BOROUGH OF AVONDALE
STORMWATER MANAGEMENT ORDINANCE

ORDINANCE NO._____

BOROUGH OF AVONDALE, CHESTER COUNTY,

PENNSYLVANIA

Adopted at a Public Meeting held on

_____, 2022

EXHIBIT A

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ARTICLE I – GENERAL PROVISIONS

Section 101. Short Title

This Ordinance shall be known as the "Borough of Avondale's 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 using 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 require the Municipality to implement a program of stormwater controls. The Municipality is required to obtain a permit and comply with its provisions for stormwater discharges from its Separate Storm Sewer System under the National Pollutant Discharge Elimination System (NPDES).

H. Non-stormwater discharges to municipal or other storm sewer systems can contribute to pollution of the Waters of the Commonwealth.

I. The use of green infrastructure, low impact development (LID), and Conservation Design (CD) are intended to address the root cause of water quality impairment by using systems and practices which use or mimic natural processes to 1) infiltrate and recharge, 2) evapotranspire, and/or 3) harvest and use precipitation near where it falls to earth. Green infrastructure practices, LID, and CD contribute to the restoration or maintenance of pre-development hydrology.

Section 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. Reduce flooding impacts and preserve and restore the natural flood-carrying capacity of streams and their floodplains.

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

L. Minimize Impervious Surfaces and connected Impervious Surfaces to promote infiltration and reduce the volume and impacts of stormwater runoff.

M. Provide proper long-term operation and maintenance of all permanent stormwater management facilities, BMPs and Conveyances that are implemented within the Municipality.

N. 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.

O. Implement an illicit discharge detection and elimination program that addresses non-stormwater discharges.

P. Provide stormwater management performance standards and design criteria on a watershed basis.

Q. Provide standards to meet certain NPDES stormwater permit requirements.

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

S. Implement the requirements of Total Maximum Daily Load (TMDLs) where applicable to waters within or impacted by the Municipality.

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

U. Fulfill the purpose and requirements of PA Act 167 (PA Act 167, Section 3):

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. Borough Code, 8 Pa.C.S.A. Section 101 et seq.

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. When a building and/or grading permit is required for any Regulated Activity on an existing parcel or approved lot created by a subdivision and/or improved as a land development project, issuance of the permit shall be conditioned upon adherence to the terms of this Ordinance.

3. This Ordinance contains the stormwater management performance standards and design criteria that are necessary from a watershed-based perspective. The 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 continue to be regulated by the applicable municipal ordinance(s) and applicable State regulations, or as included in Section 311 of this Ordinance.

B. Duty of Persons Engaged in a Regulated Activity

Notwithstanding any provision(s) of this Ordinance, including exemptions, any Landowner or any person engaged in a Regulated Activity, including but not limited to the alteration or development of land, which may affect stormwater runoff characteristics, shall implement such measures as are reasonably necessary to prevent injury to health, safety, or other property. Such measures also shall include actions as

are required to manage the rate, volume, direction, and quality of resulting stormwater runoff in a manner which otherwise adequately protects health, property, and water quality of Waters of the Commonwealth.

C. Phased and Incremental Project Requirements

1. Any Regulated Activity (including but not limited to New Development, Redevelopment, or Earth Disturbance) that is to take place incrementally or in phases, or occurs in sequential projects on the same parcel or property, shall be subject to regulation by this Ordinance if the Regulated Impervious Surface or Earth Disturbance exceeds the corresponding threshold for exemption (as presented in Table 106.1 "Thresholds for Regulated Activities that are Exempt from the Provisions of this Ordinance as Listed Below").

2. 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, unless such requirements have previously been adopted, then the earliest date of the applicable municipal ordinance adoption shall remain as the starting point.

   For example:

   If, after adoption of this Ordinance, an Applicant proposes construction of a one hundred and fifty (150) square foot garage, that project would be exempt from the requirements of this Ordinance as noted in Table 106.1. If, at a later date, an Applicant proposes to construct a nine hundred (900) 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 one thousand and fifty (1,050) square feet of additional Impervious Surface added to the property since adoption of this Ordinance.

Section 106. Exemptions and Modified Requirements

A. Requirements for Exempt Activities

1. An exemption from any requirement of this Ordinance shall not relieve the Applicant from implementing all other applicable requirements of this Ordinance or from implementing such measures as are necessary to protect public health, safety, and welfare, property, and water quality.

