the following purposes:
1. To permit unimpeded flow of natural watercourses. Such flow may be redirected as required, subject to the approval of the Pennsylvania Department of Environmental Protection;
  2. To insure adequate drainage of all low points as may be related to streets;
  3. To intercept stormwater runoff along streets at intervals reasonably related to the extent and grade of the area drained to prevent flow of stormwater across intersections during the design storm;
  4. To insure adequate and unimpeded flow of stormwater under driveways in, near, or across natural watercourses or drainage swales. Properly sized pipes or other conduits shall be provided as necessary;
  5. To prevent excessive flow on or across streets, sidewalks, drives, parking areas, and any other paved surface or accessway; and
  6. To lead stormwater away from springs.
- Y. All natural streams, channels, swales, drainage systems, and/or areas of concentration of surface water shall be maintained in their existing condition, unless alteration is approved by the Township. In any event, all encroachment activities shall comply with Chapter 105 of the Commonwealth of Pennsylvania's Department of Environmental Protection Dam Safety and Waterway Management Rules and Regulations.
- Z. Bridges, culverts, or rip-rap shall be constructed to maintain natural characteristics of the stream and shall meet the approval of the Township.
- AA. Retention/detention basins shall be designed to utilize the natural contours of the land. When such design is impracticable, the construction of the basin design shall utilize slopes as shallow as possible to blend the structures into the existing terrain. The use of multiple retention/detention facilities, which are smaller and less intrusive on the site, is encouraged to meet the requirements of this section.

- BB. All areas containing non-deleterious lakes, ponds, wetlands and watercourses shall be preserved. Any alteration, development, filling, piping, or diverting of such water resources shall be in strict compliance with the provisions of the Zoning Ordinance, especially those pertaining to the Flood Hazard District, and all prevailing rules and regulations of federal and state agencies. The Township recognizes the use of wetlands as potential components of stormwater management facilities and encourages such innovative use if assurances are met that conservation measures are adequate and that all federal and state requirements are satisfied.
- CC. The Township may require that a landowner or development provide reasonable corrective measures to alleviate any existing site conditions that cause and create drainage problems off-site which may be affected by the proposed subdivision, land development or earth disturbance. It shall be the responsibility of the landowner or developer to obtain all drainage easements on, over, or through other properties, and the Township, its agents, workmen, and employees shall be indemnified and held harmless from any liability.
- DD. Any water originating from non-natural sources, such as swimming pools, air-conditioning units, sump pumps, roof drains, or other similar flow, shall be properly discharged into a recharge facility or natural watercourses on the property or connected to an existing or proposed storm drainage system as approved by the Township. Polluting matter from such sources may not be deposited into natural watercourses or storm drains. See also Article IX.
- EE. Any water originating from non-natural sources, as referenced above, shall not be discharged onto any street or other public right-of-way used for pedestrian or vehicular access. See also Article IX.
- FF. To mitigate the potential polluting of surface waters and groundwaters by pollutants such as salt, petroleum products, and antifreeze flowing from paved parking lots, pretreatment of the runoff shall be required. The extent of the treatment shall be set by the Township Engineer and will be determined by such factors as the area of the parking lot and the course of the runoff as it is recharged or flows into natural waterways.

### **Section 303. Permit Requirements by Other Governmental Entities**

The following activities may require permits or other regulatory approvals. Any necessary permit or approval shall be met prior to final approval by the Municipality of the SWM Site Plan and prior to commencement of any Regulated Activities.

- A. Any Earth Disturbance (Title 25 Pennsylvania Code Chapter 102, or erosion and sediment control requirements of the Municipality);
- B. Work within a watercourse (PADEP under Title 25 Pennsylvania Code Chapter 105);
- C. Any BMP or Conveyance located in or adjacent to surface Waters of the Commonwealth, including wetlands (PADEP under Title 25 Pennsylvania Code Chapter 105);

- D. Any BMP or Conveyance located on, or discharging to, or requiring access to or from, a State highway right-of-way (PennDOT under Title 67 Highway Occupancy Permit); and
- 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 (PADEP under Title 25 Pennsylvania Code Chapter 105).

### **Section 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 313) 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 313.C 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 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);
  - 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 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;
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 304.B and 304.C. Appendix B presents additional discussion of natural hydrology site design and sources of information for “Conservation Design”, “Low Impact Design”, and “Sustainable Design”.

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 305, 306 and 308.

### **Section 305. Peak Rate Controls, Water Quality and Runoff Volume Requirements**

A. 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 Applicant shall comply with the following peak rate, water quality and runoff volume requirements for all Regulated Activities, including all New Development and Redevelopment activities:

1. Standard 1: Recharge Volume - In addition to the control of the rate of stormwater runoff, the volume of runoff from any proposed earth disturbance, grading, subdivision or land development, assuming full development, shall be based on either the sum of subsections a. and b. that follow or on subsection c) as applicable:
  - a. Recharge requirements are set at a volume of a minimum of three (3) inches or runoff from the area of new and additional Impervious Surface. This is equal to the runoff of a two (2) year, twenty-four (24) hour storm (3.22 inches of rainfall), plus
  - b. To the extent that a site is made less pervious by development (re-grading, recompaction, loss of vegetation, or any land disturbance), but not made totally impervious, a recharge volume requirement of a minimum of one (1) inch of runoff from all areas of disturbed earth is required as well.
  - c. In the MU Mixed Use Development and the C Commercial Zoning Districts only (as shown on the Township Zoning Map) for Sites containing areas of Redevelopment, a recharge volume requirement of a minimum of one (1) inch of runoff from all areas of Proposed Impervious Surface shall be provided rather than the criteria of subsections a. and b. above.

Runoff volumes shall be calculated using the Soil Cover Complex Method of the NRCS. The applicant is required to include these calculations in the volume requirements to be accommodated by the stormwater management system. Infiltration systems shall be designed such that failure of the infiltration component does not eliminate compliance with the required peak rate attenuation capability of the BMP.

2. Standard 2: Assuming full compliance with Standard 1, the peak flow rate of the post-construction design storm shall be reduced to the peak flow rate of the corresponding pre-development design storm set forth below. Rainfall depths shall be based on NOAA Atlas 14 values, as amended and are estimated below. Design storms include:

Post-Construction Design Storm Frequency (24-Hour Duration)	Rainfall Depths (inches)	Pre-Development Design Storm Frequency (24-Hour Duration)
1-year	2.67	0.75% (0.75) of the 1-year
2-year	3.22	1-year
10-year	4.70	2-year
25-year	5.67	25-year
50-year	6.49	50-year
100-year	7.36	100-year

The above design criteria are in addition to all required groundwater recharge requirements. Infiltration system storage volume shall not be used as part of the storage volume necessary to achieve the above listed peak rate attenuation requirements.

3. Standard 3: In the MU Mixed Use Development and the C Commercial Zoning Districts only (as shown on the Township Zoning Map), the following peak flow rate design criteria shall apply to areas of Redevelopment:

Post-Construction Design Storm Frequency (24-Hour Duration)	Rainfall Depths (inches)	Pre-Development Design Storm Frequency (24-Hour Duration)
2-year	3.22	2-year
10-year	4.70	10-year
25-year	5.67	25-year
50-year	6.49	50-year
100-year	7.36	100-year

- a. At the discretion of the Municipal Engineer, Regulated Activities that involve a combination of both New Development and Redevelopment activities may either:
- (1) Apply the stormwater standards (Redevelopment or New Development) that are associated with the activity that involves the greatest amount of land area; or
  - (2) Apply the Redevelopment and New Development stormwater standards to the corresponding Redevelopment and New Development portions of the proposed Regulated Activity.
- b. All other Sites (in other Zoning Districts) that qualify as Redevelopment or that are a combination of New Development and Redevelopment shall comply with Standard 2 above.

4. Standard 4: Under certain conditions, the Township, upon recommendation of the Township Engineer, may impose the following additional restrictions on stormwater discharges:
    - c. Peak discharge may be further restricted when it can be shown that a probable risk to downstream structures or unique natural areas exists or that existing severe flooding problems could be further aggravated.
    - d. Measures shall be imposed to protect against ground or surface water pollution where the type of business activity may result in significant nonpoint source pollution ("hot spots") or the nature of the soils or bedrock underlying a stormwater management structure constitutes substantial risk of contamination, such as might be the case in limestone formations. Special provisions to be followed in these cases will be provided by the Township Engineer.
    - e. Where groundwater yields are very low or where a groundwater supply already is heavily used, the Township may require that the entire volume of the two-year frequency rainfall (3.3 inches in 24 hours) be retained and infiltrated.
  5. Standard 5: Significant loadings of nonpoint source pollutants shall not be discharged into either surface water or groundwater. Significant is defined as resulting in an increase greater than 10% of existing background concentrations of all water quality parameters of consequence identified in federal and state criteria for the watershed. In particular, nutrients (nitrate and total phosphorus), metals (cadmium and lead), total petroleum hydrocarbons (PH) and synthetic organic compounds identified by the US Environmental Protection Agency (EPA) as toxic or hazardous substances must be controlled. If the volume and peak rate standards above (Standards 1 and 2) are met, then water quality impacts are assumed to be adequately controlled. If the volume standard (Standard 1) above cannot be achieved, then a water quality impact analysis must be performed, at the direction of the Township Engineer, confirming prevention of any significant increase in nonpoint source pollution, with particular focus on the pollutants discussed above. Both structural and nonstructural (preventive) measures are to be considered for reduction and prevention of nonpoint source pollution.
- B. For modeling purposes, the Predevelopment ground cover conditions shall be determined using the corresponding ground cover assumptions presented in Subsection 307.D of this Ordinance.
  - C. The design of the 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.

- E. 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.
- F. The Municipality may require additional water quality and runoff control measures for stormwater discharging to special management areas such as those listed in Subsection 302.P.
- G. 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.
- H. Weighted averaging of runoff coefficients shall not be used for manual computations or input data for water quality and runoff volume calculations.
- I. Areas located outside of the Site (i.e., areas outside of the Regulated Activity) that drain through a Site are not subject to peak rate control requirements, water quality and runoff volume requirements.
- J. Water quality and volume control practices shall be selected and designed to meet the criteria of Subsection 304.C that apply to water quality and volume control.
- K. When designing detention or retention facilities to control peak rates of runoff, storage volume that is required to meet water quality or infiltration volume requirements, shall not be included as part of the storage volume designed to control peak rates of runoff. Failure of an infiltration facility, at any point in time, shall not adversely affect necessary peak flow rate alternation.
- L. Stormwater Distribution - The distribution of runoff from the developed property onto adjacent properties shall, to the maximum extent possible, be in the same direction as that which existed before development. No new concentrations of stormwater discharge will be permitted.

### **Section 306. 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 NRCS Type II distribution.

- B. To the maximum extent practicable, and unless otherwise approved by the Municipal 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 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 307.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 Municipal 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 Municipal Engineer's satisfaction. When filters are utilized, maintenance provisions shall be provided to ensure filters meet the design function.
- F. All proposed stormwater 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 307. Calculation Methodology**

- A. Stormwater runoff from all Regulated Activity Sites with a drainage area of greater than one (1) acre shall be calculated using a generally accepted calculation technique(s) that is based on the NRCS Soil Cover Complex Method. Table 307.1 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. The use of the Rational Method to estimate peak discharges for drainage areas greater than one (1) acre shall be permitted only upon approval by the Municipal Engineer. The runoff volume requirements of this Ordinance shall always be based on the NRCS Soil Cover Complex Method.

**TABLE 307.1  
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.
Rational Method (or commercial computer package based on Rational Method)	Emil Kuichling (1889)	For Sites up to one (1) acre or as approved by the Municipality.
Other Methods	Varies	Other computation methodologies approved by the Municipality.

- 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 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. All calculations using the Rational Method shall use rainfall intensities consistent with appropriate times-of-concentration (duration) and storm events with rainfall intensities obtained from NOAA Atlas 14 partial duration series estimates, or the latest version of the PennDOT Drainage Manual (PDM Publication 584). Times-of-concentration shall be calculated based on the methodology recommended in the respective model used. Times of concentration for channel and pipe flow shall be computed using Manning’s equation.
- D. 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 and area of cultivation), Predevelopment calculations shall assume ground cover of “meadow.”
  2. In the MU Mixed Use Development and the C Commercial Zoning Districts only (as shown on the Township Zoning Map), the following ground cover assumptions shall be used for areas of Redevelopment:
    - 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 existing Impervious Surfaces, Predevelopment calculations shall assume ground cover of “meadow.”
    - c. For areas that are existing Impervious Surfaces, Predevelopment calculations shall assume at least twenty percent (20%) of the existing Impervious Surface area to be disturbed as “meadow” ground cover.
- 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 C-1 in Appendix C of this Ordinance. All those areas to be disturbed during construction shall be assumed to be reduced one Hydrologic Soil Group Category level during post-development runoff calculations (i.e. HSG B is reduced to HSG C and so forth). This requirement does not apply to Regulated Activities involving Redevelopment in the MU Mixed Use Development and the C Commercial Zoning Districts.
- F. Runoff coefficients (C) for both Predevelopment and proposed (Post-construction) conditions for use in the Rational Method shall be obtained from Table C-2 in Appendix C of this Ordinance. All those areas to be disturbed during construction shall be assumed to be reduced one Hydrologic Soil Group Category level during post-development runoff calculations (i.e. HSG B is reduced to HSG C and so forth). This requirement does not apply to Regulated Activities involving Redevelopment in the MU Mixed Use Development and the C Commercial Zoning Districts.
- 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 C-3 in Appendix C 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); and
2. A type II distribution storm (for the Soil Cover Complex Method only for example, TR-55, TR-20).

### **Section 308. 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:

- A. Infiltration devices shall be selected based on suitability of soils and site conditions. Measures may include porous pavement with underground infiltration beds, vegetated infiltration beds, swales and trenches, or other seepage structures as proposed in the Pennsylvania Stormwater Best Management Practices Manual, as amended, or other sources acceptable to the Municipal Engineer.
- B. Infiltration shall be designed to accommodate the entire water quality and runoff volume required in Section 305.A.1.
- C. 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.
- D. When a project contains or is divided by multiple watersheds, the infiltration volume shall be separately addressed for each watershed.
- E. 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.
- F. 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 Municipal 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 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 Municipal Engineer that the soils are conducive to infiltration on the identified lots.
  5. Tests shall be conducted at the proposed bottom elevation of an infiltration BMP. At a minimum, 2 tests per infiltration BMP or 1 test per 1,000 square feet of infiltration area, whichever is greater, shall be provided.
  6. Soil analysis and infiltration test methods and test locations shall be submitted to the Township Engineer for review and approval prior to testing. The Township Engineer shall observe all testing and will require that specific test pits and percolation data be obtained in order to approve test result data and ensure that the proposed infiltration systems will function as designed.
- G. 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. If less than twenty-four (24) inches exists, filter media may be utilized to remove pollutants.
  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. No allowance for infiltration during the storm shall be considered.
- H. All infiltration practices shall:
1. Be selected and designed to meet the criteria of Subsection 304.C that are applicable to infiltration;

2. Additional Setbacks. Recharge facilities serving only one dwelling unit shall be sited at least ten (10) feet from any property line, twenty-five (25) feet from all buildings, fifty (50) feet from any water supply well, and twenty-five (25) feet from any wastewater treatment of wastewater treatment system replacement area. All other recharge facilities, including, but not limited to, those serving non-residential uses or more than one residential dwelling unit shall be sited at least 50 feet from a property line, 50 feet down gradient or 100 feet up gradient from a basement wall, 50 feet from septic system drainfields, 50 feet from individual water supply wells and 100 feet from community or municipal water supply wells.
  3. For any infiltration practice that collects runoff from shared or multiple features and that is located within fifty (50) 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.
- I. Infiltration Facilities, to the maximum extent practicable, shall be located to avoid introducing contaminants to groundwater:
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.
- J. 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 Municipal Engineer for review. All areas designated for infiltration shall not receive runoff until the contributory drainage area has achieved final stabilization.
- K. Where sediment or debris transport in the stormwater runoff is anticipated to reach the Infiltration Facility, appropriate permanent measures, as determined by the Municipal Engineer, to prevent or collect sediment shall be installed prior to discharge to the infiltration system. Measures may include settlement or filtration devices. Where Infiltration Facilities are proposed that do not include permanent easily maintainable sediment and debris filtration systems, they shall be designed to allow easy access by persons and equipment to remove accumulated debris and sediment.

- L. 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. Whenever possible, roof drains shall discharge to vegetated areas that drain overland to infiltration practices.
- M. All infiltration practices shall have appropriate positive overflow controls.
- N. No sand, salt or other particulate matter may be applied to a porous surface material for winter ice conditions.
- O. 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 which 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, free of fines, shall be allowed.
  - 4. The top and sides of all seepage beds, trenches, or like facilities shall be covered with drainage filtration fabric. Fabric shall meet the specifications of PennDOT Publication 408, Section 735, Construction Class 1.
  - 5. Perforated distribution pipes connected to centralized catch basins and/or manholes with provision for the collection of debris shall be provided in all facilities. The perforated pipes shall distribute stormwater throughout the entire seepage bed/trench, or like facility. All distribution pipes shall be a material which meets the one hundred (100) year life expectancy criteria of PennDOT as per PennDOT Design Manual Part 2, Publication 13M, Chapter 10, August 2009, Change No. 1, as amended.
  - 6. Recharge facilities shall be designed in accordance with infiltration system guidelines of the DEP BMP Manual Appendix C Protocol 2, as amended.
  - 7. The Municipal Engineer shall be permitted to inspect construction methods. Shop drawings shall be submitted for all materials utilized in recharge facilities.
- P. All Infiltration Facilities which service more than one lot and are considered a common facility shall have an easement provided to the Township for future access if necessary.

### **Section 309. Detention and Retention Facility Design Requirements.**

- A. All detention/retention basins shall be designed to detain the peak rate of water resulting from the site for all design storms up to and including the fifty-year (50 year) frequency rainfall. Design storms shall be routed through the basin facilities, excluding in the design calculations, the volume of the basin required for stormwater infiltration/recharge.
- B. The following setbacks are required for stormwater management facilities:
  - 1. Stormwater retention or detention basins shall be located at least 50 feet from any structure, whether existing or proposed.
  - 2. Stormwater retention or detention basins shall be located at least 50 feet from any property boundary or right-of-way.
  - 3. Stormwater retention or detention basins shall be located at least 50 feet from existing wetlands, or the banks of existing streams.
  - 4. Recharge systems shall be located at least 25 feet from any basement wall and 25 feet from wastewater treatment areas.
  - 5. Any recharge system designed to handle runoff from any commercial or industrial impervious parking or outside storage area shall be a minimum of 50 feet from any water supply well or any wastewater treatment area.
- C. Riser. A riser or other acceptable outfall shall be provided at the outlet of all detention basins. The riser shall be constructed of precast or poured in place concrete with controlled orifices. A trash rack or similar appurtenance shall be provided to prevent debris from entering the riser. All risers shall have a concrete base attached with a watertight connection. The base shall be of sufficient weight to prevent flotation of the riser.
- D. Landscaping. All stormwater control systems, whether existing or proposed, shall be planted to effectively naturalize areas so as to become an integral and harmonious element in the local landscape. No trees shall be planted in the earthfill of berms or dams.
- E. Emergency spillway. Whenever possible, the emergency spillway for detention basins shall be constructed on undisturbed ground. Emergency spillways shall be designed according to the NRCS Engineering Field Manual. All emergency spillways shall be constructed so that the detention basin berm is protected against erosion with a permanent erosion control blanket. The minimum capacity of all emergency spillways shall be such that the capacity of the emergency spillway equals the peak flow rate from the one-hundred (100) year design storm. Emergency spillway linings shall extend along the upstream and downstream berm embankment slopes. The upstream edge of the emergency spillway lining shall extend to a minimum of two (2) feet below the spillway crest elevation. The downstream edge of the spillway lining shall, at minimum, extend to a distance of ten (10) feet beyond the toe of the berm embankment. The emergency spillway shall not discharge over earthen fill and/or easily erodible material.