2. An exemption shall not relieve the Applicant from complying with the requirements for State-designated special protection waters designated by PADEP as high quality (HQ) or exceptional value (EV) waters, or any other current or future State or municipal water quality protection requirements.

3. 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 one hundred and fifty (150) square feet of Regulated Impervious Surfaces AND less than five hundred (500) square feet of Earth Disturbance; or

2. Are listed in Subsection 106.C,

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	Activities Listed in Subsection 106.C.	< 150 sq. ft. of Regulated Impervious Surfaces AND < 500 sq. ft. of Proposed Earth Disturbance	≥ 150 sq. ft. of Regulated Impervious Surfaces OR ≥ 500 sq. ft. of Proposed Earth Disturbance
Article I	Not Exempt	Not Exempt	Not Exempt
Article II	Not Exempt	Not Exempt	Not Exempt
Sections 302, and 303, 311	Not Exempt	Not Exempt	Not Exempt
Sections 301, 304, 305, 306, 307, 308, 309, and 310	Exempt	Exempt	Not Exempt
Article IV	Exempt	Exempt	Not Exempt
Article V	Exempt	Exempt	Not Exempt
Article VI	Exempt	Exempt	Not Exempt
Article VII	Exempt	Exempt	Not Exempt
Article VIII	Not Exempt	Not Exempt	Not Exempt
Article IX	Not Exempt	Not Exempt	Not Exempt
Other Erosion, Sediment and Pollution Control Requirements	Must comply with Title 25, Chapter 102 of the PA Code and other applicable State and 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 Regulated Impervious Surfaces and proposed Earth Disturbance thresholds to be eligible for exemption from the requirements listed in this table.
- "Regulated Impervious Surface" - as defined in this Ordinance.
- "Exempt" – Regulated Activities are exempt from the requirements of listed section(s) only; all other provisions of this Ordinance apply. These exemptions have no bearing on other municipal regulations or ordinances.

C. Exemptions for Specific Activities

The following specific Regulated Activities are exempt from the requirements of Sections 301, 304, 305, 306, 307, 308, 309, and 310, and Article IV, Article V, Article VI, and Article VII) of this Ordinance (as shown in Table 106.1), unless otherwise noted below. 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 Stormwater Management Facility; upgrades, additions or other improvements are not exempt. A written description of the scope and extent of any emergency work performed shall be submitted to the 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 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), when performed in accordance with the requirements of 25 PA Code Chapter 102.

    b. Conservation Practices (as defined in Article II) that do not involve construction of any new or expanded Impervious Surfaces.

    c. High Tunnel if:
        i. The High Tunnel or its flooring does not result in an impervious surface exceeding 25% of all structures located on the Landowner's total contiguous land area; and
        ii. The High Tunnel meets one of the following:
            1. The High Tunnel is located at least 100 feet from any perennial stream or watercourse, public road, or neighboring property line.

2. The High Tunnel is located at least 35 feet from any perennial stream or watercourse, public road or neighboring property line and located on land with a slope not greater than 7%.
3. The High Tunnel is supported with a buffer or diversion system that does not directly drain into a stream or other watercourse by managing stormwater runoff in a manner consistent with the requirements of Pennsylvania Act 167.

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 Section 303 of this Ordinance, as well as municipal ordinance requiring the same.

7. Maintenance of Existing Gravel and Paved Surfaces - Replacement of existing gravel and paved surfaces shall meet the erosion and sediment control requirements of 25 PA Code Chapter 102 and Section 303 of this Ordinance and is exempt from all other requirements of this Ordinance listed in Subsection 106.C above. Resurfacing of existing gravel and paved surfaces is exempt from the requirements of this Ordinance listed above. Paving of existing gravel surfaces is exempt from the requirements of this 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.

10. In-Place Replacement, Repair, or Maintenance of Residential Impervious Surfaces - The replacement of existing residential patios, decks, driveways, pools, garages, and/or sidewalks that are accessory to an existing one- or two-family dwelling unit in the exact footprint of the existing Impervious Surface.