- F. Anti-seep collars. Anti-seep collars shall be installed around the principal pipe barrel within the normal saturation zone of the detention basin berms. The anti-seep collars and their connections to the pipe barrel shall be watertight. The anti-seep collars shall extend a minimum of two feet beyond the outside of the principal pipe barrel. The maximum spacing between collars shall be fourteen (14) times the minimum projection of the collar measured perpendicular to the pipe.
- G. Freeboard. 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 one (1) foot of Freeboard above the design flow depth of the emergency spillway. Should any BMP required 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.
- H. Slope of detention basin embankment. The maximum slope of earthen detention basin embankments shall meet the requirements contained in this subsection. Whenever possible, the side slopes and basin shape shall be amenable to the natural topography. Straight side slopes and rectangular basins shall be avoided.
- I. Width of berm. For dams less than ten (10) feet high, a minimum top width of six (6) feet is required. For dams ten (10) feet to fifteen (15) feet in height, a top width of 10 feet is required. For dams greater than fifteen (15) feet in height, the top width shall be designed by a professional engineer.
- J. Slope of basin bottom. In order to insure proper drainage of the detention basin, a minimum grade of 2% shall be maintained for all sheet flow. A minimum grade of 1% shall be maintained for all channel flow. The Township Engineer may approve the use of a flat (0%) bottom accompanied with appropriate water tolerant landscape plantings to promote water quality and groundwater recharge.
- K. Energy dissipaters. Energy dissipating devices (rip-rap, end sills, etc.) shall be placed at all basin outlets. Any pipe or other component which discharges directly into the basin shall be equipped with energy dissipating devices and shall outlet into the bottom of the basin.

L. Landscaping and grading of detention basin. All landscaping and grading standards shall be as follows:

1. Cuts. No excavation shall be made with a cut face steeper than three (3) horizontal to one (1) vertical, except under the condition that the material in which the excavation is made is sufficiently stable to sustain a slope of steeper than three (3) horizontal to one (1) vertical. A written statement to that effect is required from an engineer and must be submitted and approved by the Municipal Engineer. The statement shall affirm that the site has been inspected and that the deviation from the slope should not result in injury to persons or damage to property. Retaining walls shall be required if a stable slope cannot be maintained. Any retaining wall design must be approved by the Municipal Engineer. The toe of the slope or headwall of any cut must be located a minimum of five (5) feet from property lines.
2. Fills. No fills shall be made which creates any exposed surfaces steeper in slope than three (3) horizontal to one (1) vertical, except where the fill is located so that settlement, sliding, or erosion will not result in property damage or be a hazard to adjoining property, streets, or buildings. A written statement is required from an engineer certifying that s/he has inspected the site and that any proposed deviation from the slope specified above should not endanger any property or result in property damage, and must be submitted to and approved by the Municipal Engineer.
  - a. A concrete or stone masonry wall designed and constructed in accordance with these specifications and standards may be required to support the face of the fill where the above specified slopes are exceeded.
  - b. The top of any fill or toe of the slope of any fill shall be located twenty-five (25) feet from any property line with the exception of a downstream property line where the toe of the embankment shall be placed a sufficient distance to allow for energy dissipating devices, but in no case less than forty (40) feet unless approved otherwise by the Township.
3. Planting requirements. All areas proposed for recreational use, whether active or passive, shall be planted to effectively naturalize the areas to become an integral and harmonious element in the natural landscape.
4. Drainage channels and retention areas. All storm drainage channels and retention areas, whether existing or proposed, shall be graded and planted to effectively naturalize areas so as to become an integral and harmonious part of the landscape by contour and type of plant material employed.

5. Fence or screening. A fence or suitable vegetation screen shall be provided around all detention basins as required by the Municipal Engineer. All vegetative screening shall be at least 3 1/2 feet in height and shall be composed of the following shrubs: Barberry (Barberis species); Eleagnus (Eleagnus species); Firethorn (Pyracantha species); or Rose (Rose species). All vegetative screening shall provide a barrier to prevent entrance to the detention basin area. The fencing or vegetative screening requirement shall be waived only upon approval by the Township.
- M. Easements for all basins and storm pipes not located within the public street right-of-way shall be provided in accordance with Section 804.
  - N. 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 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 Officer for design information).
  - O. A profile, shall be provided on the plan, of the berm embankment and outlet structure indicating the embankment top elevation, embankment side slopes, top width embankment emergency spillway elevation, riser dimensions, pipe barrel dimensions, and dimensions and spacing of anti-seep collars.

**Section 310. Drainage and Conveyance System Design Requirements.**

- A. Design flow rate. The storm drain system shall be designed to carry a twenty-five (25) year peak flow rate, and a fifty (50) year peak flow rate at the sump area. The design twenty-five (25) year peak flow rate into each inlet shall be indicated on the Stormwater Management Plan. The twenty-five (25) year flow rate shall be determined by the rational formula,  $Q = CIA$ .

Where:

Q = Peak runoff rate, cubic feet per second (CFS);

C = Runoff coefficient equal to the ratio of the runoff rate to the average rate of rainfall over a time period equal to the time of concentration;

I = Average rainfall intensity to inches per hour for a time equivalent to the time of concentration;

A = Drainage area in acres.

Approximate values for the runoff coefficient and runoff intensity can be found in the Commonwealth of Pennsylvania, Department of Transportation, PennDOT Drainage Manual Publication 584, as amended.

- B. Overflow system. An overflow system shall be provided to carry flow to the detention basin when the capacity of the storm drain pipe system is exceeded. The overflow system shall be of sufficient capacity to carry the difference between the one-hundred (100) year and the twenty-five (25) year peak flow rates without creating additional damage to any drainage facilities, structures or roadways.
- C. Inlet capacity. All inlets must be designed to accommodate the twenty-five-year (25 year) peak flow rate. The designer must submit capture/bypass calculations for each inlet and include these calculations in the stormwater report. As a minimum, the storm drainage system serving a street shall be designed to collect water at any point where three (3) to five (5) cubic feet per second is accumulated, and at the bottom of all vertical grades, and immediately upgrade of all street intersections. The system shall discharge any collected water into the nearest practical drainage channel or storm system. The capacity of each inlet shall be indicated on the Stormwater Plan. The capacity of all C, M, or S type inlets shall be determined from the following source:

Commonwealth of Pennsylvania  
Department of Transportation  
Design Manual, Part 2  
Highway Design, Chapter 10.

- D. Summary Table. A table shall be provided on the plan summarizing storm sewer information including; inlet numbers, inlet pipes, elevation of all grates and pipe inverts, pipe diameters and lengths, pipe material, etc. A similar table shall be provided summarizing the design information for all temporary and permanent drainage channels.
- 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 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 Municipal Engineer.
- H. Straight pipe selections. Wherever possible, all storm drain pipes shall be designed to follow straight courses. No angular deflections of storm sewer pipe sections in excess of 5° shall be permitted. No vertical curves shall be permitted in the storm drain pipe system.

- I. Minimum grade and size. All storm drain pipes shall be designed to maintain a minimum grade of 1/2%. All storm pipes shall have a minimum inside diameter of 15 inches, except that pipes under a 25 foot deep or greater fill shall not be less than 24 inches, or a cross-sectional area of 453 square inches.
- J. Pipe material and thickness. All storm sewers shall meet PennDOT standards for service life and proper class and thickness to support the above fill material. Pipe type and joint specifications shall be noted on the plans and shall be in accordance with PennDOT standards.
- K. Pipe capacity. The capacity of all pipe culverts shall, as a minimum, provide the required carrying capacity as determined by the following source:

United States Department of Transportation  
Federal Highway Administration  
Hydraulic Design Series Number 5  
Hydraulic Design of Highway Culverts, 3rd Edition.

- L. Pipe arches. Where headroom is restricted, equivalent pipe arches may be used in lieu of circular pipes.
- M. Allowable headwater depth. At all inlets or manholes, the maximum allowable headwater depth shall be one (1) foot below the top of the inlet grate of the manhole cover.
- N. Horizontal pipe deflections. A manhole or inlet shall be provided at all horizontal deflections in the storm pipe system exceeding five (5) degrees.
- O. Inlet boxes shall conform to PennDOT Standard Drawings and Publication 408, latest edition. Inlets shall be permanently marked with the phrase "NO DUMPING - DRAINS TO CREEK" with metal medallion style signs or other method approved by the Municipal Engineer.
- P. Minimum and maximum cover. A minimum of eighteen (18) inches of cover shall be maintained over all storm drain pipes. The top of storm drain pipes shall be at least one-half (1/2) foot below subgrade elevation.
- Q. Diversion or runoff. All storm drain pipes shall be designed to carry the runoff into a detention basin or similar facility utilized to control the rate of runoff. No discharge at the top or side of basin embankments shall be permitted.
- R. Culverts and drainage channels.
  - 1. Design flow standards. All culverts and drainage channels shall be designed to carry a flow rate equal to a fifty (50) year, twenty-four (24) hour storm (NRCS, Technical Release No. 55).

2. Erosion prevention. All drainage channels shall be designed to prevent the erosion of the bed and bank areas. The flow velocity in all vegetated drainage channels shall not exceed three (3) feet per second to prevent erosion unless special provisions approved by the Municipal Engineer are made to protect banks and channel bottoms against erosion. Suitable bank stabilization shall be provided where required to prevent erosion of the drainage channels. Where storm sewers discharge into existing drainage channels at an angle greater than 30° from parallel with the downstream channel flow, the far side bank shall be stabilized by the use of rip-rap or masonry, and/or concrete walls. The stabilization shall be designed to prevent erosion and frost heave under and behind the stabilizing media.
3. Maximum side slope. Any vegetated drainage channel requiring mowing of the vegetation shall have a maximum grade of three (3) horizontal to one (1) vertical of those areas to be mowed.
4. Design standard. Because of the critical nature of the vegetated drainage channels, the design of all vegetated channels shall, at a minimum, conform to the design procedures outlines in the PADEP manuals. Several acceptable sources outline procedures for non-vegetated drainage channels, including the following:

Bureau of Public Roads  
Hydraulic Engineering Circular No. 5  
Hydraulic Charts for the Selection of Highway Culverts  
Federal Highway Administration  
Hydraulic Engineering Circular No. 13  
Hydraulic Design of Improved Inlets for Culverts.

5. Reference to publications and source documents in this section shall be deemed to include any amendments and revisions thereof.
- S. Easements for all drainage and conveyance systems, existing or proposed, not located within the public street right-of-way, shall be provided per Section 804.
- T. Residential Subdivisions or Development. Drainage channels shall be provided to intercept stormwater along property lines at locations where runoff from a lot would drain onto an adjacent lot. These channels shall be designed to convey stormwater to a suitable discharge point or the storm sewer system.

### **Section 311. SWM Site Plan General Requirements**

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

- A. Preparation and implementation of an approved SWM Site Plan is required.

- B. No Regulated Activity shall commence until the Municipality 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 or conditional approval of a SWM Site Plan from the Municipality.
- D. The SWM Site Plan approved by the Municipality shall be kept on Site by the Applicant throughout the duration of the Regulated Activity.
- E. The SWM Site Plan shall consist of a general description of the project including calculations, maps, and plans.
- F. A note on the maps shall refer to the associated computations and Erosion and Sediment Control Plan by title and date.
- G. The cover sheet of the computations and Erosion and Sediment Control Plan shall refer to the associated maps by title and date.
- H. All SWM Site Plan materials shall be submitted to the Municipality in a format that is clear, concise, legible, neat, and well organized; otherwise, the SWM Site Plan shall not be accepted for review and shall be returned to the Applicant.
- I. When a Regulated Activity is not part of a subdivision or land development proposal and is less than one (1) acre of Earth Disturbance, at the discretion of the Municipal Engineer, reduced provisions may be established from those listed below in order to show compliance with the requirements of this Ordinance subject to the approval of the Municipality.

**Section 312. Relationship of the Stormwater Management Site Plan to the Erosion and Sediment Control Plan.**

- A. The Stormwater Management Site Plan should be developed for a site before soil erosion and sediment control measures are considered, to ensure that the standards for control of discharge can be established for each point or line of interest.
- B. In designing sediment control facilities, consideration should be given to maintaining the distribution and rates of discharge developed for the Stormwater Management Plan at all times during the construction period. Where necessary to maintain this standard, sediment control facilities must be developed upstream of stormwater management facilities.
- C. When preparing the sequences of construction, attention shall be given to protecting subsurface stormwater management facilities from sediments. Provisions for clearing sediments from permanent surface stormwater management facilities upon completion of construction shall be included in the construction sequences.

### **Section 313. SWM Site Plan Contents**

The Stormwater Management Site Plan shall consist of a narrative report, design drawings, calculations, supporting text and documentation. The report shall describe the project and its compliance with the applicable sections of this chapter, and a map or maps describing the topography of the area, proposed alterations, and the location and description of permanent stormwater management measures and facilities. The following elements shall be included in the Stormwater Management Site Plan:

A. The written narrative report summary of the project shall include:

1. General description of the project, including:
  - a. Description of how the proposed project complies with all requirements of federal, state, county and Township agencies with regard to stormwater management.
  - b. Description of existing and proposed man-made features, including planned temporary and permanent stormwater management and soil erosion control measures on site.
  - c. Plans and specifications of the stormwater management and soil erosion measures and facilities.
2. The overall stormwater management design concept for the project, both during and after construction, and how the Site design achieves the requirements of Section 301 through 317 of Article III;
3. Date project is to begin and expected date final stabilization will be completed;
4. A suitable map of the total watershed (a USGS quadrangle map is sufficient);
5. General description of on-site stormwater flows and their effect on neighboring properties;
6. A table of contents for the stormwater management report and complete design calculations. All report pages shall be numbered and referenced in the Table of Contents.
7. Seal and signature of the registered professional responsible for preparation of the plan and report.
8. Existing features, conditions, natural resources, hydrologic features, and special management areas (as listed in Subsection 313.C);
9. A description of how the Site design achieves the requirements of Section 304, and, if applicable, where they could not be achieved and why;

10. Proposed features and conditions, proposed erosion and sediment control features, proposed BMPs, Conveyances, and any other stormwater facilities;
  11. 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 municipal 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;
  12. 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; and
  13. Description of construction stages or project phases, if so proposed.
- B. Design information. As part of the Stormwater Management Site Plan and report, complete design calculations and analysis, as well as supplemental information, shall be submitted. The information shall show compliance with applicable federal, state, county and Township standards and regulations. The information shall include, but is not limited to the following:
1. Analysis of the percentage of all predevelopment and postdevelopment stormwater that is recharged to groundwater, and all supporting material.
  2. A design drawing of the berm embankment and outlet structure indicating the embankment top elevation, embankment side slopes, top width embankment emergency spillway elevation, perforated riser dimensions, pipe barrel dimensions, and dimensions and spacing of anti-seep collars.
  3. Hydraulic computer model design computations for the pipe barrel and riser.
  4. A plot of the stage-storage (acre-feet vs. elevations) and all supporting computations.
  5. Design storm hydraulic computer model routing computations for before, during, and after development.
  6. A detailed plan of the trash rack.
  7. Design computations for energy dissipater devices located at pipe outfalls.
  8. Storm sewer and storm inlet design, capacity, efficient and other related calculations.
  9. Design computations for all swales, waterways, channels or diversions.

10. An analysis of all pre-development and post-development stormwater flows to and from the project area, including flows to all inlets, headwalls, swales, channels, recharge components, basins, and other system facilities and all supporting material.

11. All calculations shall be submitted as a formal report. It shall include as a minimum a cover, the signature and seal of the responsible design professional, a preparation date, a table of contents and a number on each page.

C. Mapping or Plan Sheet information. Maps or Plan Sheet showing the locations of all stormwater management system components shall be submitted. Details must be shown to define each and every proposed component of the stormwater management design. Details shall show dimensions, locations, specifications and other information as required by the Municipal Engineer to facilitate proper construction.

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 Municipal Engineer, the contents of the maps or plan sheets shall include, but not be limited to:

1. 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 Municipality prior to (or as a condition of) the Municipality'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:

a. NPDES Permit for Stormwater Discharges from Construction Activities;

b. PADEP permits as needed:

(1) PADEP Joint Permit Application,

(2) Chapter 105 (Dam Safety and Waterway Management),

(3) 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.

2. A statement on the plan, signed by the Applicant, acknowledging that any revision to the approved SWM Site Plan shall be submitted to and approved by the Municipality, and that a revised Erosion and Sediment Control Plan shall be submitted to, and approved by, the Conservation District or Municipality (as applicable) for a determination of adequacy prior to construction of the revised features.
3. The following signature block, on the plan, 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 Pikeland Township, Code of Ordinances, Chapter 22 Stormwater Management, Erosion and Sediment Control and Grading [Note: include signature, name, discipline of professional license, and license stamp or seal here]

4. 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, municipal boundaries, or other identifiable landmarks.
5. 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.
6. The date of SWM Site Plan submission and revision dates, as applicable.
7. A graphic and written scale of one (1) inch equals no more than fifty (50) feet.
8. A north arrow.
9. 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.
10. 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.

- 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 302.P).
- f. For the water bodies, streams and wetlands identified in Subsection 313.C.10 and 11, label or otherwise show the following attributes, if applicable:
  - (1) The Designated Use as determined by PADEP (25 PA Code Chapter 93);
  - (2) Impairments listed on the PADEP “Integrated List” (as updated) and the listed source and cause of impairment;
  - (3) Name, date, and target pollutant(s) for any approved Total Maximum Daily Load (TMDL); and
  - (4) 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 of proposed Earth Disturbance).
- h. Woods, vegetated riparian buffers and other areas of natural vegetation.
- i. Topography using contours (with elevations based on established bench marks) at intervals of two (2) feet. In areas of slopes greater than fifteen (15), or other at option of Municipality, percent five (5)-foot contour intervals may be used. The datum used and the location, elevation and datum of any bench marks used shall be shown.
- j. Areas classified by the Municipality 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.