D. Modified Requirements for Small Projects

Regulated Activities that involve 150 square feet of Regulated Impervious Surfaces and 500 square feet of proposed Earth Disturbance may apply the modified requirements presented in the "Simplified Approach to Stormwater Management for Small Projects" (Simplified Approach) (Appendix A) to comply with the requirements of Sections 301, 304, 305, 306, 307, 308, 309, and 310, and Article IV, Article V, Article VI and Article VII of this Ordinance (as shown in Table 106.2). The Applicant shall first contact the Municipal Engineer: to confirm that the proposed project is eligible for use of the Simplified Approach and is not otherwise exempt from these Ordinance provisions; to determine what components of the proposed project are to be considered as Impervious Surfaces; and to determine if other known Site or local conditions exist that may preclude the use of any techniques included in the Simplified Approach. Appendix A includes instructions and procedures for preparation, submittal, review, and approval of documents required when using the Simplified Approach and shall be adhered to by the Applicant. Infiltration testing for projects using the Simplified Approach is recommended but is not required by this Ordinance. All other provisions of this Ordinance shall apply."

TABLE 106.2
Thresholds for Regulated Activities that are Eligible for "Modified" Requirements for the Provisions of this Ordinance that are Listed Below

Ordinance Article/Section	Activities Listed in Subsection 106.D and 106.E
Article I	All Provisions Apply
Article II	All Provisions Apply
Sections 302, and 303, 311	All Provisions Apply
Sections 301, 304, 305, 306, 307, 308, 309, and 310	Exempt if Modified Requirements of Subsection(s) 106.D and 106.E are Applied
Article IV	Exempt if Modified Requirements of Subsection(s) 106.D and 106.E are Applied
Article V	Exempt if Modified Requirements of Subsection(s) 106.D and 106.E are Applied
Article VI	Exempt if Modified Requirements of Subsection(s) 106.D and 106.E are Applied
Article VII	Exempt if Modified Requirements of Subsection(s) 106.D and 106.E are Applied
Article VIII	All Provisions Apply
Article IX	All 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 the modified requirements of Subsection(s) 106.D and 106.E are met to the satisfaction of the Municipality; all other provisions of this Ordinance apply.

106.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 the requirements of Sections 301, 304, 305, 306, 307, 308, 309, and 310, and Article IV, Article V, Article VI and Article VII of this Ordinance (and listed in Table 106.2) only when it has been demonstrated to the satisfaction of the Municipality that the proposed project will comply with all of the requirements listed below. The property owner/applicant must submit a Drainage and Grading Permit Application with all necessary supporting plans for review to determine eligibility for an exemption. All other provisions of this Ordinance shall apply. To be eligible for exemption from the Ordinance provisions stated above, the proposed Regulated Activity shall:

1. Be directly associated with an Agricultural Activity (as defined in Article II);
2. Include less than fifteen thousand (15,000) square feet of proposed new or expanded Impervious Surface and adjoining vehicle parking and movement area.
3. Be installed on a farm or mushroom operation that has a current Mushroom Farm Environmental 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.
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; and

8. Not be eligible for exemption if an NPDES permit is required."

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. Nothing in this Ordinance shall be construed to affect any of the Municipality's requirements regarding stormwater matters that do not conflict with the provisions of this Ordinance, such as local stormwater management design criteria (e.g., inlet spacing, inlet type, collection system design and details, outlet structure design, etc.). The requirements of this Ordinance shall supersede any conflicting requirements in other municipal ordinances or regulations.

Section 110. Financial Security

For all activities requiring submittal of a Stormwater Management (SWM) Site 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 and this Ordinance, and such financial security shall:

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

   AND

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

Section 111. Waivers

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

B. 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 modification will not be contrary to the public interest and that the purpose and intent of the Ordinance is observed. Cost or financial burden shall not be considered a hardship. Modification may also be considered if an alternative standard or approach can be demonstrated to provide equal or better achievement of the results intended by the Ordinance. A request for modification shall be in writing and accompany the SWM Site Plan submission. The request shall state in full the grounds and facts on which the request is based, the provision or provisions of the Ordinance involved and the minimum modification necessary.

C. PADEP Approval Required
   No waiver or modification of any regulated stormwater activity involving Earth Disturbance greater than or equal to one (1) acre may be granted by the Municipality

unless that action is approved in advance by PADEP or the Chester County Conservation District.

Section 112. Erroneous Permit

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

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 502 of this Ordinance as "final As-Built Plans".