- n. Water supply wells –
    - (1) 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;
    - (2) 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).
  - 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, as required by Section 370-28 of the Township Zoning Ordinance.
11. Boundaries of all natural resources as defined by the Natural Resources Conservation District of the Township Zoning Ordinance, including but not limited to steep slopes, watercourses/riparian buffers, wetlands, wetland margins, woodlands and specimen trees.
  12. 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 304.
  13. Description of existing and proposed ground cover and land use including the type and total area.
  14. Existing and proposed structures 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 Municipal Engineer) and within the proposed Disturbed Area, and including the type and total area of the following:
    - a. Existing Impervious Surfaces;
    - 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
    - e. Percent of the Site covered by Impervious Surfaces for both the existing and proposed Post-construction conditions.
  15. The total extent of the upstream area draining through the Site.

16. 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. Details shall be provided to define how the facilities are to be constructed and installed. Specifications shall be provided for all materials, methods, and workmanship based on PennDOT standards unless stricter Township standards exist. Details may be shown on separate sheets but shall be carefully cross-referenced.
17. Complete delineation of the flow paths used for calculating the time of concentration for the Predevelopment and Post-construction conditions shall be included.
18. 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.
19. 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.
20. Proposed final grade elevations and contours at intervals of two (2) feet.
21. 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 VIII, that shall include:
    - (1) Boundaries labeled with distances shown in feet and bearings to the nearest degree;
    - (2) Notes or other documentation, as needed, to grant the Municipality the right of access to all BMPs and Conveyances for the purposes of inspection and enforcement of the requirements of this Ordinance, and any applicable O&M Plans and O&M Agreements;
    - (3) Notes or other documentation, as needed, to grant the Municipality the right of access to all roadways necessary to access all BMPs and Conveyances, where roadways are not to be dedicated to the Municipality;

- (4) 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 Municipality, and other than the owner of the property on which the BMP or Conveyance is located;
  - (5) A minimum twenty (20)-foot perimeter (or other width as determined in consultation with the Municipal Engineer) around all BMPs and Conveyances;
  - (6) Sufficient vehicular ingress to and egress from a public right-of-way or roadway, as determined in consultation with the Municipal Engineer; and
  - (7) Accompanying notes or other documentation as needed, and in accordance with Article VIII 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 VIII.
- D. A detailed Site evaluation conducted by a qualified Licensed Professional for projects proposed environmentally sensitive areas, such as contaminated sites and brownfields, as described in Subsections 302.O of this Ordinance.
- E. Inspections, Operation and Maintenance Requirements

The following documents shall be prepared and submitted to the Municipality for review and approval as part of the SWM Site Plan, in accordance with the requirements of Article VIII, 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;
- 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 302.G and Article VIII of this Ordinance.
- F. 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 Municipal 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.
- G. A Highway Occupancy Permit from the Pennsylvania Department of Transportation (PennDOT) District Office must be submitted to the Municipality prior to (or as a condition of) the Municipality's final approval of the SWM Site Plan when utilization of a PennDOT storm drainage system is proposed.

#### **Section 314. SWM Site Plan Submission**

A complete SWM Site Plan that complies with all applicable provisions of Section 313 shall be submitted to the Municipality for review and approval, as follows:

- A. The SWM Site Plan shall be coordinated with the applicable State and Federal permit process(es) and the Municipal 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 Municipality must be submitted to the Municipality prior to (or as a condition of) the Municipality'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 with a Grading Permit application for the proposed improvements or activities.
- 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 Municipality.
- E. The corresponding review fee shall be submitted to the Municipality simultaneously with the SWM Site Plan, per the Municipality's fee schedule as revised from time to time.

- F. Any submissions to the Municipality that are found to be incomplete shall not be accepted for review and shall be returned to the Applicant within ten (10) business days of the application date with a notification in writing of the specific manner in which the submission is incomplete.
- G. Financial security, per the requirements of Section 112, shall be submitted to the Municipality prior to approval of the SWM Site Plan.

**Section 315. SWM Site Plan Review**

- A. The SWM Site Plan shall be submitted to the Municipality for review by the Municipal Engineer for consistency with this Ordinance and the respective PA Act 167 Stormwater Management Plan(s). The Municipal Engineer will review the SWM Site Plan for compliance with this Ordinance and the Municipal 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 Municipality.
- C. The Municipal Engineer will notify the Applicant and the Municipality 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 Municipality.
  - 1. If the Municipal Engineer determines that the SWM Site Plan is consistent with this Ordinance, the Municipal Engineer shall forward a letter of consistency to the Municipality, who shall then forward a copy to the Applicant.
  - 2. The Municipality 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 Municipal Engineer determines that the SWM Site Plan is inconsistent or noncompliant with this Ordinance, the Municipal Engineer will forward a letter to the Municipality, 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 317 when consistent with this Ordinance. Resubmission will commence a new municipal review and notification time period.

- D. The Municipality 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 Municipality prior to (or as a condition of) final approval of any proposed subdivision, land development, or other Regulated Activity by the Municipality.
- F. No building permits for any Regulated Activity will be approved by the Municipality if the SWM Site Plan has been found to be inconsistent with this Ordinance, as determined by the Municipal Engineer. All required permits from PADEP shall be obtained prior to issuance of a building permit.
- G. The Municipality's approval of a SWM Site Plan shall be valid for a period not to exceed one (1) year commencing on the date that the Municipality 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 one (1) year time period, then the Applicant may seek reinstatement of approval of the expired SWM Site Plan. If the Municipality 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 317 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 Municipality.
- 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 602 of this Ordinance.

**Section 316. Revision of SWM Site Plans**

- A. An unapproved SWM Site Plan under review by the Municipality 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 Municipal Engineer, and the new conditions necessitate design changes.

The revised SWM Site Plan shall be resubmitted in accordance with Section 314 and subject to review as specified in Section 315 of this Ordinance.

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

### **Section 317. 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 Municipal Engineer's concerns documented in writing. The submission shall be addressed to the Municipality in accordance with Section 314 of this Ordinance, distributed accordingly, and be subject to review as specified in Section 315 of this Ordinance. The applicable municipal review fee shall accompany a resubmission of a SWM Site Plan previously determined to be inconsistent or noncompliant.

## ARTICLE IV – EROSION AND SEDIMENT CONTROL REQUIREMENTS

### Section 401. General Requirements

- A. No Regulated Activity within the Municipality shall commence until:
1. The Municipality 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, if applicable;
    - b. A PADEP NPDES Construction Activities Permit as required under Title 25 Pennsylvania Code Chapter 92, if applicable;
    - c. Evidence of any other permit(s) or approvals required for the Regulated Activities; and
  2. An Erosion and Sediment Control Plan has been approved by the Municipality, 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 308.J.
- D. The Erosion and Sediment Control Plan shall consist of two phases on the base plan for preliminary and final plans as follows:
1. The Phase 1 Erosion and Sediment Control Plan shall be prepared on a separate sheet showing all existing features on the site, including the perimeter boundaries. The Phase 1 Plan shall show only the minimum earthmoving necessary to install the Erosion and Sediment Control measures. Wholesale topsoil stripping or complete earthmoving necessary to build the project shall not be shown. That is, this plan must show the erosion and sediment control items that are required to be in place prior to the start of any large scale earth disturbance.

2. The Phase 2 Erosion and Sediment Control Plan shall be prepared on a separate sheet. It shall show the complete and final earth disturbance elements of a preliminary or final plan relating to grading, storm drainage, impervious coverage and the like which may affect the design of erosion control and stormwater management facilities. Phase 2 plans shall show the complete and final E & S BMPs proposed to control erosion and stormwater runoff related to construction of these elements. Depending on the complexity of the proposal and the time expected to complete all improvements, more than just a Phase 2 plan may be required, at the discretion of the Township Engineer, in order to demonstrate and assure the control of erosion, sediment and stormwater based on intermediate/partially completed stages of construction. If a preliminary or final plan is itself proposed in phases, a separate Erosion and Sediment Control Plan shall be prepared for each phase.
- E. A Grading, Stormwater, Erosion and Sediment Control Plan shall be submitted with the Preliminary and Final Plan Subdivision and Land Development applications and with applications for Grading Permits for Regulated Activities that are not exempt under Section 106. Such plan shall be submitted in accordance with the Pennsylvania Department of Environmental Protection Erosion and Sediment Pollution Control Manual, as amended, and the Special Protection Waters Implementation Handbook, as amended, and in compliance with the most current review requirements of the Chester County Conservation District.
1. Erosion and Sediment Control Plans shall incorporate facilities for stormwater management in accordance with the policies and regulations of the Chester County Conservation District and the Stormwater Management Plan required by Article III.
  2. Upon recommendation from the Municipal Engineer, the Municipality may require the submission of plans, regardless of their size or other outside review requirements, to the Chester County Conservation District for review and approval. In such a case, approval by the Chester County Conservation District shall be required before final approval of a subdivision or land development; the issuance of a Grading Permit in the case of a minor subdivision; or the issuance of a Grading Permit for a Regulated Activity that is not exempt under Section 106.
- F. The purpose of the Erosion and Sediment Control Plan is to identify plans and techniques to be incorporated into the development proposal that regulate the modification of natural terrain during the site development process to ensure that:
1. The disturbance of the site does not result in damaging erosion and sedimentation control problems in order to protect the health, safety and welfare of the Township residents. These objectives will be pursued at the Township level in conjunction with state requirements for erosion and sedimentation control, as defined in the Department of Environmental Protection Chapter 102 regulations, as amended, and defined in the Erosion and Sediment Pollution Control Program Manual;
  2. The site design and preparation incorporates necessary steps to ensure the successful installation and long-term operation of erosion and sedimentation control and stormwater management facilities; and

3. The disturbance and removal of topsoil is reduced and avoided.
- G. The applicant or applicant's agent shall prepare a Soil Erosion and Sediment Control Plan in accordance with the provisions of this Section. The plan shall consist of a Phase 1 Plan and a Phase 2 Plan provided on separate sheets as described further under plan content. All land disturbance activities shall be conducted in such a way as to minimize erosion on adjoining and down-slope properties.
1. The applicant or applicant's agent undertaking land disturbance activity including, but not limited to grading, excavating, or disturbance of topsoil or vegetative cover, or introduction of fill material that may affect the existing flow of surface water within or down-slope from the subject parcel, shall be required to:
    - a. Collect on-site run-off and manage its release to a point of discharge into a natural watercourse of the drainage area;
    - b. Protect and clean the down-slope of silt and debris washed from the subject property as a result of land disturbance activities on the subject property; and
    - c. Install all drainage and erosion control improvements as required by the approved soil erosion and sediment control plan.
  2. Measures to minimize soil erosion and sedimentation shall meet the standards and specifications contained in the Pennsylvania Department of Environmental Protection, *Soil Erosion and Sediment Pollution Control Manual*, as amended and the Pennsylvania Clean Streams Law, Chapter 102, Erosion and Sedimentation Control Rules and Regulations, as amended and the specifications contained herein. The Municipal Engineer or other duly authorized agent shall ensure compliance with the appropriate specifications.
  3. The Municipality may require measures to be incorporated into the plan for erosion and sediment pollution control in addition to and/or more stringent than those required by the PADEP Manual, or by the Chester County Conservation District.
- H. The disturbed area and the duration of exposure shall be kept to a practical minimum and the disturbed soils shall be stabilized within three (3) days after earth disturbances cease.
1. The erosion control and stormwater management structures and systems shall be installed in accordance with the approved sequence of construction and shall be completed as quickly as possible; and

2. If runoff from a project area discharges to a stream that is classified as Special Protection (High Quality or Exceptional Value) as designated by Pennsylvania Code 25, Chapter 93; Water Quality Standards, as amended, more stringent criteria shall be used to design best management practices for that site in accordance with the Erosion and Sediment Pollution Control Program Manual. All graded surfaces shall be stabilized immediately upon completion of an earth disturbance activity, or any stage or phase of an activity, and, shall be watered, tended, and maintained as necessary until growth is well established.
- I. Whenever feasible, natural vegetation shall be retained, protected and supplemented.
  - J. Sediment laden water shall be trapped by the use of erosion and sediment control best management practices (BMP) such as inlet protection, sediment basins, sediment traps, or similar measures until the disturbed area is permanently stabilized and BMP removal is approved by the Chester County Conservation District. Accumulated sediment shall be removed to ensure continued adequate capacity in the BMPs in accordance with the PADEP Manual.
  - K. There shall be no increase in discharge of sediment or other solid material from the site as a result of stormwater runoff.
  - L. Erosion and sedimentation control BMPs, whether temporary or permanent, such as vegetation and mulch, earthen berms, waterbars, diversion terraces, rock filter berms, rock construction entrances, sediment basins, silt fences, and the like, appropriate to the scale of operations, shall be constructed, stabilized and functional before site disturbance (other than the minimal site disturbance necessary to install the BMPs) begins within the tributary areas of those BMPs, and whenever any situation is created which would contribute to increased soil erosion.
  - M. Earthmoving operations shall be minimized where possible and practicable to preserve desirable natural features and the topography of the site.
  - N. Stripping of vegetation, re-grading or other development shall be done in such a way that will minimize soil erosion.
  - O. To the maximum extent practicable, mature, healthy trees with a DBH of (6) inches in caliper and other significant existing vegetation shall be retained and protected. Such trees shall not be removed, except as provided on the approved subdivision and/or land development plan. The filling of soil more than five (5) inches over the roots of trees to be preserved is prohibited (The roots are presumed to extend out from the tree as far as the tree's branches extend outward).
  - P. Land disturbance shall be limited to the actual construction site and an access strip. The amount of disturbed area and the duration of exposure shall be kept to a practical minimum. Disturbed areas shall be stabilized immediately upon completion of an earth disturbance activity or any stage or phase of an activity with an appropriate BMP.

- Q. Provisions shall be made to effectively accommodate the increased runoff caused by changed soil and surface conditions during and after development. Water runoff shall be minimized and retained on-site wherever possible to facilitate groundwater recharge;
- R. Temporary vegetation and/or mulching shall be used to protect critical areas during development (Critical areas shall be construed to mean those portions of a site which are extremely vulnerable to soil erosion);
- S. The permanent final vegetation and structural soil erosion control and drainage measures shall be installed as soon as practical in the development in accordance with the approved plans;
- T. Sediment removed from best management practices shall be disposed of in landscaped areas outside of steep slopes, wetlands, floodplains or drainage swales and immediately stabilized.
- U. Until the site is stabilized, all best management practices for erosion and sediment pollution control must be maintained properly. Maintenance must include inspections of all best management practices after each run-off event, and on a weekly basis. All preventive and remedial maintenance work, including clean out, repair, replacement, regrading, reseeding, re-mulching and re-netting must be performed immediately.
- V. If erosion and sediment pollution control best management practices fail to perform as expected, replacement best management practices or modifications of those installed will be required as determined by the Municipal Engineer.
- W. Should it be necessary, any pumping of sediment laden water shall be through a sediment control BMP, such as a sediment basin or a pumped water filter bag discharging over non-disturbed areas.
- X. All earth disturbance activities shall proceed in accordance with the approved sequence of construction or staging of earth moving activities as it may be called. Each stage shall be completed before any following stage is initiated. Clearing and grubbing shall be limited to only those areas described in each stage.
- Y. Responsibility.
  - 1. Whenever sedimentation is caused by the removal of vegetation, regrading or other development, it shall be the responsibility of the applicant or applicant's agent causing such sedimentation to remove it from all adjoining surfaces, drainage systems and watercourses and to repair any damage at his or her expense within a time period acceptable to the Township.
  - 2. All required drainage and erosion control improvements, whether temporary or permanent, shall be installed by the applicant or applicant's agent, at their expense, and in accordance with applicable requirements.

3. Each application shall contain a commitment to submit for approval a modified Soil Erosion and Sediment Control Plan should the proposed plan prove to be inadequate prior to final release of escrow and dedication of improvements.

#### **Section 402 Erosion and Sediment Control Plan Content Requirements**

Erosion and Sediment Control Plan contents. A Erosion and Sediment Control Plan shall accompany Preliminary and Final Plan subdivision and land development applications and applications for Grading Permits for Regulated Activities that are not exempt under Section 106. It shall be prepared by a design professional experienced in stormwater management and soil erosion control, and in accordance with federal, state, county and Township requirements and regulations.

- A. The Erosion and Sediment Control Plan shall be prepared to include two phases as defined in Section 401.
- B. The Erosion and Sediment Control Plan shall contain, at a minimum, the following information:
  1. A description of proposed earthmoving, grading, temporary erosion and sedimentation control facilities, and the relationship to permanent stormwater management facilities;
  2. Proposed alterations to the project area, including changes to the surface and vegetative cover, areas of cut and fill, structures, roads, paved areas and buildings;
  3. A description of the staging of earthmoving activities, including the staging of cover removal and all cuts and fill, and installation of erosion and sediment control facilities and practices;
  4. Details and specifications for all erosion and sediment control measures to be utilized in conjunction with the installation of improvements, including streets, storm sewers, underground utilities, sewer and water lines, buildings, driveways, parking areas, recreational facilities and other structures shall be described; and
  5. The program of operations to convert erosion and sedimentation controls to permanent stormwater management facilities, along with a schedule of the relative time sequence of activities.
- C. A narrative description and a map illustrating temporary and permanent control measures and facilities to be used during earthmoving. The description shall include the following information:
  1. The type, location and dimensions of each measure and/or facility to be used, along with its purpose;
  2. Design considerations and calculations of control measures and facilities;

3. Facilities or measures to be used to protect trees and existing vegetation;
  4. Facilities or measures to prevent tracking of mud by construction vehicles.
- D. A narrative description of the maintenance procedures for temporary control facilities and the ownership arrangements, including the methods and frequency of removal and ultimate disposal site for sediments and other material removed from control facilities both during and upon completion of the project.
- E. The applicant or applicant's agent shall produce proof of the acquisition of all required permits, approvals, or certificates for soil erosion and sedimentation controls, including, but not limited to, permits/approvals required by:
- Pennsylvania Department of Environmental Protection
  - Pennsylvania Department of Transportation
  - Chester County Conservation District
  - Utility Companies
  - Public Utility Commission
- F. The Soil Erosion and Sediment Control Plan shall be available at all times on the construction site. The applicant or applicant's agent shall be responsible for correcting any stormwater runoff problems that arise from the subdivision or land development, even if final approval has been granted. The Township reserves the right to order a cease and desist of all construction where runoff problems arise.
- G. The following practices shall be required for all subdivisions, land developments, and/or grading plan where applicable, as determined by the Township Engineer:
1. Silt fence or compost filter socks shall be installed on each graded lot down-slope of the disturbed area prior to any lot disturbance. Straw bale barriers shall not be used.
  2. The appropriate E & S BMPs shall be placed at all inlets, headwalls, basin outlets and similar drainage structures during the construction period in order to prevent sediment from entering any watercourse, storm drainage system, or system that does not discharge to an E & S BMP, adjoining property, or other areas downstream.
  3. Each individual lot or unit within a subdivision, or each building within a land development shall incorporate temporary on-lot berms designed to act as sediment traps and to capture and reduce runoff. These shall be located to protect environmentally sensitive areas and downstream properties, and shall be required during construction. The top width of the berms shall be a minimum of three (3) feet, with side slopes of a 3:1 maximum.
  4. Rock construction entrances shall be placed at all entrances to construction areas. Rock construction entrances shall be of sufficient width and length to prevent transportation of sediment off of the construction site or shall incorporate other features to do so.

5. Temporary and permanent seeding and mulch specifications shall be noted on all plans. The specifications shall include lime and fertilizer rates of application, as well as other provisions regarding procedures and materials. All locations where earthmoving has ceased for more than one (1) day shall be stabilized with temporary seeding or mulch.
6. During roadway grading, water bars shall be installed on all roadway sub-grades to prevent erosion of the sub-grades. The water bars shall divert stormwater runoff to an appropriate best management practice.
7. The crushed stone base course for driveways, roadways and parking areas shall be applied immediately after grading procedures, in order to prevent erosion of the sub-grade. All construction and trade vehicles must access a site by the crushed stone driveway and not across the unstabilized earth area. Construction vehicles shall not track mud onto paved drives or roads.
8. Drainage swales and ditches, and all slopes greater than three (3) to one (1) shall be protected against erosive velocities with E & S BMPs, such as erosion control blanket or other material, as determined by the Township Engineer.

## **ARTICLE V GRADING REQUIREMENTS**

### **Section 501. Standards For Grading, Excavation and Fill Requirements, and Retaining Walls.**

- A. Retaining Walls - All retaining walls shall be designed and approved in accordance with the following:
1. Retaining walls to support the face of excavation shall not exceed a maximum height of five (5) feet or a stepped level or terraced retaining wall system with a combined maximum height of ten (10) feet.
  2. Retaining walls greater than three and one-half (3½) feet in height shall have a protective pedestrian guard fence meeting the specification of the Township Building Code.
  3. All retaining walls shall be designed by a Pennsylvania registered professional engineer whose signature and seal shall appear on the Final Plan. In-lieu-of a seal on the final plan, final plans may contain a note deferring the professional design to a later Shop Drawing submittal to be reviewed and considered for approval by the Municipal Engineer.
  4. Developers or Applicants shall be required to retain the services of a professional geotechnical engineer to inspect construction of all retaining walls for compliance with the Township approved design drawings. This geotechnical engineer shall provide a written certification to the Municipality that all retaining walls were constructed in accordance with the design plans prior to final Municipality approval of the improvements.
- B. No excavation or fill shall be made with an exposed face steeper in slope than three horizontal to one vertical, except under one or more of the following conditions:
1. The material in which the excavation or fill is to be made is sufficiently stable to sustain a slope of steeper than three horizontal to one vertical, and a written statement to that effect by a licensed professional engineer experienced in erosion control is submitted and approved by the Township Engineer. The statement shall certify that the site has been inspected and that the deviation from the slope specified will not result in injury to persons or damage to property or increased erosion and resulting sedimentation.
  2. The Municipal Engineer may require a flatter slope when it is found that the material in which the excavating is to be made is unusually subject to erosion or if other conditions exist which make such a shallower slope necessary for stability and safety.

- C. The top or bottom edge of slopes shall be located at least five (5) feet from property lines or from any ultimate right-of-way, whichever is more restrictive, in order to permit a gradual rounding of the edge without encroaching onto the abutting property. At property lines where resulting slopes are steeper than three (3) horizontal to one (1) vertical or a retaining wall system is three feet or more in height, a protective fence shall be located on top of the slope or retaining wall system. The fence shall be a minimum of four (4) feet in height.
- D. Excavation shall not exceed below the angle of repose or natural slope of the soil under the nearest point of any footing or foundation or any existing building or structure unless such footing or foundation is first properly underpinned or protected against settlement.
- E. Grading shall not redirect or concentrate surface water onto an adjacent property.
- F. During grading operations, necessary measures for dust control to prevent particulate matter from becoming airborne shall be followed. These measures shall include, but not be limited to the following:
  - 1. A tire cleaning area shall be provided at each point of egress from the development areas;
  - 2. Use, where possible, of water or other method approved by the Township Engineer for control of dust during any land disturbance activity; and
  - 3. Prompt removal of earth or other material from paved streets.
- G. Grading equipment shall not be allowed to cross permanent or intermittent streams without first obtaining appropriate permits or approvals from the Pennsylvania Department of Environmental Protection.
- H. No applicant shall engage in land disturbance activities that endanger any adjoining property, public street, sidewalk, alley or other property from settling, cracking or other damage which might result from such land disturbance. If, in the opinion of the Township Engineer, the land disturbance would create a hazard to life or property unless adequately safeguarded, the applicant shall construct walls, fences, guard rails, or other structures to safeguard the adjoining property, public street, sidewalk, alley, or other property and persons.
- I. Excavations or fills shall not encroach on natural watercourses, floodplain areas, constructed channels, or wetlands without the necessary state and federal permits. Excavations or fills located adjacent to natural watercourses or constructed channels shall have suitable protection against erosion. Excavation and fill shall comply with the maximum disturbance standards contained in the Zoning Ordinance.
- J. All fill shall be compacted to provide stability of material and to prevent undesirable settlements. The fill shall be spread in a series of layers, not exceeding twelve (12) inches in thickness, and be compacted by a sheepsfoot roller or other approved method after each layer is spread. The Municipal Engineer may require compaction tests and reports.

- K. Adequate provisions shall be made to prevent surface waters from damaging the cut face of an excavation or the sloping surface or a fill within the area of a proposed subdivision or land development. Slopes of more than ten (10) feet in vertical height shall be separated by level berms of at least four (4) feet in width within which ditches shall be constructed where necessary to prevent erosion and as a safe place to deposit and receive such water. The Municipal Engineer may require such drainage structures or pipes to be constructed or installed which are perceived necessary to prevent erosion damage and to satisfactorily carry off surface waters.
- L. When excavation or fill is proposed, all retaining walls, cribbing, drainage structures, fences or other protective devices shall be maintained in good condition and repair.
- M. All lots, tracts or parcels shall be graded to provide property drainage away from buildings, and to dispose of water without ponding. All land within a development shall be graded to drain and dispose of surface water without ponding, except where ponding as in the case of detention basins, is part of the stormwater management system for the proposed subdivision or land development.
- N. All drainage provisions shall be of such design to adequately handle the surface runoff and carry it to the nearest suitable outlet. Where drainage swales are used to direct surface waters away from buildings, they shall be sodded or planted as required.
- O. If load-bearing fill is proposed, a soils investigation report shall be submitted which shall consist of test borings, laboratory testings and engineering analysis to correlate surface and subsurface conditions with the proposed grading plan. The results of the investigation shall include: data regarding the nature, distribution and supporting ability of existing soils and rocks on the site; conclusions and recommendations to ensure stable soil conditions, and groundwater control, as applicable. The Township may require such supplemental reports and data as is deemed necessary by the Township Board of Supervisors or its designated official.
  - 1. Fills toeing out on natural slopes steeper than three horizontal to one vertical shall not be made unless approved by the Municipal Engineer after receipt of a report by a registered professional engineer, qualified in soils analysis, certifying that he has investigated the property, made soil tests and that, in his opinion, such steeper slopes will safely support the proposed fill. The Municipal Engineer need not approve such fills if there is reason to believe, e.g., due to a report from similarly qualified registered professional engineer, that such steeper slopes will not safely support the proposed fill.
  - 2. Natural and/or existing slopes exceeding five horizontal to one vertical shall be benched or continuously stepped into competent materials, as determined by the Municipal Engineer, prior to placing all classes of fill.

**Section 502. Stripping, Replacement of Removal of Topsoil**

Initial construction on the subdivision site shall consist of stripping and stockpiling of topsoil from all areas to be disturbed. Upon completion of other construction, the entire amount of topsoil stripped shall be replaced on the subdivision site.

- A. No topsoil shall be disposed of, by sale or otherwise, off the site of the subdivision or land development.
- B. Subsoil may be disposed of at the option of the applicant or applicant's agent.
- C. Topsoil and subsoil shall be separately piled and not intermixed.

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

**Section 601. Performance and Inspection of Regulated Activities**

- A. All Regulated Activities that require a SWM Site Plan shall be conducted, operated and maintained in accordance with the requirements set forth in Articles III, IV, V, VIII, and IX of this Ordinance and in accordance with the requirements of the approved SWM Site Plan.
- B. Upon completion of construction, every permanent stormwater BMP, Conveyance or other stormwater 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 Municipality.
- C. The Municipality or its designee may periodically inspect any permanent stormwater BMP, Conveyance or facility for compliance with this Ordinance, an approved O&M Plan, or an approved O&M Agreement, per the provisions of Article X. The Municipality may inspect at any time it has reason to believe a violation exists. The Municipality may pursue enforcement for violations consistent with the provisions of Article X.
- D. The Municipal Engineer or other Municipal 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 Municipal Engineer or other municipal designee.
- E. Periodic inspections during construction, including but not limited to a final inspection, shall be made by the Municipal Engineer or other Municipal designee to confirm compliance of all constructed BMPs, Conveyances, or other stormwater facilities, and related improvements with this Ordinance and with the approved SWM Site Plan.
- F. A set of approved design plans shall be available for viewing at the Site throughout the duration of the construction activity.

**Section 602. Final As-Built Plans**

- A. For Regulated Activities involving one (1) acre or more of Earth Disturbance, the Applicant shall provide to the Municipality 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. As-built plan submittals shall consist of one set of paper prints to the Municipality and one set to the Municipal Engineer. After review and final approval, the applicant shall submit to the municipality two sets of recorded paper prints, one reproducible mylar and one electronic version of the same information suitable for GIS application, and shall provide the Municipal Engineer with the same information.

- C. 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; 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).
- D. 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.
- E. All areas of the Regulated Activity draining to BMPs must be stabilized prior to submittal of the As-Built Plans.
- F. After receipt of the As-Built Plans by the Municipality, the Municipality 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 Municipality may conduct a final inspection, as per Subsection 601.
- G. The As-Built Plans must be received, reviewed and determined to be acceptable by the Municipality prior to:
1. Close out of the drainage permit or other close out of the project by the Municipality;
  2. Release of the financial security or other performance guarantee; and
  3. Dedication of the stormwater facilities to the Municipality, or conveyance to a homeowners association, or other person responsible for operation, maintenance and repair.
- H. Final occupancy permit(s) or Use Permit or other final approval to use or operate the constructed improvement may not be issued by the Municipality until the final As-Built Plans have been accepted.
- I. Upon final acceptance of the final As-Built Plans by the Municipality, the Applicant shall review and, if required by the Municipality, 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 VIII.
- J. All or portions of the final As-Built Plans shall be recorded if required by the Municipality.

## **ARTICLE VII – FEES AND EXPENSES**

### **Section 701. Fees**

- A. Fees, in amounts as established from time to time by resolution, are required upon initial submission of an application. The fee is to defray administrative, plan review and construction inspection costs incurred by the Municipality.
- B. Cost of all inspections will be billed to the Applicant as inspections are completed, in an amount as established from time to time by resolution. Payments shall be made within thirty (30) days and no occupancy permit will be issued until all payments have been made.
- C. If the applicant has paid a fee under another Municipal ordinance which is applicable to the requirements of this Chapter, such as the Subdivision and Land Development Ordinance, the Township may waive any or all of the fees under this chapter as it determines to be equitable.
- D. Additionally, the applicant shall be responsible for all legal fees for review of the plan, agreement and/or easement as well as for any legal services rendered with respect to a plan, the review of the same, including interpretation, enforcement or legal services and any related legal costs concerning the imposition, execution, and enforcement of the plan, agreement or any easements arising therefrom.
- E. The applicant shall also be responsible for all fees and costs with respect to any consultant engaged by the Municipality.
- F. The applicant shall also be responsible for additional work required to monitor and enforce any provisions of this chapter, correct violations, and assure proper completion of stipulated remedial actions.
- G. To the extent that the Applicant disputes the amount of any of the above-referenced fees, the procedures set forth in Section 510.G of the Pennsylvania Municipalities Planning Code (53 P.S. § 10510) shall be utilized to resolve the same.

### **Section 702. Expenses Covered by Fees**

- A. The fees required of the Applicant by this Ordinance shall at a minimum cover:
  - 1. Administrative costs;
  - 2. The review of plans and calculations by the Municipality, the Municipal Engineer and other municipal consultants;
  - 3. Coordination and meetings with the Applicant;

4. The inspection of erosion and sediment control measures, stormwater facilities, 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 Municipality for any additional work or municipal consultant fees required to enforce any permit provisions regulated by this Ordinance, correct violations, and ensure proper completion of remedial actions.

## **ARTICLE VIII – OPERATION AND MAINTENANCE (O&M) RESPONSIBILITIES AND EASEMENTS**

### **Section 801. 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 VIII.

- A. Continuing operations and maintenance responsibilities of all permanent BMPs, Conveyances, or other stormwater management facilities shall be reviewed and approved by the Municipality along with the SWM Site Plan. The Applicant may offer for dedication such facilities as part of the requirements for approval of the SWM Site Plan. Such an offer is not an indication that the Municipality will accept the facilities. The Municipality 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 Municipality 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 or entity other than the Municipality:
  - 1. An O&M Agreement shall be submitted to the Municipality 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 an O&M or other agreement or by otherwise establishing covenants, easements, deed restrictions, or by dedication to the Municipality:
  - 1. Permanent protection of the BMP or Conveyance from disturbance or alteration;

2. Right of entry and access for the Municipality for inspection and enforcement of this Ordinance (including Subsection 1003.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 Municipality and is different from the owner of the property on which the BMP or Conveyance is located (such as may be applicable for Subsection 302.G of this Ordinance).
- F. All O&M and other agreements, covenants, easements and deed restrictions shall:
1. Be submitted to the Municipality 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. Where the Municipality has accepted an offer of dedication of the permanent stormwater management facilities, the Township shall be responsible for the maintenance. Municipal ownership notwithstanding, the applicant is required to prepare a stormwater management plan including a maintenance plan component, as defined above. Upon approval of the stormwater management facilities by the Municipality, the applicant shall provide for maintenance guarantees as follows:
1. Long – Term Maintenance Bond – The long-term maintenance bond shall be in any amount equal to the present worth of maintenance of the facilities for an eighteen (18) month period. See Section 806.
  2. Documentation – The terms of the maintenance guarantees shall be documented as part of the stormwater management plan and the maintenance plan.
- H. The materials, documents and content required by this Article VIII 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 (NPDES permit).
- I. Whenever sedimentation is caused by stripping vegetation, regrading, or other development, it shall be the responsibility of the person causing such sedimentation to remove the accumulated sediment from all adjoining or downstream properties, surfaces, drainage systems and watercourses and to repair any damage at his expense as quickly as possible.

- J. All necessary soil erosion and sedimentation control measures installed under this Ordinance shall be adequately maintained by the landowner or developer after completion of the approved plan or until such measures are permanently stabilized as determined by the Township.

### **Section 802. Operation and Maintenance Plans**

The following items shall be included in the O&M Plan, unless otherwise approved by the Municipal 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.
  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 Municipal 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 twenty (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 municipal 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.
- 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 Municipality’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 Municipality.”*

5. Inspection and maintenance schedules.
  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 Municipal 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 805.B, 805.C, and 805.D of this Ordinance.

### **Section 803. 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 or entity other than the Municipality, and the Agreement shall:
1. Be between the owner of the BMP or Conveyance and the Municipality, and shall be substantially the same as the O&M Agreement in Appendix E;
  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 Municipality, 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 Municipality for review prior to approval of the SWM Site Plan;
  6. Upon approval by the Municipality, be signed by the designated owner of the BMP or Conveyance and submitted for signature by the Municipality; and
  7. When fully executed, be recorded by the Landowner at the Chester County Office of the Recorder of Deeds following municipal approval of the O&M Plan and prior to the start of construction.
- B. Other items or conditions may be required by the Municipality to be included in the O&M Agreement where determined necessary by the Municipality to guarantee the satisfactory operation and maintenance of all permanent BMPs and Conveyances.
- 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 Municipality, 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 804. Easements or Deed Restrictions**

- A. Easements shall be established to ensure access, inspection, maintenance, operation, repair and permanent protection of all permanent BMPs and Conveyances that will not be dedicated to or otherwise owned by the Municipality, (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 twenty (20) foot wide perimeter (or other width as determined in consultation with the Municipal 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 Municipality 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 Municipality, the Municipality 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 Municipality 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
  9. Be recorded at the Chester County Office of the Recorder of Deeds following municipal approval and prior to the start of construction.
- B. For any BMP or Conveyance to be owned by a person other than the Municipality 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 Municipality for review and approval prior to approval of the SWM Site Plan;

8. Upon approval by the Municipality, be signed by the owner of the BMP(s) or Conveyance(s) and the Landowner and submitted for signature by the Municipality;
  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 Municipality; and
  11. When fully executed, be recorded by the Landowner at the Chester County Office of the Recorder of Deeds against all parcels affected by the terms of the easement agreement, within fifteen (15) regular business days of the Municipality'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 804.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 Municipality for review and approval prior to approval of the SWM Site Plan;
  10. Contain all additional provisions or information as the Municipality may require upon review; and
  11. Be executed by the parties to the easement agreement and recorded 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 fifteen (15) regular business days of the Municipality'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 Municipality for review and approval prior to approval of the SWM Site Plan;
  6. Upon approval by the Municipality, be signed by the Landowner and owner of the BMP or Conveyance and submitted to the Municipality; and
  7. Be fully executed and recorded at the Chester County Office of the Recorder of Deeds within fifteen (15) regular business days of the Municipality's approval of the O&M Plan.

### **Section 805. Other Post-construction Responsibilities**

- A. The provisions of Section 904 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.
- 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 ten (10) years. These records shall be submitted to the Municipality, if requested.
- C. At a time no later than the final inspection, the Municipality 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 Municipality 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 Municipality within thirty (30) regular business days of the change.