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

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

BMP (Best Management Practice) – Activities, facilities, designs, measures, or procedures used to manage stormwater impacts from Regulated Activities, to provide water quality treatment, infiltration, volume reduction, and/or peak rate control, to promote groundwater recharge, and to otherwise meet the purposes of this Ordinance. Stormwater BMPs are commonly grouped into one (1) of two (2) broad categories or measures: "structural" or "nonstructural." In this Ordinance, nonstructural BMPs or measures include certain low impact development and conservation design practices used to minimize the contact of pollutants with stormwater runoff. These practices aim to limit the total volume of stormwater runoff and manage stormwater at its source by techniques such as protecting natural systems and incorporating existing landscape features. Nonstructural BMPs include, but are not limited to, the protection of sensitive and special value features such as wetlands and riparian areas, the preservation of open space while clustering and concentrating development, the reduction of impervious cover, and the disconnection of rooftops from storm sewers. Structural BMPs are those that consist of a system that is designed and engineered to capture and treat stormwater runoff. Structural BMPs include, but are not limited to, a wide variety of practices and devices from large-scale retention ponds and constructed wetlands to small-scale underground treatment systems, infiltration facilities, filter strips, bioretention, wet ponds, permeable paving, grassed swales, riparian buffer, sand filters, detention basins, and manufactured devices. Structural and nonstructural stormwater BMPs are permanent appurtenances to the Site. [See also Stormwater Management Facility and Stormwater Control Measure (SCM)].

Buffer – See Riparian Buffer.

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

CFS – Cubic Feet per Second.

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

CN – Curve number.

Commonwealth – Commonwealth of Pennsylvania.

Conservation District – The Chester County Conservation District.

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

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

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

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

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

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

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

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

Developer – A person, company, or organization who seeks to undertake any Regulated Activities at a Site in the 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 (one and thirty-seven one-hundredths of a meter (1.37 m)) above the forest floor on the uphill side of the tree.

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

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

Earth Disturbance (or Earth Disturbance Activity) – A construction or other human activity which disturbs the surface of the land, including, but not limited to, clearing and grubbing; grading; excavations; embankments; road maintenance; land development; building construction; and the moving, depositing, stockpiling, or storing of soil, rock, or earth materials.

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

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

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

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

FEMA – Federal Emergency Management Agency.

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

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

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

Forest Management/Timber Operations – Planning and activities necessary for the management of forest 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 Council of the Borough of Avondale**.**

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

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

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

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

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

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

High Tunnel - A structure which meets the following:

A. is used for the production, processing, keeping, storing, sale or shelter of an agricultural commodity as defined in section 2 of the Act of December 19, 1974 (P.L. 973, No. 319), known as the "Pennsylvania Farmland and Forest Land

Assessment Act of 1974," or for the storage of agricultural equipment or supplies; and

B. is constructed with all the following:
   1. has a metal, wood, or plastic frame.
   2. when covered, has a plastic, woven textile, or other flexible covering; and
   3. has a floor made of soil, crushed stone, matting, pavers, or a floating concrete slab.

Hotspots – Areas where prior or existing land use or activities can potentially generate highly contaminated runoff with concentrations of pollutants more than 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, decks if solid (slatted board decks with pervious surface below are not impervious), pools (not the pool water surface, but surrounding deck if solid), 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. Uncompacted gravel areas with no vehicular traffic, such as gardens, walkways, or patios areas, shall be considered pervious per review by the Municipal Engineer. Surfaces that were designed to allow infiltration (i.e., pavers and areas of porous pavement) are not to be considered impervious surface if designed to function as a BMP per review by the Municipal Engineer. Additionally, for the purposes of determining compliance with this Ordinance, the total horizontal projection area of all ground-mounted and free-standing solar collectors, including solar photovoltaic cells, panels, and arrays, shall be considered pervious so long as the designs note that natural vegetative cover will be preserved and/or restored underneath the solar photovoltaic cells, panels, and arrays, and the area disturbed is planned as a vegetated pervious surface.

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 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 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.

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

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

MFEMP – Mushroom Farm Environmental Management Plan.

MS4 - Municipal Separate Storm Sewer System.

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

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 – Borough of Avondale, Chester County, Pennsylvania.

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.

NOAA - National Oceanic and Atmospheric Administration.

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

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

Planning Commission – The Planning Commission of the Borough of Avondale

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 – Ground 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, or other subsurface applications.