### **Section 806. Municipal Stormwater Control and BMP Operation and Maintenance Fund**

- A. Persons installing stormwater controls or BMPs for a Regulated Activity involving one (1) acre or more of Earth Disturbance shall be required to pay a specified amount to the Municipal Stormwater Control and BMP Operation and Maintenance Fund to help cover the costs of periodic inspections and maintenance expenses. The amount of the deposit shall be determined as follows:
  - 1. If the BMP or Conveyance is to be privately owned and maintained, the deposit shall cover the cost of periodic inspections performed by the Municipality, as estimated by the Municipal Engineer, for a period of twenty-five (25) years. This is to be paid in a manner specified by the Municipality. After that period of time, inspections will be performed at the expense of the Municipality.
  - 2. If the BMP or Conveyance is to be owned and maintained by the Municipality, the deposit shall cover the estimated costs for maintenance and inspections for twenty-five (25) years. The Municipality will establish the estimated costs utilizing information submitted by the Applicant.
  - 3. The amount of the deposit to the fund shall be converted to present worth of the annual series values. The Municipality shall determine the present worth equivalents, which shall be subject to the approval of the Governing Body.
- B. If a BMP or Conveyance is proposed that also serves as a recreational facility (e.g., ball field or lake), the Municipality may reduce or waive the amount of the maintenance fund deposit based upon the value of the land for public recreational purpose.

- C. If at some future time, a BMP or Conveyance (whether publicly or privately owned) is eliminated due to the installation of storm sewers or other storage facility, the unused portion of the maintenance fund deposit will be applied to the cost of abandoning or demolishing the facility and connecting to the storm sewer system or other facility. Any amount of the deposit remaining after the costs of abandonment or demolition will be used for inspection, maintenance, and operation of the receiving stormwater management system.
- D. If a BMP or Conveyance is accepted by the Municipality for dedication, the persons installing the BMP or Conveyance shall pay a specified amount to the Municipal Stormwater Control and BMP Operation and Maintenance Fund to help cover the costs of operations and maintenance activities. The amount may be determined as follows:
  - 1. The amount shall cover the estimated costs for operations and maintenance for twenty-five (25) years, as determined by the Municipality, and
  - 2. The amount shall then be converted to present worth of the annual series values.
- E. The Municipality may require Applicants to pay a fee to the Municipal Stormwater Control and BMP Operation and Maintenance Fund to cover:
  - 1. Long-term maintenance of BMP(s) or Conveyance(s), and
  - 2. Stormwater-related problems which may arise from the land development and Earth Disturbance.



## ARTICLE IX – PROHIBITIONS

### Section 901. 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 Municipality's separate storm sewer system or the Waters of the Commonwealth is prohibited.
- B. No person shall allow, or cause to allow, discharges into the Municipality's separate storm sewer system or the Waters of the Commonwealth that are not composed entirely of stormwater, except:
  - 1. As provided in Subsection 901.C below; and
  - 2. Discharges allowed under a State or Federal permit.
- C. The following discharges are authorized unless they are determined by the Municipality to be significant contributors to pollution to the Municipality'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;
  - 3. Irrigation drainage;
  - 4. Air conditioning condensate;
  - 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;
  - 12. Dechlorinated swimming pool discharges;
  - 13. Uncontaminated groundwater;

- 14. Water from individual residential car washing; and
  - 15. Routine external building washdown (which does not use detergents or other compounds).
- D. In the event that the Municipality determines that any of the discharges identified in Section 901.C significantly contribute pollutants to the Municipality's separate storm sewer system or to the Waters of the Commonwealth, or is notified of such significant contribution of pollution by PADEP, the Municipality will notify the responsible person to cease the discharge.
  - E. Upon notice provided by the Municipality under Section 901.D, the discharger shall, within a reasonable time period, as determined by the Municipality 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.

**Section 902. Prohibited Connections**

The following connections are prohibited, except as provided in Section 901.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.
- 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 Municipality.

**Section 903. Roof Drains and Sump Pumps**

- 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 Municipal Engineer; and
  - 3. Shall be considered in stormwater management calculations to demonstrate that Conveyance and receiving facilities have adequate capacity.

**Section 904. Alteration of BMPs**

- A. No person shall modify, remove, fill, landscape, alter, or impair the effectiveness of any stormwater BMPs, Conveyances, facilities, areas or structures unless the activity is part of an approved maintenance program, without the written approval of the Municipality.
- 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 Municipality.



## **ARTICLE X – ENFORCEMENT AND PENALTIES**

### **Section 1001. 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 Municipality does not enforce any provision of this Ordinance, such action or inaction shall not constitute a waiver by the Municipality of its rights of future enforcement hereunder.

### **Section 1002. Right of Entry**

- A. Upon presentation of proper credentials, duly authorized officers or agents of the Municipality may request to enter at reasonable times upon any property within the Municipality to inspect the implementation, condition, or operation and maintenance of all erosion and sediment controls and permanent stormwater BMPs, Conveyances, or other stormwater facilities both during and after completion of a Regulated Activity, or for compliance with any requirement of this Ordinance. Nothing herein shall abrogate the right of the Municipality to enter onto such property. To the extent that a landowner refuses to grant such access, the Municipality may take all necessary actions to obtain lawful access or pursue enforcement per Section 1003 and Section 1004 below.
- B. Subject to subsection “A” above, persons working on behalf of the Municipality shall have the right to temporarily locate on or in any BMP, Conveyance or other stormwater facility in the Municipality such devices as are necessary to conduct monitoring and/or sampling of the discharges from such BMP or Conveyance, or other stormwater facilities.

### **Section 1003. Enforcement**

- A. The Municipal Engineer or other Municipal Designated Official is hereby authorized and directed to enforce all of the provisions of this Ordinance. The 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 Municipality 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.

C. All municipal inspections for compliance with the approved SWM Site Plan shall be the responsibility of the Municipality or its designee.

D. Stop Work Order

1. The Municipal Engineer or other designee shall discuss the non-compliant results of an inspection and the Ordinance violations with the permit holder at the completion of the inspection.
2. The Municipal Engineer or other designee may issue a written stop work order when it is determined that construction violates this Ordinance or is being performed in a non-compliant, dangerous or unsafe manner. The stop work order is to contain the reasons for the order and list the required conditions for construction to resume.
3. The Municipal Engineer or other designee shall serve the stop order to the permit owner or the owner's agent by certified mail, or place it at a prominent location on the site, or by personal service.
4. A person who continues construction after service of a stop work order, except for construction work that is necessary to remove a violation or an unsafe condition, may be subject to the penalties under Section 1005 of this Ordinance. The Municipal Engineer or other designee may seek enforcement of a stop work order in a court of competent jurisdiction.

E. Notice of Violation - The Municipal Engineer or other designee shall issue a Stop Work Order or other cease and desist order and follow the following procedures if an inspection reveals a violation of this Ordinance:

1. During any stage of the work of any Regulated Activity, if the Municipal 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 Municipality may suspend or revoke any existing permits or other approvals until the deficiencies are corrected or until a revised SWM Site Plan is submitted and approved and new permits are issued, if and as determined to be necessary by the Municipal Engineer or other designee.
2. In the event that the Municipal 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 Municipality, or any O&M Plan or O&M Agreement approved by the Municipality, the Municipality may order compliance by written notice of the violation to the Landowner.
3. Such notice may, without limitation, require the following remedies:
  - a. Performance of monitoring, analyses, and reporting;
  - b. Elimination of prohibited connections or discharges;

- c. Cessation of any violating discharges, practices, or operations;
  - d. Abatement or remediation of stormwater pollution or contamination hazards and the restoration of any affected property;
  - e. Payment of a fine to cover administrative and remediation costs and/or forfeiture of financial security;
  - f. Implementation of stormwater controls, BMPs, and Conveyances; and
  - g. Operation, maintenance or repair of BMPs, Conveyances or other stormwater facilities.
4. 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 Municipal Governing Body in accordance with Section 1006 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 Municipality or designee, and the expense thereof shall be charged to the violator.
  5. 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 Municipality from pursuing any and all other remedies available in law or equity.

**Section 1004. Suspension and Revocation of Permits and Approvals**

- A. Any Grading, building, land development, or other permit or approval issued by the Municipality may be suspended or revoked by the Municipality for:
  1. Noncompliance with or failure to implement any provision of the Grading 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 Municipality.
- B. A suspended permit or approval may be reinstated by the Municipality when:

1. The Municipal Engineer or other designee has inspected and approved the corrections to the BMPs, Conveyances or other stormwater facilities, or the elimination of the hazard or nuisance; and
  2. The Municipality is satisfied that the violation has been corrected.
  3. If any Applicant believes that their permit was unjustly suspended or revoked, they may request a hearing, pursuant to public notice, before the Municipality's Governing Body for reinstatement. The expense of a hearing shall be the Applicant's responsibility if the suspension or revocation was found to be justified.
- C. A permit or approval that has been revoked by the Municipality cannot be reinstated. The Applicant may apply for a new permit or approval in accordance with this Ordinance.

### **Section 1005. 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 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 Municipality 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 Municipality's attorney's fees (charged at the hourly rate approved by the Governing Body of the Municipality) and costs, as may be permitted by law.
- C. Notwithstanding any other provision of this Ordinance, the Municipality shall have the right at any or all times deemed necessary by the Municipal Engineer or designee to enter upon any property within the Municipality 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 1006. Appeals**

- A. Any person aggrieved by any action of the Municipal Engineer or other designee relative to the provisions of this Ordinance may appeal to the Municipality's Governing Body within thirty (30) days of that action.

B. Any person aggrieved by any decision of the Municipality's Governing Body relative to the provisions of this Ordinance may appeal to the County Court of Common Pleas in the County where the activity has taken place within thirty (30) days of the Municipality's decision.

**Section 1007. Effective Date**

This Ordinance shall take effect on \_\_\_\_\_, \_\_\_\_\_, 2014.

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# **APPENDIX A**

## **MINOR STORMWATER MANAGEMENT PLAN**

### **APPENDIX A.1**

Frequently Asked Questions

### **APPENDIX A.2**

Minor Stormwater Management Plan  
Best Management Practices Worksheets

### **APPENDIX A.3**

Minor Stormwater Management Plan  
Operation, Maintenance and Inspection Combined Plan and Agreement

# **APPENDIX A.1**

## **Frequently Asked Questions**

**Minor Stormwater Management Plan  
per Sections 106.D & E of this Ordinance**

**(Minor SWM Plan)**

Frequently Asked Questions  
Minor Stormwater Management Plan (Minor SWM Plan)  
per Sections 106.D & E of this Ordinance

**What activities come under Minor SWM Plan requirements?**

Per the East Pikeland Township Stormwater Ordinance, Section 106.D, activities with between 500 and 1500 sq. ft. of impervious surface or between 2000 and 5,000 sq. ft. earth disturbance may use Minor SWM Plan requirements. Per Section 106.E, agricultural structures up to 10,000 sq. ft. plus another 5000 sq. ft. of adjoining parking/movement area may use Minor SWM Plan requirements. See the Stormwater Ordinance for more detail.

**What's a Best Management Practice (BMP)?**

A BMP is a facility constructed to manage stormwater impacts by providing water quality treatment, groundwater recharge through infiltration, volume reduction and peak rate control. BMPs include but are not limited to those listed and shown in the Minor SWM Plan, BMP Worksheets (Worksheets) that follow. See the Stormwater Ordinance definition of BMP for more detail.

**Do I require professional services to meet these requirements?**

No. The goal of the Worksheets is to allow the individual to complete the calculations showing compliance with the infiltration goals of the Stormwater Ordinance, also your contractor may complete the Worksheets for you. If the steps presented in the Worksheets are able to be followed, the individual does not require professional services; however, the information is technical in nature so please call for assistance if necessary.

**What do I need to Submit?**

The items to be submitted are:

- Grading Permit Application with fee
- Minor SWM BMP Worksheets including Site Sketch Plan
- Operation, Maintenance & Inspection Plan & Agreement for Minor SWM Plan

Basic information is needed regarding the proposed activity and the BMP(s) chosen to manage the stormwater runoff, including but not limited to the types of materials used, total impervious areas and volume calculations. Completion of the Worksheets will provide the needed information. In addition, a simple Site Sketch Plan (see example) showing the location of following features (existing and proposed) shall be submitted:

- a. structures, driveways and other paved surfaces (all impervious areas) with approximate dimensions in feet,
- b. BMPs,
- c. erosion control measures, and
- d. on-site septic system & wells (potable) showing rough proximity to infiltration facilities.

Completing the Worksheets and submitting them with the Grading Permit application should provide sufficient information for review for compliance with the requirements.

## **APPENDIX A.2**

### **Minor Stormwater Management Plan Best Management Practices Worksheets**

(Minor SWM BMP Worksheets)

**Minor SWM BMP Worksheets**  
**East Pikeland Township**

Stormwater management design for earth disturbance activities qualifying under Section 106 as Minor Stormwater Plans must address the intent of the SW Ordinance by managing the increase in runoff through infiltration facilities. To determine the size of infiltration facilities, utilize a factor of 0.083 times the impervious area. This reflects the infiltration of one (1) inch of stormwater runoff from the impervious surfaces (in feet).

<b>STEP ONE: DETERMINE REQUIRED VOLUME</b>	
<b><u>PROPOSED TOTAL AREA of IMPERVIOUS COVER</u></b> Includes all areas of buildings, paving, concrete and compacted gravel that are part of the proposed work.	<b>sq. ft.</b>
Multiply by 0.083	<b>x 0.083</b>
<b>Infiltration VOLUME REQUIRED – Total</b>	<b>cu. ft.</b>

Details of the BMP's listed below are provided as guidelines. For additional information on how these BMP's function and ideas of other BMP's refer to the "Pennsylvania Stormwater Best Management Practices Manual" latest edition prepared by the DEP.

<b>STEP TWO: SELECT BMP(s) TO BE UTILIZED</b>	
<b>BMP NAME</b>	<b>(How Many)</b>
1. Infiltration Basin	
2. Infiltration Bed	
3. Infiltration Trench	
4. Rain Garden	
5. Vegetated Swale w/ Check Dam	
6. Cistern/Rain Barrel	
7. Pervious Paver Blocks	
8. Other*	
<b>TOTAL (use of 2 encouraged)</b>	

\* As approved by the Township Engineer. Provide additional information as needed.

The first six BMP's listed are Infiltration BMP's and as such should be located on the site in areas with the most suitable soil. Areas of wet or poorly drained soils should be avoided.

Infiltration BMP's should also be located with the following minimum setbacks:

- Ten (10) feet down gradient from a building basement
- One hundred (100) feet up gradient from a building basement
- Ten (10) feet from property lines
- One Hundred (100) feet from wells
- ten (10) feet from septic system drain fields (or per Pa DEP)

**BMP Installation Guidelines:**

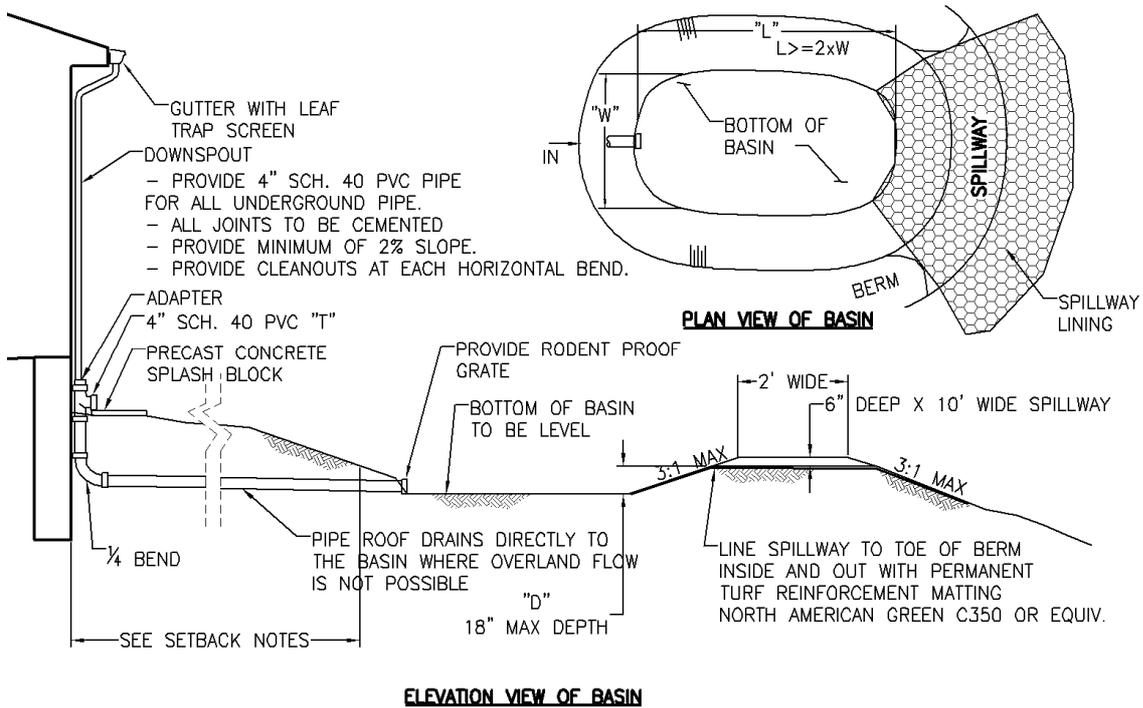
1. BMPs shall be protected during construction to prevent sediment-laden (muddy) water from entering the facility.
2. Excavation for the BMP's shall be conducted in a manner that will not compact the bottom of the facility.
3. For subsurface facilities, the bottom of the facility shall be scarified immediately prior to the placement of geotextile.
4. Geotextile shall be placed in accordance with the manufacturer's specifications. Seams shall be overlapped a minimum of 16 inches.
5. The area of the BMP shall be fenced off during site construction. Construction equipment shall be prohibited from entering the area to avoid soil compaction.

<b>STEP THREE: DETERMINE VOLUME PROVIDED</b>	
<b>BMP (see specific detail drawings for volume calculations)</b>	<b>Volume (cu. ft.)</b>
1. Infiltration Basin	
2. Infiltration Bed	
3. Infiltration Trench	
4. Rain Garden	
5. Vegetated Swale w/ Check Dam	
6. Cisterns	
7. Pervious Paver Blocks (provide square feet of area to be covered)	
8. Other	
<b>Infiltration VOLUME PROVIDED - TOTAL*</b>	

\*must be greater than the Infiltration VOLUME REQUIRED calculated in Step One

## **BMP #1 –INFILTRATION BASIN**

An Infiltration Basin provides an aboveground area for water to be stored and infiltrate into the ground. Roof drains and overland stormwater runoff are directed into the aboveground basin area. A spillway is provided to release the larger storm volumes. The spillway should be located such that any down slope problems are avoided when water is flowing over it. The spillway should be lined with a permanent erosion mat to prevent deterioration. The spillway should be located as far away as possible from any inflow pipes to promote infiltration and settling of stormwater runoff contaminants. The basin needs to be planted with vegetation that is tolerant of the wet conditions that will occur. The depth of the basin may be increased with the approval of the Township Engineer.

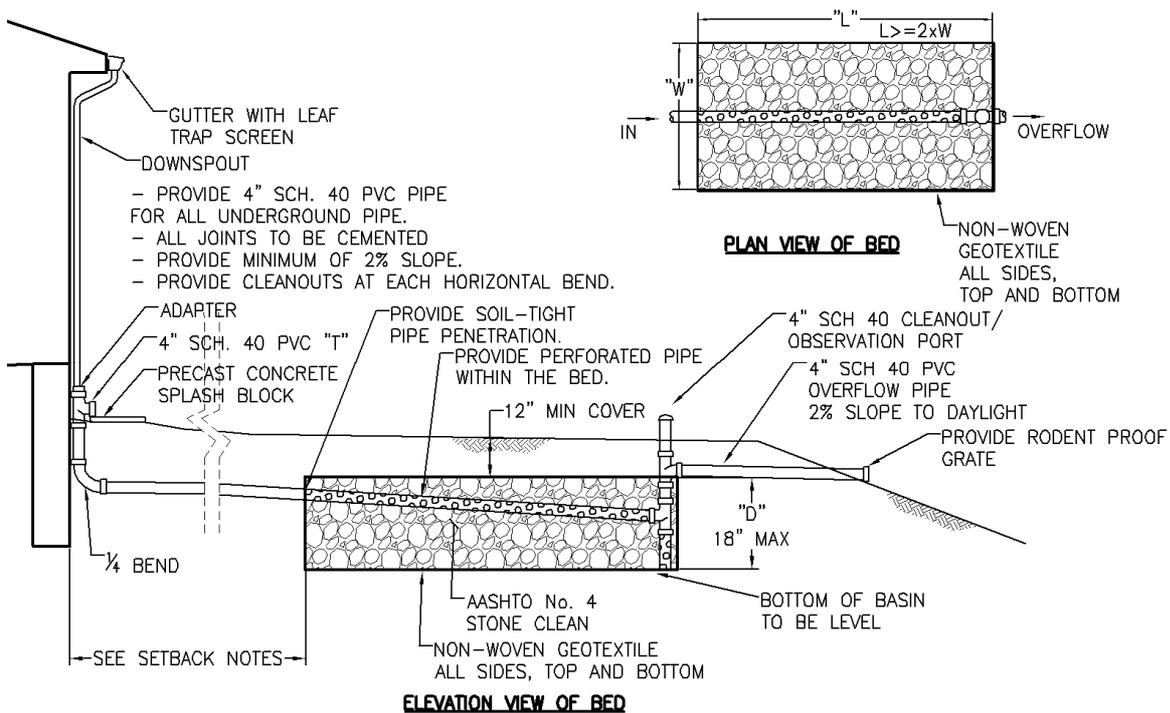


Determination of Water Quality Volume provided:

1	Area – L (length) x W (width) for rectangular basins estimate for irregular shapes	sq. ft.
2	Depth of Basin = D	ft.
3	Volume = Area x D (Line 1 x Line 2) (assuming straight sides)	cu. ft.
4	Side Slope Factor "Z" – Use 3 for 3:1 slope, 4 for 4:1 slope, etc	
5	Approx. Additional Volume = (L+W) x Z x D x D	cu. ft.
6	TOTAL VOLUME PROVIDED (Line 3 + Line 5) (Use this number in Step Three)	cu. ft.

## **BMP #2 –INFILTRATION BED**

An infiltration bed can be used where surface stormwater runoff does not need to be captured. Roof drains from the proposed structure are piped into an underground area to infiltrate into the ground. An overflow pipe is provided to release the larger storm volumes. A cleanout is provided to facilitate maintenance and provide an inspection port. The pipe within the bed is perforated and should be run through the basin to the fullest extent to promote infiltration and distribution of the stormwater. Additional pipe can be utilized within the bed to increase the available storage volume. The soil over the bed shall be planted with vegetation that will not interfere with the operation of the bed. The depth of the bed may be increased with the approval of the Township Engineer.



Note: AASHTO No. 4 is approximately 1-2 inch stone

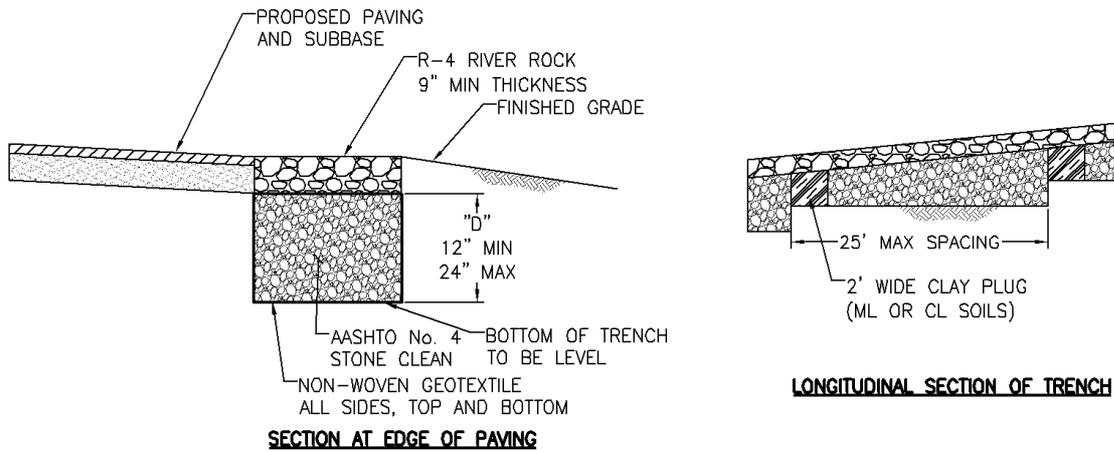
Determination of Water Quality Volume provided:

1	Area – L (length) x W (width)	sq. ft.
2	Depth of Bed = D	ft.
3	Volume = Area x D (Line 1 x Line 2) (stone not considered)	cu. ft.
4	factor to determine void volume due to stone = 0.4 x Line 3 = TOTAL VOLUME PROVIDED (Use this number in Step Three)	cu. ft.

If additional perforated pipe is used in the bed, volume may be adjusted accordingly.

### **BMP #3 –INFILTRATION TRENCH**

Infiltration trenches are utilized along the perimeter of impervious surfaces to collect, store and infiltrate stormwater runoff. River rock or equivalent will be placed on the bed to allow the stormwater runoff to enter the trench; alternately the bed may utilize a perforated pipe with inlets to get the stormwater into the trench. When on a slope, the trench is constructed as a terraced system with clay dikes to promote infiltration. The depth of the trench may be increased with the approval of the Township Engineer. Pipe can be utilized within the trench to increase the available storage volume. When the trench is installed along a paved area that will need to be compacted during construction, extra attention needs to be paid to avoid compaction in the area of the trench and to loosen the material under the trench prior to installation.



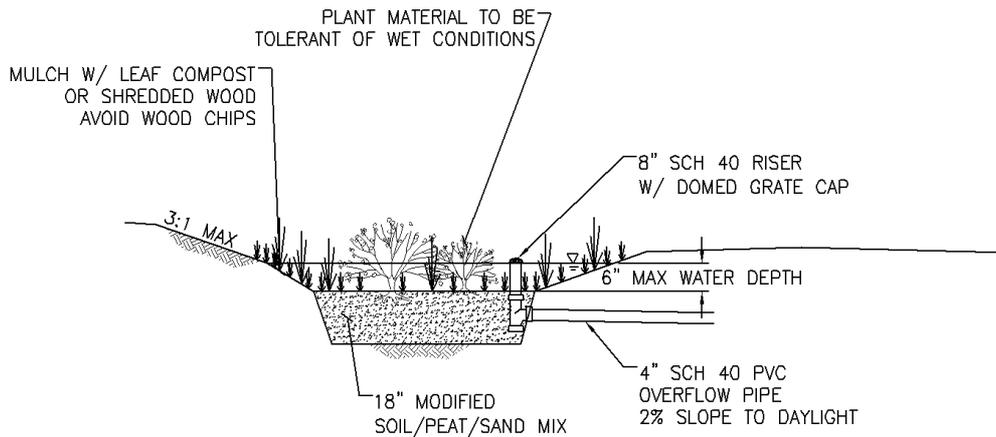
Determination of Water Quality Volume provided:

1	Area = L (length) x W (width)	sq. ft.
2	Depth of Trench = D	ft.
3	Volume = Area x D (Line 1 x Line 2) (stone not considered)	cu. ft.
4	factor to determine void volume due to stone = 0.4 x Line 3 = <b>TOTAL VOLUME PROVIDED</b> (Use this number in Step Three)	cu. ft.

If perforated pipe is used in the bed, volume may be adjusted accordingly.

## **BMP #4 –RAIN GARDEN**

Rain gardens are similar to the infiltration basin, but provide less storage volume and rely more on the plantings to provide water quality and to remove the water through evapo-transpiration. Plant material utilized in the rain garden should be selected by a landscaping professional and be suitable for the proposed conditions. The bottom of the garden is a modified soil intended to hold water and allow it to infiltrate. An overflow pipe is provided to take larger stormwater runoff away. The planted bed needs regular maintenance and should be mulched on an annual basis. The entire bed should be dug up and rejuvenated every three years or as necessary to maintain function. The owner of the facility should be aware of the long term maintenance needs of the plant materials utilized.

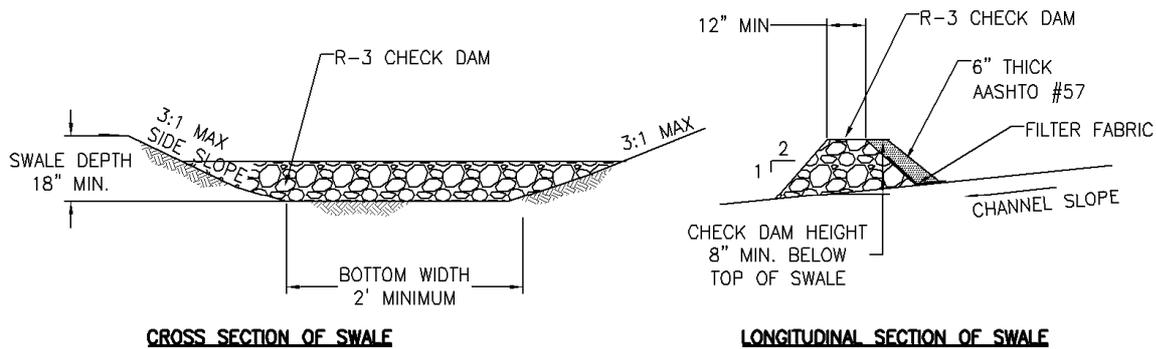


Determination of Water Quality Volume provided:

1	Area – L (length) x W (width) for rectangular areas estimate for irregular shapes	sq. ft.
2	Depth of Water on Surface = 6" = 0.5'	0.5 ft.
3	Approx. Above Ground Volume = Area x D (Line 1 x Line 2)	cu. ft.
4	Depth of Modified Soil Mix = 18" = 1.5'	1.5 ft.
5	factor to determine void volume due to modified soil mix = Approx Volume in Soil = Area x D x 0.4 (Line 1 x Line 4 x 0.4)	cu. ft.
6	TOTAL VOLUME PROVIDED (Line 3 + Line 5) (Use this number in Step Three)	cu. ft.

## **BMP #5 –VEGETATED SWALE WITH CHECK DAM**

A vegetated swale with a check dam provides both a way to convey water around the site and provide an infiltration component. Swales should be installed with longitudinal slopes of 1-6%. Check dams are provided for swales over 3% in slope. The swales should be planted with grasses that are sod forming and can withstand frequent inundation or may be planted with other dense vegetation. For maximum benefit the grasses in the swale should be mowed infrequently. The swale and check dams should be inspected after every storm event to repair any erosion areas that may form. The dimensions shown for the channel and check dam will satisfy most applications. Larger swales may be required depending on actual site conditions.



Note: R-3 is approximately 3 inch stone & AASHTO No. 57 is approximately 1/2 inch stone

Determination of Water Quality Volume provided:

1	Check Dam Height	ft.
2	Channel Slope = Vertical Rise / 100 ft length x 100%	%
3	Impoundment Length = (Line 1 / Line 2) x 100	ft.
4	Side Slope (Horizontal Length in Ft./ 1 ft Vertical Rise)	
5	Bottom Width of Channel	ft.
6	Top Width of Check Dam = Line 5 + 2 x Line 4 x Line 1	ft.
7	TOTAL VOLUME PROVIDED = 0.5 x Line 3 x Line 1 x (Line 5 + Line 6) / 2 (Use this number in Step Three)	cu. ft.

## **SWM BMP #6 –CISTERN/RAIN BARREL**

A cistern provides an artificial reservoir, such as a tank, for storing water. Cisterns date back to early civilizations as a way to collect and manage stormwater. Historically the water was collected to serve as a source of drinking water, but for these purposes, that is, as a SWM BMP, the cistern is not intended as a source of drinking water but for utilization for watering plants/irrigation systems. The sizing of the facility is primarily based on the intended use of the water. In order for the facility to be effective during storm events it must be emptied on a regular basis between storms. No details are provided here since each use would be unique. The following design criteria should be considered:

- A. Determine the amount needed. Consider the area to be irrigated and the amount to be applied and the frequency. This is the minimum volume to be stored. Consider a factor of safety to allow for drought conditions.
- B. Conversely, methods should be provided to draw down the cistern from time to time especially during non-growing seasons to insure that there is adequate volume in the cistern for storm events.
- C. Stormwater from roofs is preferred due to their low amounts of pollutants and sediments.
- D. Pumps and piping utilized in the system should be clearly labeled that this is not potable water and cross-contamination of drinking water supplies must be avoided. All systems should be watertight.
- E. An overflow system should be provided.
- F. Facilities need to be kept from freezing.

## **BMP #7 –PERVIOUS PAVER BLOCK**

Pervious paver blocks consist of interlocking units (often concrete) that provide some portion of the surface that may be filled with a pervious material such as gravel or topsoil. These are often used in patio area or small parking areas. Pervious paver blocks can be utilized as part of site landscaping plan to minimize the impervious coverage. Brand names of such products include, but are not limited to: Turfstone, UNI Eco-stone, Checkerblock, EcoPaver, Turf Pavers, or Monoslab. If the products are installed per manufacturer's specification as part of a permeable paving system with minimal compaction, the area can be considered as a non-impervious area in calculating the Water Quality Volume requirements as part of Step One of the BMP Worksheets. The Township Engineer shall review all materials proposed to determine if they are suitable for this application.

### Example of Site Sketch Plan



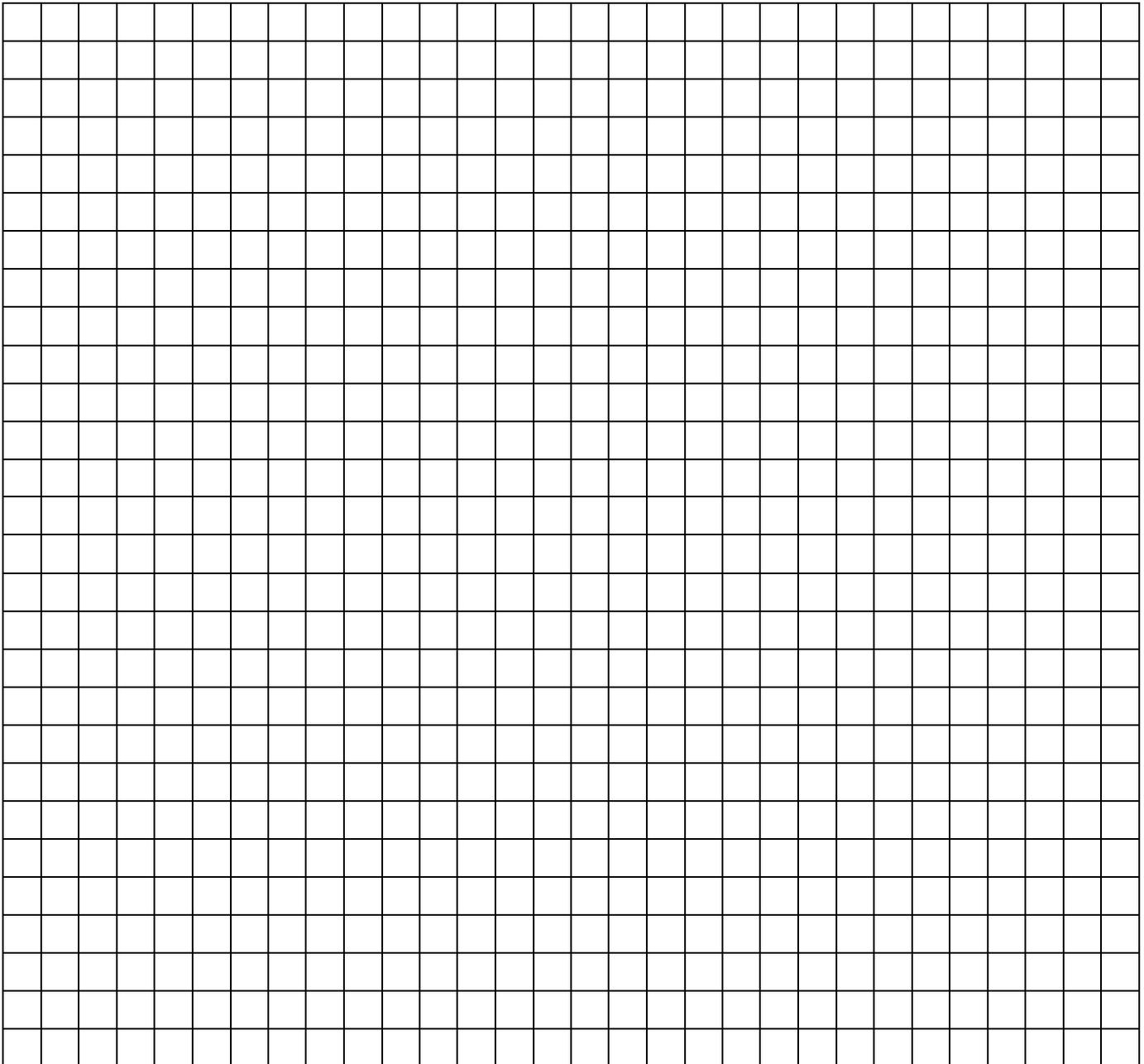
#### Plan shall contain the following items:

- Lot configuration and total acreage.
- Existing features: buildings, driveways, parking areas, woodland, streams, etc.
- Proposed impervious surfaces: driveways, parking areas including dimensions.
- Names of owners immediately adjacent to the project site location.
- Locations of existing streets or easements, railroads, drainage facilities.
- Proposed erosion and sedimentation control facilities.
- Location of watercourses, wetlands, and riparian stream buffer located within the property or one hundred (100) feet from the project site location.
- Distances between the proposed activity and existing features, property lines, on-lot sewage facilities, wells and watercourses.

**SITE SKETCH PLAN**

NAME: \_\_\_\_\_

LOCATION: \_\_\_\_\_



Is your drawing to scale Y / N? If yes, what is the scale? \_\_\_\_\_

**Any questions, please contact:  
LTL Consultants, Ltd. at 610-987-9290 or 1-888-987-8886**

## **APPENDIX A.3**

### **Minor Stormwater Management Plan Best Management Practices**

#### **Operation, Maintenance and Inspection Combined Plan and Agreement**

It is the Landowner's responsibility to properly maintain BMPs. It is also the Landowner's responsibility to inform any future buyers of the function, operation, and maintenance needed for any BMPs on the property prior to the purchase of the property.