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

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

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

Regulated Impervious Surface - Proposed impervious surface as part of a current proposed activity and all existing impervious surfaces installed after January 28, 2014, as part of previous activity.

Retention or **To Retain** – The prevention of direct discharge of stormwater runoff into surface waters or water bodies during or after a storm event by permanent containment in a pond or depression; examples include systems which discharge by infiltration to groundwater, exfiltration, 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 typically 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, or through subsurface pipes and or culverts including direct connection of roof drains to a stormwater system.

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 – (see Return Period).

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

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

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

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

SWM Site Plans shall incorporate the approved SWM Site Plan and all subsequent approved revisions thereto.

Stream – A natural watercourse.

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

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

Subdivision and Land Development Ordinance – Subdivision and Land Development ordinance of the Borough of Avondale, 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.

USDA – United States Department of Agriculture.

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

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

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

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

Wetland – Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do

support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, fens, and similar areas.

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

ARTICLE III – STORMWATER MANAGEMENT STANDARDS

Section 301. General Requirements

A. For all properties within the Township, the developer is required to control stormwater runoff both during and after construction in accordance with the provisions of this Section.

B. 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.

C. 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.

D. 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.**

E. Neither submission of a 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.

F. 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 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.

G. 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.

H. Existing drainage peak rate discharges up to and including the one hundred (100)-year storm and the volume of runoff up to and including the two (2)-year storm onto or through adjacent property(ies) or downgradient property(ies), including diffuse drainage discharge, shall not be altered in any manner by Regulated Activities under this Ordinance 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). Altered stormwater discharges shall be subject to any applicable discharge criteria specified in this Ordinance.

1. For Regulated Activities with less than five thousand (5,000) square feet of proposed Earth Disturbance AND less than one thousand (1,000) square feet of Regulated Impervious Surfaces, the Applicant shall provide written notification to the affected Landowner(s) describing the proposed Regulated Activity and proposed discharge(s), unless otherwise required by the Municipality.

I. Areas located outside of the Site (i.e., areas outside of the Regulated Activity) that drain through a proposed Site are not subject to water quality and volume control, infiltration, stream channel protection, or peak flow rate control requirements (as presented in Sections 305, 306, 307, and 308). Drainage facilities located on the Site shall be designed to safely convey flows from outside of the Site through the Site.

J. 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.

K. 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.

L. 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.

M. 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).

N. 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.

O. 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. Marinas (service and maintenance areas).
8. Outdoor liquid container storage.
9. Outdoor loading/unloading facilities.
10. Public works storage areas.
11. Facilities that generate or store hazardous materials.
12. Commercial container nursery.
13. Contaminated sites/brownfields.
14. Other land uses and activities as designated by the Municipality.

P. 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.

Q. 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.).

R. 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.

S. For areas underlain by karst or carbonate geology that may be susceptible to the formation of sinkholes and other karst features, the location, type, and design of infiltration BMPs shall be based on a Site evaluation conducted by a qualified Licensed Professional and based on the PA BMP Manual (as amended) or other design guidance acceptable to the Municipal Engineer.

T. All Regulated Activities located within a Special Flood Hazard Area designated by the Federal Emergency Management Agency (FEMA) shall comply with the Borough of Avondale Ordinance No. 199 – Flood Hazard District and shall be designed to maintain the flood carrying capacity of the floodway such that the base flood elevations are not increased, either upstream or downstream. The natural conveyance characteristics of the Site and the receiving floodplain shall be incorporated into the stormwater management practices proposed for the Site.

U. Disturbance of existing ground cover during construction of the proposed Regulated Activity is prohibited within fifty (50) feet of top-of-bank of all perennial and intermittent waterways, water bodies (lakes, ponds, etc.) and wetlands, except for activities otherwise approved by State or local agencies (e.g., stream restoration projects, road crossings, subsurface utility projects, etc.). At the Municipal Engineer's

discretion, and with Conservation District and PADEP approval where necessary, the non-disturbance buffer may be reduced because of setback or other Site constraints, but never be less than ten (10) feet.

V. The concentration or ponding of runoff onto adjacent property shall be strictly prohibited.

W. The issuance of any permit or approval by any Municipal Official does not relieve the Developer of the responsibility to independently determine and ensure that the Improvements and/or Work are properly designed and constructed, comply with all Applicable Regulations and will be fit and safe for their intended purposes.