The following Operation, Maintenance and Inspection Combined Plan and Agreement (Agreement) outlines the inspection and maintenance required for each type of BMP, the responsibilities of the Landowner, and the rights of the Municipality in regards to operation, inspection and enforcement of the maintenance requirements.

The Agreement must be signed, notarized and submitted to the Municipality. Following approval and signature by the Municipality, the Landowner must have the Agreement recorded at the Chester County Office of the Recorder of Deeds, so that the Agreement will be applicable to future landowners.

**Minor Stormwater Management Plan  
Best Management Practices  
Operation, Maintenance and Inspection  
Combined  
Plan and Agreement**

**THIS AGREEMENT**, made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_, by and between \_\_\_\_\_, (hereinafter the Landowner), and East Pikeland Township, Chester County, Pennsylvania, (hereinafter Municipality).

**WITNESSETH**

**WHEREAS**, the Landowner is the owner of certain real property by virtue of a deed of conveyance recorded in the land records of Chester County, Pennsylvania, at Deed Book \_\_\_\_\_ and Page \_\_\_\_\_, with a street address of \_\_\_\_\_ (hereinafter Property); and

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

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

BMP – Best Management Practice; activities, facilities, designs, measures or procedures used to manage stormwater impacts from land development, to protect and maintain water quality and ground water recharge and to otherwise meet the purposes of the Municipality’s Stormwater Management Ordinance, including, but not limited to infiltration basins, infiltration beds infiltration trenches, rain gardens, vegetated swales with check dams, cisterns/rain barrels, pervious paver blocks, and

Conveyance – a man-made, existing or proposed facility, structure or channel used for the transportation or transmission of stormwater from one place to another, including pipes, drainage ditches, channels and swales (vegetated and other), gutters, and like facilities or features; and

**WHEREAS**, the Grading Permit (which includes the Minor Stormwater Management BMP Worksheets which include the Site Sketch Plan hereafter referred to as the “Plan and Worksheets”) issued by East Pikeland Township for the Property provides for management of stormwater within the confines of the Property through the use of the BMP(s) shown on the Plan; and

**WHEREAS**, the Municipality and the Landowner agree that the health, safety, and welfare of the residents of the Municipality and the protection and maintenance of water quality require that on-site

stormwater management BMP(s) be constructed, and adequately inspected, operated and maintained on the Property by the Landowner in accordance with the approved Plan and Worksheets and the operation and maintenance requirements included herein. The Plan and Worksheets are attached hereto and incorporated herein together as Exhibit A. The corresponding maintenance requirements are attached hereto and incorporated herein together as Exhibit B: and

**NOW, THEREFORE**, in consideration of the foregoing, the mutual covenants contained herein, and the following terms and conditions, the parties hereto, intending to be legally bound hereby, agree as follows:

1. The foregoing recitals to this Agreement are incorporated as terms of this Agreement and obligations of the Landowner as if fully set forth in the body of this Agreement.
2. The Landowner shall construct the BMP(s) in accordance with the specifications identified in the approved Plan and Worksheets (copy attached as Exhibit A).
3. The Landowner shall inspect, operate and maintain the BMP(s) as shown on the Plan and Worksheets in good working order acceptable to the Municipality and in accordance with the specific inspection and maintenance requirements outlined in Exhibit B.
4. The Landowner hereby grants permission to the Municipality, its authorized agents and employees, to enter upon the Property from the public right-of-way or roadway, at reasonable times and upon presentation of proper identification, to inspect the BMP(s) whenever it deems necessary for compliance with this Agreement and the Municipality's Stormwater Ordinance. Whenever possible, the Municipality shall notify the Landowner prior to entering the Property.
5. The Landowner acknowledges that, per the Municipality's Stormwater Ordinance, it is unlawful, without written approval of the Municipality, to:
  - a. Modify, remove, fill, landscape, alter or impair the effectiveness of any BMP or conveyance that is constructed as part of the Plan;
  - b. Place any structure, fill, landscaping, additional vegetation, yard waste, brush cuttings, or other waste or debris into a BMP or conveyance that would limit or alter the functioning of the BMP or conveyance;
  - c. Allow the BMP or conveyance to exist in a condition which does not conform to the Plan and Worksheets or this Agreement; and

- d. Dispose of, discharge, place or otherwise allow pollutants including, but not limited to, deicers, pool additives, household chemicals and automotive fluids to directly or indirectly enter any BMP or conveyance.
6. In the event the Landowner fails to operate and maintain the BMP(s) (as shown on the Plan and Worksheets) in good working order acceptable to the Municipality, the Landowner shall be in violation of this Agreement, and the Landowner agrees that the Municipality or its representatives may, in addition to and not in derogation or diminution of any remedies available to it under the Stormwater Ordinance or other statutes, codes, rules or regulations, or this Agreement, enter upon the Property and take whatever action is deemed necessary to maintain said BMP(s).
7. It is expressly understood and agreed that the Municipality is under no obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the Municipality.
8. In the event the Municipality, pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner shall reimburse the Municipality within 15 days of delivery of an invoice from the Municipality for all expenses (direct and indirect) incurred. Failure of the Landowner to make prompt payment to the Municipality may result in enforcement proceedings, which may include the filing of a lien against the Property, which filing is expressly authorized by the Landowner.
9. The intent and purpose of this Agreement is to ensure the proper maintenance of the onsite BMP(s) by the Landowner; 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.
10. The Landowner, its executors, administrators, assigns, heirs, and other successors in interests, hereby release and shall release the Municipality, its employees, agents and designated representatives from all damages, accidents, casualties, occurrences or claims which might arise or be asserted against the Municipality and/or its said employees, agents or representatives, arising out of the construction, presence, existence, or maintenance of the BMP(s) either by the Landowner or Municipality. In the event that a claim is asserted or threatened against the Municipality, its employees, agents or designated representatives, the Municipality shall notify the Landowner and the Landowner shall defend, at his own expense, any claim, suit, action or proceeding, or threatened claim, suit, action or proceeding against the Municipality or, at the request of the Municipality, pay the cost, including

attorneys' fees, of defense of the same undertaken on behalf of the Municipality. If any judgment or claims against the Municipality, its employees, agents or designated representatives shall be allowed, the Landowner shall pay all damages, judgments or claims and any costs and expenses incurred by the Municipality, including attorneys fees, regarding said damages, judgment or claims.

11. The Municipality may enforce this Agreement in accordance with its Stormwater Ordinance, at law or in equity, against the Landowner for breach of this Agreement. Remedies may include fines, penalties, damages or such equitable relief as the parties may agree upon or as may be determined by a Court of competent jurisdiction. Recovery by the Municipality shall include its reasonable attorneys fees and costs incurred in seeking relief under this Agreement.
12. Failure or delay in enforcing any provision of this Agreement shall not constitute a waiver by the Municipality of its rights of enforcement hereunder.
13. The Landowner shall inform future buyers of the Property about the function, operation, inspection and maintenance requirements of the BMP(s) prior to the purchase of the Property by said future buyer, and upon purchase of the Property the future buyer assumes all responsibilities as Landowner and must comply with all components of this Agreement.
14. This Agreement shall inure to the benefit of and be binding upon, the Municipality and the Landowner, as well as their heirs, administrators, executors, assigns and successors in interest.

This Agreement shall be recorded at the Office of the Recorder of Deeds of the County of Chester, Pennsylvania, and shall constitute a covenant running with the Property and/or equitable servitude, in perpetuity.

ATTEST:

WITNESS the following signatures and seals:

(SEAL)

For the Municipality:

---

(SEAL)

For the Landowner:

---

ATTEST:

East Pikeland Township

County of Chester, Pennsylvania

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

**GIVEN UNDER MY HAND THIS** \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_

**NOTARY PUBLIC**

**(SEAL)**

East Pikeland Township

County of Chester, Pennsylvania

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

**GIVEN UNDER MY HAND THIS** \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_

**NOTARY PUBLIC**

**(SEAL)**

Exhibits A and B MUST be attached

**Exhibit A:**  
**Approved Minor Stormwater Management BMP Worksheets and Site Sketch Plan**

(include only those Worksheets and the Site Sketch Plan that were approved)

**Exhibit B:**  
**BMP Operation and Maintenance Requirements**

(include only those sheets that apply to the Property, that is, those that correspond to the approved Worksheets and Plan)

## **BMP #1 - Infiltration Basin**

### Operation and Maintenance Requirements

- a. Infiltration basins are to be inspected by the landowner after significant rainfalls but not less than twice a year.
- b. Inspect for debris, trash, sediment, and any other waste material that needs to be removed and dispose of at suitable disposal or recycling sites and in compliance with local, state, and federal waste regulations.
- c. Inspect for damage to the outlet structure if included in the design and repair accordingly
- d. The vegetation should be maintained in good condition and any bare spots re-vegetated as soon as possible.
- e. Mow only as appropriate for vegetative cover species planted.
- f. Vehicles should not be parked or driven on an infiltration basin and care should be taken to avoid excessive compaction by mowers.
- g. Inspect for erosion and slope stability. Remove accumulated sediment and restore original cross section and infiltration rate.

## **BMP #2 - Infiltration Bed**

### Operation and Maintenance Requirements

- a. Infiltration beds are to be inspected by the landowner at least four (4) times a year and after significant rainfalls (1 inch or more recommended).
- b. Debris, trash, sediment, and any other waste material need to be removed and disposed of at suitable disposal or recycling sites and in compliance with local, state, and federal waste regulations.
- c. Evaluate the drain-down time of the infiltration bed to ensure the time is not excessive (72 hours recommended). If drain-down times are exceeding the recommended, drain the infiltration bed via pumping. If the infiltration bed contains chambers and/or perforated piping, clean out these facilities. If slow drainage persists, the system may need replacing.
- d. The filter screen system for downspouts and/or roof gutters that intercepts roof runoff and conveys it to the infiltration bed must be cleaned and replaced as necessary. Check the roof drain system for proper connections.
- e. If an intermediate sump box exists in conjunction with a infiltration bed, it must be cleaned out at least once per year.
- f. Vehicular access on infiltration beds should be prohibited, and care should be take to avoid excessive compaction by mowers.

### **BMP #3 - Infiltration Trenches**

#### Operation and Maintenance Requirements

- a. At least twice a year and after significant rainfall events the landowner is to inspect the infiltration trench and remove any accumulated debris, sediment and invasive vegetation.
- b. Vegetation either over the surface of an infiltration trench or along the edge of an “open” trench is to be maintained in good condition, and any bare spots are to be re-vegetated as soon as possible.
- c. Vehicles are not to be parked or driven on an infiltration trench, and care is to be taken to avoid excessive compaction by mowers.
- d. Any debris, such as leaves blocking flow from entering an infiltration trench, is to be routinely removed.

## **BMP #4 - Rain Garden**

### Operation and Maintenance Requirements

- a. Pruning and weeding are required as needed including removal of invasive species, especially while vegetation is being established for a rain garden.
- b. Mulch cover should be maintained in a rain garden, re-spread and replenished as needed to prevent erosion, reduce weed growth and assist with plant survival, without restricting the infiltration of stormwater.
- c. At least twice a year the landowner is to inspect the rain garden for sediment buildup, ground cover and vegetative conditions and make any repairs as needed.
- d. Water as needed especially during periods of extended dry weather and drought.
- e. Trees and shrubs in a rain garden are to be inspected at least twice per year by the landowner to evaluate their health. If they are in poor health, they may need to be replaced.

## **BMP #5 Vegetated Swale w/ Check Dam**

### Operation and Maintenance Requirements

- a. After significant rain events, inspect swale bottom and correct erosion problems, damage to vegetation and accumulation of sediment (address when >3 inches at any spot or covering vegetation). Restore longitudinal slope.
- b. After significant rain events, inspect swale side slopes for erosion and formation of rills or gullies; correct as needed.
- c. Mow and trim vegetation as appropriate for the species.
- d. Mow only during dry conditions to avoid rutting.
- e. Inspect for and remove debris and trash.
- f. Inspect swale inlet is applicable (curb cuts, pipes, etc.) and outlet for signs of erosion or blockage; correct as needed.
- g. Re-vegetate bare areas.
- h. When included in the design, inspect and correct check dams when signs of altered water flow are identified (channelization, obstructions, erosion etc.).

## **BMP #6 Cisterns/Rain Barrels**

### Operation and Maintenance Requirements

- a. Cisterns/Rain Barrels are to be cleared of debris routinely at least every three (3) months and after significant storms to allow stormwater from gutters to enter them.
- b. Gutters that directly convey rain water to cisterns/rain barrels are to be routinely cleared of trash and debris at least every three (3) months and after significant rainfall events.
- c. Cisterns/Rain Barrels should be routinely emptied to allow for storage of additional rain water.
- d. Overflow outlets from cisterns/rain barrels must be kept free and clear of debris.
- e. Cisterns/Rain Barrels that are damaged are to be fixed or replaced within two (2) weeks of being damaged.

## **BMP #7 Pervious Paver Blocks**

### Operation and Maintenance Requirements

For proposals that specify gravel between the paver blocks:

- a. Periodic maintenance is required to clean silt and debris from the surface.
- b. Planted areas adjacent to the paver blocks should be well maintained to prevent soil washing onto the surface and clogging the gravel areas.
- c. Refill displaced gravel whenever necessary.
- d. Salts and sands should be used sparingly if at all for deicing in the winter.

For proposals that specify grass between the paver blocks:

- a. Mow as needed, but care should be taken to avoid excessive compaction.
- b. Water during extended periods of dry weather.
- c. Reseed bare areas.
- d. Deicing salts should not be used.

**APPENDIX B**

**SITE DESIGN PROCESS**

# NATURAL HYDROLOGY SITE DESIGN PROCESS

## INTRODUCTION

Section 304 identifies a natural hydrology site design process that strives to minimize disturbances to land, site hydrology, and natural resources, and maintain the natural hydrologic regime, drainage patterns and flow conditions of a site to the maximum extent practicable. This appendix is intended to build on that process by providing additional information for achieving site designs that best maintain pre-construction stormwater runoff conditions, protect site amenities, and preserve natural resources. This appendix describes the following components of the natural hydrology site design process:

- Design Principles and Techniques;
- Design Process;
- Design Practices; and
- References.

Some common drainage design approaches for land development 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 runoff, as well as the expenditure of additional resources for detaining and managing increased volumes of concentrated runoff at some downstream location.

The natural hydrology site design process encourages land development site designs that minimize post-development runoff rates and volumes, and that minimize needs for artificial conveyance and storage facilities. This process strives 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. This avoids cumulative environmental impacts often associated with land development, and reducing the need for and size of constructed stormwater facilities. This approach minimizes the disturbance of land area, natural features and site hydrology; preserves significant concentrations of open space, woodlands, and corridors of environmentally sensitive features; and incorporates landscape-based BMPs and low impact development techniques to minimize the utilization of more intrusive structural stormwater facilities.

With this design process, the primary goals of a land development project can be achieved while minimizing the negative environmental impacts and avoiding management costs associated with unnecessary stormwater runoff. The fundamental principle of this design process is that site hydrology features are considered “up front” in the land development design process and are prioritized as integral aspects to be maintained and utilized within the site design, rather than being first sacrificed for space needed for traditional site layout or for construction of more intrusive stormwater facilities.

Natural hydrology site design is not a new approach but rather a holistic process that combines certain principles of Low Impact Development, Conservation Design, and Sustainable Design, and focuses on reducing unnecessary alterations to the natural patterns and functions of existing on-site hydrologic features. These natural hydrologic features tend to perform their “hydrologic function” (i.e., infiltration, evapotranspiration, flow attenuation, pollutant removal, etc.) very efficiently and sometimes have the hydrologic capacity to perform that function on increased runoff loadings from the built environment. However, care must be taken to adequately characterize the capacity of their hydrologic function and avoid overwhelming the feature with excessive runoff loadings, thus causing unintended impairments that are completely counter-productive to the purpose of natural hydrology site design.

Preserving natural hydrologic conditions requires careful site design considerations. Natural hydrology site design should serve as the foundation of the overall site design approach, and when applied in conjunction with the design professional’s overall land development goals and desired outcomes, can help shape the overall vision and conceptual layout of the land development project.

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 and distributing storm 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 those features.

## **DESIGN PRINCIPLES AND TECHNIQUES**

Natural hydrology site design involves identifying and prioritizing natural resources and natural and man-made hydrologic features, and incorporating such features into the overall site design to take advantage of their efficiencies of hydrologic performance, their cost efficiencies of reducing the need for or size of constructed stormwater facilities, and their aesthetic amenities. The five Design Principles to be achieved by this approach are as follows:

- Minimize land disturbance – both surface and subsurface.
- Minimize the cumulative area to be covered by impervious and compacted surfaces.
- Designing to the land, so that the layout of constructed and landscape features utilizes the natural topography and minimizes grading.
- Design the constructed stormwater management system to take advantage of the natural hydrologic landscape to achieve the required stormwater runoff control standards.

- Refine the site design and layout to optimize the cumulative benefits of the natural hydrologic features, the constructed stormwater management system, and the land development components to achieve the minimum post-construction runoff volume, peak discharge rates and pollutant loads from the proposed land development site.

Techniques to be applied to achieve the design principles are presented in Table B.1.

## **DESIGN PROCESS**

The first step in applying natural hydrology site design is to identify, delineate and assess the functions of all existing natural resources and natural and man-made 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. This includes:

- Streams, waterways, springs, wetlands, vernal pools, and water bodies;
- Drainage patterns, conveyances and discharge points;
- Natural infiltration areas and patterns;
- Areas of natural vegetation 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 (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
- 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 five (5) Design Principles outlined above. The following section describes just a few of the many design practices, methods and techniques that are available to achieve the landowner's desired land development goals and the desired environmental efficiencies intended by natural hydrology site design.

**Table B.1 – Site Design Process Principles and Techniques**

<b>Design Principles</b>	<b>Design Techniques</b>
<p><b>Minimize land disturbance – both surface and subsurface.</b></p>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• 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.</li> </ul>
<p><b>Minimize the cumulative area to be covered by impervious and compacted surfaces.</b></p>	<ul style="list-style-type: none"> <li>• Minimize the size of individual impervious surfaces.</li> <li>• Separate large impervious surfaces into smaller components.</li> <li>• Disconnect runoff from one impervious surface to another.</li> <li>• Avoid unnecessary impervious surfaces.</li> <li>• Utilize porous materials where suited in lieu of impervious materials.</li> </ul>
<p><b>Designing to the land, so that the layout of constructed and landscape features utilizes the natural topography and minimizes grading.</b></p>	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> <li>• Consider the scale and placement of buildings and other infrastructure to minimize impact to natural hydrologic features.</li> <li>• 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 complimentary and aesthetically pleasing development, such as can be achieved through Conservation Design and Sustainable Design approaches.</li> </ul>

<p><b>Design the constructed stormwater management system to take advantage of the natural hydrologic landscape to achieve the required stormwater runoff control standards.</b></p>	<ul style="list-style-type: none"> <li>• Incorporate natural hydrologic features that have been selected for their available capacity and function into the overall system of site runoff controls.</li> <li>• Incorporate Low Impact Development (or similar) BMPs and distribute storm flows to: <ul style="list-style-type: none"> <li>○ Reduce runoff;</li> <li>○ Manage stormwater at or as close to the point of generation as possible;</li> <li>○ Disconnect discharges from streets and municipal storm sewer systems; and</li> <li>○ Select and design BMPs to give first priority to nonstructural and vegetation (landscape-based) BMPs, second priority to surface structural BMPs, third priority to subsurface structural BMPs, and design subsurface BMPs as shallow as possible.</li> </ul> </li> <li>• Provide open channel conveyance, as needed, to: <ul style="list-style-type: none"> <li>○ Treat water quality;</li> <li>○ Reduce runoff velocity; and</li> <li>○ Promote infiltration and evapotranspiration of runoff.</li> </ul> </li> <li>• Manage remaining conveyed stormwater from small storms in common open space areas to achieve multiple objectives: <ul style="list-style-type: none"> <li>○ Disperse storm flows and reduce velocity;</li> <li>○ Treat water quality; and</li> <li>○ Promote infiltrate and evapotranspiration of runoff.</li> </ul> </li> <li>• Provide for appropriate conveyance to retention or detention storage facilities as needed for flows from large storm events.</li> <li>• Maintain open space functions consistent with common area uses (passive recreation, on-site sewage management, scenic vistas, etc).</li> </ul>
<p><b>Refine the site design and layout to optimize the cumulative benefits of the natural hydrologic features, the constructed stormwater management system, and the land development components to achieve the minimum post-construction runoff volume, peak discharge rates and pollutant loads from the proposed land development site.</b></p>	<p>Apply site design techniques and practices as appropriate based on:</p> <ul style="list-style-type: none"> <li>• Conservation Design principles and practices.</li> <li>• Sustainable Design principles and practices.</li> <li>• Low Impact Development Design principles and practices.</li> </ul>

## 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. Following are brief descriptions of various practices that can be used to achieve the principles of the natural hydrology site design process.

### **Site Layout Practices**

The following site layout practices are but a few of the methods by which the natural hydrology site design process described above can be implemented. Such practices 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 some circumstances, communication among design engineers, land planning and environmental professionals, knowledgeable developers, community representatives, and regulatory authorities is also beneficial to combine their collective understanding and perspectives to create effective planning efforts.

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

***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.

***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 and/or by reducing roadway widths. Designers should select the narrowest practical street width for the design conditions (speed, curvature, etc.). Narrower neighborhood streets should be considered and encouraged under select conditions. Reduced street widths also can lower maintenance needs and costs.

***Limiting Sidewalks to One Side of the Street.*** A sidewalk on one side of the street may suffice in low-traffic neighborhoods. The lost sidewalk could be replaced with bicycle/recreational trails that follow back-of-lot lines as an alternative to reduced sidewalks, where appropriate.

***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.

***Constructing Compact Developments or Conservation Design:*** Low impact cluster or compact development can reduce the amount of impervious area for a given number of lots. Savings result from reduced street length, which also contributes 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.

### **Stormwater Best Management Practices**

Stormwater best management practices (BMPs) 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.

***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.

***Reducing the Need for Storm Sewers.*** Increasing the use of natural or vegetated drainage swales can reduce the need for extending storm sewers for draining streets, parking lots, and back yards, the potential for accelerating runoff from the development can be greatly reduced. The practice requires greater use of swales and may not be practical for some development sites, especially if there are concerns for areas that do not drain in a “reasonable” time. The practice requires educating local citizens, who may expect runoff to disappear shortly after a rainfall event.

***Using 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.

## **SOURCES**

*Conservation Design for Stormwater Management*, Delaware Department of Natural Resources and Environmental Control and the Brandywine Conservancy, September 1997.

*Conservation Design: Techniques for Preserving Natural Hydrologic Functions*, White Paper prepared for New Castle County, Delaware Drainage Code, John M. Gaadt, AICP, September 2007.

*Growing Greener, Conservation by Design*, a program of the Natural Lands Trust, [www.natlands.org/](http://www.natlands.org/).

Guidance on MS4 Ordinance Provisions, Document Number 392-0300-003, by the Pennsylvania Department of Environmental Protection.

Low Impact Development Center, <http://www.lowimpactdevelopment.org/>.

PA Department of Environmental Protection, Best Management Practices Manual, 2006.



## APPENDIX C

### CURVE NUMBERS, RUNOFF COEFFICIENTS AND N-VALUES

#### TABLE C-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 C-2. RATIONAL RUNOFF COEFFICIENTS

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

#### TABLE C-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 C-1

Table 2-2a Runoff curve numbers for urban areas <sup>1/</sup>

Cover description	Average percent impervious area <sup>2/</sup>	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.) <sup>3/</sup> :					
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) <sup>4/</sup> .....					
		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) <sup>5/</sup> .....					
		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

<sup>1</sup> Average runoff condition, and  $I_a = 0.2S$ .

<sup>2</sup> 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.

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

<sup>4</sup> 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.

<sup>5</sup> 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.

TABLE C-1

Chapter 2

Estimating Runoff

Technical Release 55

Urban Hydrology for Small Watersheds

Table 2-2b Runoff curve numbers for cultivated agricultural lands <sup>1/</sup>

Cover description		Hydrologic condition <sup>2/</sup>	Curve numbers for hydrologic soil group			
Cover type	Treatment <sup>2/</sup>		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
C&T+ CR	Poor	65	73	79	81	
	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	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
Good	51	67	76	80		

<sup>1</sup> Average runoff condition, and  $I_a=0.2S$ <sup>2</sup> Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.<sup>3</sup> 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.

TABLE C-1

Chapter 2

Estimating Runoff

Technical Release 55  
Urban Hydrology for Small WatershedsTable 2-2c Runoff curve numbers for other agricultural lands <sup>1/</sup>

Cover description Cover type	Hydrologic condition	Curve numbers for hydrologic soil group			
		A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. <sup>2/</sup>	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. <sup>3/</sup>	Poor	48	67	77	83
	Fair	35	56	70	77
	Good	30 <sup>4/</sup>	48	65	73
Woods—grass combination (orchard or tree farm) <sup>5/</sup>	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods. <sup>6/</sup>	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30 <sup>4/</sup>	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.	—	59	74	82	86

<sup>1</sup> Average runoff condition, and  $I_a = 0.2S$ .<sup>2</sup> *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.<sup>3</sup> *Poor*: <50% ground cover.*Fair*: 50 to 75% ground cover.*Good*: >75% ground cover.<sup>4</sup> Actual curve number is less than 30; use CN = 30 for runoff computations.<sup>5</sup> 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.<sup>6</sup> *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.



TABLE C-3

## Chapter 3— Basic Data Requirements

Table 3-1 Manning's 'n' Values

Type of Channel and Description	Minimum	Normal	Maximum
<b>A. Natural Streams</b>			
<b>1. Main Channels</b>			
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
<b>2. Flood Plains</b>			
a. Pasture no brush	0.025	0.030	0.035
1. Short grass	0.030	0.035	0.050
2. High grass			
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			
c. Brush	0.035	0.050	0.070
1. Scattered brush, heavy weeds	0.035	0.050	0.060
2. Light brush and trees, in winter	0.040	0.060	0.080
3. Light brush and trees, in summer	0.045	0.070	0.110
4. Medium to dense brush, in winter	0.070	0.100	0.160
5. Medium to dense brush, in summer			
d. Trees	0.030	0.040	0.050
1. Cleared land with tree stumps, no sprouts	0.050	0.060	0.080
2. Same as above, but heavy sprouts	0.080	0.100	0.120
3. Heavy stand of timber, few down trees, little undergrowth, flow below branches	0.100	0.120	0.160
4. Same as above, but with flow into branches			
5. Dense willows, summer, straight	0.110	0.150	0.200
<b>3. Mountain Streams, no vegetation in channel, banks usually steep, with trees and brush on banks submerged</b>			
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

TABLE C-3

Chapter 3— Basic Data Requirements

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

Type of Channel and Description	Minimum	Normal	Maximum
<i>B. Lined or Built-Up Channels</i>			
<b>1. Concrete</b>			
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	
<b>2. Concrete bottom float finished with sides of:</b>			
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
<b>3. Gravel bottom with sides of:</b>			
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
<b>4. Brick</b>			
a. Glazed	0.011	0.013	0.015
b. In cement mortar	0.012	0.015	0.018
<b>5. Metal</b>			
a. Smooth steel surfaces	0.011	0.012	0.014
b. Corrugated metal	0.021	0.025	0.030
<b>6. Asphalt</b>			
a. Smooth	0.013	0.013	
b. Rough	0.016	0.016	
<b>7. Vegetal lining</b>			
	0.030		0.500

TABLE C-3

## 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>			
<b>1. Earth, straight and uniform</b>			
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
<b>2. Earth, winding and sluggish</b>			
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
<b>3. Dragline-excavated or dredged</b>			
a. No vegetation	0.025	0.028	0.033
b. Light brush on banks	0.035	0.050	0.060
<b>4. Rock cuts</b>			
a. Smooth and uniform	0.025	0.035	0.040
b. Jagged and irregular	0.035	0.040	0.050
<b>5. Channels not maintained, weeds and brush</b>			
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.

Although there are many factors that affect the selection of the n value for the channel, some of the most important factors are the type and size of materials that compose the bed and banks of a channel, and the shape of the channel. Cowan (1956) developed a procedure for estimating the effects of these factors to determine the value of Manning's n of a channel. In Cowan's procedure, the value of n is computed by the following equation:

**APPENDIX D**

**WEST NILE VIRUS DESIGN GUIDANCE**

# WEST NILE VIRUS GUIDANCE

## 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

(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)

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 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 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.



## **APPENDIX E**

# **STORMWATER BEST MANAGEMENT PRACTICES AND CONVEYANCES OPERATION AND MAINTENANCE AGREEMENT**

## **SAMPLE AGREEMENT**

*NOTES TO EDITOR:*

- 1) This was written to serve as a sample agreement between the Municipality and the landowner who will be responsible for the inspection, operation and maintenance of stormwater BMPs and man-made Conveyances.*
- 2) For all other situations, the language in this sample agreement will have to be adjusted.*
- 3) User must complete the information needed on Page 1, and Sections 2, 5, and 8.*

**STORMWATER BEST MANAGEMENT PRACTICES (BMPs) AND  
CONVEYANCES  
OPERATION AND MAINTENANCE AGREEMENT**

**THIS AGREEMENT**, made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by and between \_\_\_\_\_, (hereinafter the “Landowner”), and North Coventry Township , Chester County, Pennsylvania, (hereinafter “Municipality”);

**WITNESSETH**

**WHEREAS**, the Landowner is the owner of certain real property by virtue of a deed of conveyance recorded in the land records of Chester County, Pennsylvania, at Deed Book \_\_\_\_\_ and Page \_\_\_\_\_, (hereinafter “Property”); and

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

**WHEREAS**, the stormwater Best Management Practices (herein after BMP(s)) and Conveyances, Operations and Maintenance Plan approved by the Municipality (hereinafter referred to as the “O&M Plan”) for the Property, which is attached hereto as Appendix A and made part hereof, provides for management of stormwater within the confines of the Property through the use of BMP(s) and conveyances; and

**WHEREAS**, the Municipality and the Landowner, for itself and its administrators, executors, successors, heirs, and assigns, agree that the health, safety, and welfare of the residents of the Municipality and the protection and maintenance of water quality require that stormwater BMP(s) and conveyances be constructed and maintained on the Property; and

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

**BMP – “Best Management Practice”** –Those activities, facilities, designs, measures, or procedures as specifically identified in the O&M Plan, used to manage stormwater impacts from land development, to meet state water quality requirements, to promote groundwater recharge, and to otherwise meet the purposes of the Municipality’s Stormwater Management Ordinance. BMPs may include, but are not limited to, a wide variety of practices and devices, from large-scale retention ponds and constructed wetlands to small-scale underground treatment systems, infiltration facilities, filter strips, low impact design, bioretention, wet ponds, permeable paving, grassed swales, riparian or forested buffers, sand filters, detention basins, manufactured devices, and operational and/or behavior-related practices that attempt to minimize the contact of pollutants with stormwater runoff. The BMPs indentified in the O&M Plan are permanent appurtenances to the Property; and

**Conveyance** – As specifically identified in the O&M Plan, a man-made, existing or proposed facility, structure or channel used for the transportation or transmission of stormwater from one place to another, including pipes, drainage ditches, channels and swales (vegetated and other), gutters, stream channels, and like facilities or features. The conveyances identified in the O&M Plan are permanent appurtenances to the Property; and

**WHEREAS**, the Municipality requires, through the implementation of the O&M Plan, that stormwater management BMPs and conveyances, as required by said O&M Plan and the Municipality’s Stormwater Management Ordinance, be constructed and adequately inspected, operated and maintained by the Landowner, its administrators, executors, successors in interest, heirs, and assigns.

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

1. The foregoing recitals to this Agreement are incorporated as terms of this Agreement as if fully set forth in the body of this Agreement.
2. The Landowner shall construct the BMP(s) and conveyance(s) in accordance with the final design plans and specifications as approved by the Municipality \_\_\_\_\_ (title of approved plans) \_\_\_\_\_ (dated) \_\_\_\_\_ (last revised).
3. The Landowner shall inspect, operate and maintain the BMP(s) and conveyance(s) as shown on the O&M Plan in good working order acceptable to the Municipality and in accordance with the specific inspection and maintenance requirements in the approved O&M Plan.
4. The Landowner hereby grants permission to the Municipality, its authorized agents and employees, to enter upon the Property from a public right-of-way or roadway, at reasonable times and upon presentation of proper identification, to inspect the BMP(s) and conveyance(s) whenever it deems necessary for compliance with this Agreement, the O&M Plan and the Municipality's Stormwater Management Ordinance. Whenever possible, the Municipality shall notify the Landowner prior to entering the Property.
5. The Municipality intends to inspect the BMP(s) and conveyance(s) at a minimum of once every [\_\_\_\_\_] years to determine if they continue to function as required.
6. The Landowner acknowledges that, per the Municipality's Stormwater Ordinance, it is unlawful, without written approval of the Municipality, to:
  - a. Modify, remove, fill, landscape, alter or impair the effectiveness of any BMP or conveyance that is constructed as part of the approved O&M Plan;
  - b. Place any structure, fill, landscaping, additional vegetation, yard waste, brush cuttings, or other waste or debris into a BMP or conveyance that would limit or alter the functioning of the BMP or conveyance;
  - c. Allow the BMP or conveyance to exist in a condition which does not conform to the approved O&M Plan or this Agreement; and
  - d. Dispose of, discharge, place or otherwise allow pollutants including, but not limited to, deicers, pool additives, household chemicals, and automotive fluids to directly or indirectly enter any BMP or conveyance.
7. In the event that the Landowner fails to operate and maintain the BMP(s) and conveyance(s) as shown on the O&M Plan in good working order acceptable to the Municipality, the Landowner shall be in violation of this Agreement, and the Landowner agrees that the Municipality or its representatives may, in addition to and not in derogation or diminution of any remedies available to it under the Stormwater Ordinance or other statutes, codes, rules or regulations, or this Agreement, enter upon the Property and take whatever action is deemed necessary to maintain said BMP(s) and conveyance(s). It is expressly understood and agreed that the Municipality is under no obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the Municipality.

8. In the event that the Municipality, pursuant to this Agreement, performs work of any nature or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner shall reimburse the Municipality for all expenses (direct and indirect) incurred within [ ] days of delivery of an invoice from the Municipality. Failure of the Landowner to make prompt payment to the Municipality may result in enforcement proceedings, which may include the filing of a lien against the Property, which filing is expressly authorized by the Landowner.
  9. The intent and purpose of this Agreement is to ensure the proper maintenance of the on-site BMP(s) and conveyance(s) by the Landowner; provided, however, that this Agreement shall not be deemed to create or affect any additional liability on any party for damage alleged to result from or be caused by stormwater runoff.
  10. The Landowner, for itself and its executors, administrators, assigns, heirs, and other successors in interest, hereby releases and shall release the Municipality's employees, its agents and designated representatives from all damages, accidents, casualties, occurrences, or claims which might arise or be asserted against said employees, agents or representatives arising out of the construction, presence, existence, or maintenance of the BMP(s) and conveyance(s) either by the Landowner or Municipality. In the event that a claim is asserted or threatened against the Municipality, its employees, agents or designated representatives, the Municipality shall notify the Landowner, and the Landowner shall defend, at his own expense, any claim, suit, action or proceeding, or any threatened claim, suit, action or proceeding against the Municipality, or, at the request of the Municipality, pay the cost, including attorneys' fees, of defense of the same undertaken on behalf of the Municipality. If any judgment or claims against the Municipality's employees, agents or designated representatives shall be allowed, the Landowner shall pay all damages, judgments or claims and any costs and expenses incurred by the Municipality, including attorneys, regarding said damages, judgments or claims.
  11. The Municipality may enforce this Agreement in accordance with its Stormwater Ordinance, at law or in equity, against the Landowner for breach of this Agreement. Remedies may include fines, penalties, damages or such equitable relief as the parties may agree upon or as may be determined by a Court of competent jurisdiction. Recovery by the Municipality shall include its reasonable attorney's fees and costs incurred in seeking relief under this Agreement.
  12. Failure or delay in enforcing any provision of this Agreement shall not constitute a waiver by the Municipality of its rights of enforcement hereunder.
  13. The Landowner shall inform future buyers of the Property about the function of, operation, inspection and maintenance requirements of the BMP(s) prior to the purchase of the Property by said future buyer, and upon purchase of the Property the future buyer assumes all responsibilities as Landowner and must comply with all components of this Agreement.
  14. This Agreement shall inure to the benefit of and be binding upon, the Municipality and the Landowner, as well as their heirs, administrators, executors, assigns and successors in interest.
  15. Additional items or conditions, as required by the Municipality (per Subsection \_\_\_ of this Ordinance), as attached herein:
-

This Agreement shall be recorded at the Office of the Recorder of Deeds of Chester County, Pennsylvania, and shall constitute a covenant running with the Property, in perpetuity.

ATTEST:

WITNESS the following signatures and seals:

(SEAL)

For the Municipality:

\_\_\_\_\_

(SEAL)

For the Landowner:

\_\_\_\_\_

ATTEST:

\_\_\_\_\_

County of Chester, Pennsylvania

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

**GIVEN UNDER MY HAND THIS** \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_

\_\_\_\_\_

**NOTARY PUBLIC**

**(SEAL)**