Section 302. Permit Requirements by Other Governmental Entities

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

A. All Regulated Activities subject to permit or regulatory requirements by PADEP under regulations at Title 25 Pennsylvania Code Chapter 102, or erosion and sediment control requirements of the Municipality.

B. Work within natural drainage ways subject to permit by PADEP under Title 25 Pennsylvania Code Chapter 105.

C. Any BMP or Conveyance that would be located in or adjacent to surface Waters of the Commonwealth, including wetlands, subject to permit by PADEP under Title 25 Pennsylvania Code Chapter 105.

D. Any BMP or Conveyance that would be located on or discharge to a State highway right-of-way or require access to or from a State highway and be subject to approval by PennDOT.

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

Section 303. Erosion and Sediment Control

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 for projects where the area of disturbance exceeds one (1) acre, where pond dredging is involved, or when the disturbance is associated with activities described under Title 25 Chapter 105 of the Pennsylvania Code permits.

b. A PADEP NPDES Permit for Stormwater Discharges Associated with Construction Activities as required under Title 25 Pennsylvania Code Chapter 92.a, if applicable.

c. Evidence of any other permit(s) or approvals required for the Regulated Activities; and

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 306.L.

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. For Regulated Activities with five thousand (5,000) or more square feet of proposed Earth Disturbance OR one thousand (1,000) or more square feet of Regulated Impervious Surfaces, the Applicant shall demonstrate in its SWM Site Plan (as required in Subsection 402.C) that the design sequence, objectives, and techniques described below were applied to the maximum extent practicable in the Site design of the Regulated Activity while complying with all other requirements of this Ordinance. The Site design shall:

A. First, identify and delineate all existing natural resources and natural and man-made hydrologic features listed in Subsection 402.B.8 that are located within the Site, or receive discharge from, or may be impacted by the proposed Regulated Activity.

B. Second, provide a prioritized listing of these resources and features to identify:

1. Those to be incorporated into the Site design in a manner that provides protection from any disturbance or impact from the proposed Regulated Activity.

2. Those to be protected from further disturbance or impact but for which the proposed Regulated Activity will provide improvement to existing conditions.

3. Those that can be incorporated into and utilized as components of the overall Site design in a manner that protects or improves their existing conditions while utilizing their hydrologic function within the limits of their available capacity (e.g., for infiltration, 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 Subsection 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.

7. Apply selective grading design methods to provide final grading patterns or preserve existing topography 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 with peak discharge of 4-cfs or less 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 "Conservation Design" and "Low Impact Development".

D. The procedures set forth above shall be utilized to the maximum extent practicable for the overall Site design and selection, location, and design of features and BMPs to be used to comply with the requirements of Sections 305, 306, 307 and 308.

Section 305. Water Quality and Runoff Volume Requirements

No evapotranspiration and no above ground basins shall be used for meeting volume control because they don't work during winter. Underground basins only for volume control and no amended soils for volume control. Amended soils shall only be used to supplement water quality requirements.

To control post-construction stormwater impacts from Regulated Activities and meet State water quality requirements, BMPs shall be provided in the Site design that replicate Predevelopment stormwater infiltration and runoff conditions, such that post-construction stormwater discharges do not degrade the physical, chemical, or biological characteristics of the receiving waters. The green infrastructure and Low Impact Development (LID) practices provided in the PA BMP Manual, as well as the guidance on green infrastructure,

LID and Conservation Design (CD) provided in Appendix B, shall be utilized for all regulated activities wherever possible, provide they comply with the additional requirements contained herein. The Applicant shall comply with the following water quality and runoff volume requirements for all Regulated Activities, including all New Development and Redevelopment activities:

A. The Post-construction total runoff volume shall not exceed the Predevelopment total runoff volume for all storms equal to or less than the two (2)-year, twenty-four (24)-hour duration precipitation (design storm). The water quality and runoff volume to be managed shall consist of any runoff volume generated by the proposed Regulated Activity over and above the Predevelopment total runoff volume and shall be captured and permanently retained or infiltrated on the Site. Permanent retention options other than above ground, except for farm ponds, may include, reuse, and infiltration.

B. For modeling purposes, the Predevelopment ground cover conditions shall be determined using the corresponding ground cover assumptions presented in Subsection 309.D of this Ordinance.

C. The design of the Stormwater Management Facility outlet shall provide for protection from clogging and unwanted sedimentation.

D. BMPs that moderate the temperature of stormwater shall be used to protect the temperature of receiving waters.

E. Water quality improvement shall be achieved in conjunction with achieving the infiltration requirements of Section 306. The infiltration volume required under Section 306 may be included as a component of the water quality volume. If the calculated water quality and runoff volume is greater than the volume infiltrated, then the difference between the two (2) volumes shall be managed for water quality and runoff volume control through other techniques or practices but shall not be discharged from the Site.

F. Runoff from the Disturbed Area shall be treated for water quality prior to entering existing waterways or water bodies. If a stormwater management practice does not provide water quality treatment, then water quality BMPs shall be utilized to provide pre-treatment prior to the runoff entering the stormwater management practice.

G. The Municipality may require additional water quality and runoff control measures for stormwater discharging to special management areas such as those listed in Subsection 301.P.

H. When the Regulated Activity contains or is divided by multiple drainage areas, the water quality and runoff volume shall be separately addressed for each drainage area.

I. Weighted averaging of runoff coefficients shall not be used for manual computations or input data for water quality and runoff volume calculations.

J. Areas located outside of the Site (i.e., areas outside of the Regulated Activity) may be excluded from the calculation of the water quality and runoff volume requirements.

K. Water quality and volume control practices shall be selected and designed to meet the criteria of Subsection 304.C that apply to water quality and volume control.

Section 306. Infiltration Requirements

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

A. For Regulated Activities involving both New Development and Redevelopment, infiltration should be designed to accommodate the entire water quality and runoff volume required in Section 305. Infiltration BMPs should be consistent with the design and infiltration period guidelines included in the PA BMP Manual or other PA DEP design guidance. If the runoff volume required by Section 305 cannot be infiltrated, then alternative methods consistent with the PA BMP Manual (as amended) or other PA DEP guidance, such as the Managed Release Concept, may be used to manage this volume only with prior approval from the Municipal Engineer, when it is demonstrated that no other practical alternative exist.

B. For Regulated Activities involving both New Development and Redevelopment, the volume of a minimum of one (1)-inch of runoff from all Regulated Impervious Surfaces shall be infiltrated.

C. If the requirements of Subsection 306.A or Subsection 306.B cannot be physically accomplished, then the Applicant shall be responsible for demonstrating with data or calculations to the satisfaction of the Municipal Engineer why this infiltration volume cannot be physically accomplished on the Site (e.g., shallow depth to bedrock or limiting zone, open voids, steep slopes, etc.) and what alternative volume can be infiltrated.

D. Only if a minimum infiltration of the first one-half (0.5) inch of runoff volume cannot be physically accomplished on the Site, shall a waiver from Section 306 be considered by the Municipality, in accordance with Section 111.

E. 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.

F. When a project contains or is divided by multiple watersheds, the infiltration volume shall be separately addressed for each watershed.

G. 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.

H. 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.

I. Infiltration BMPs shall be selected based on suitability of soils and Site conditions and shall be constructed on soils that have the following characteristics:

1. A minimum depth of twenty-four (24) inches between the bottom of the BMP and the top of the Limiting Zone. Additional depth may be required in areas underlain by karst or carbonate geology (see Subsection 306.M).

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.

J. All infiltration practices shall:

1. Be selected and designed to meet the criteria of Subsection 304.C that are applicable to infiltration.

2. Be set back at least fifteen (15) feet from all buildings and features with sub-grade elements (e.g., basements, foundation walls, property lines, and right-of-way boundaries), unless otherwise approved by the Municipal Engineer;

3. For any infiltration practice that collects runoff from shared or multiple features and that is located within twenty-five (25) feet of a building or feature with sub-grade elements (e.g., basements, foundation walls, etc.), the bottom elevation shall be set below the elevation of the sub-grade element.

K. Infiltration Facilities shall, to the maximum extent practicable, be located to avoid introducing contaminants to groundwater:

1. When a Hotspot is 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.

L. 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. Once excavated to final grade additional infiltration testing shall be performed to demonstrate compliance of design prior to completion of the infiltration facility.

M. Consideration of infiltration BMPs for areas underlain by karst or carbonate geology is encouraged, but only where the design, supporting calculations, results of soils or other Site investigations or other documentation are provided to the Municipality demonstrating that the potential or likelihood of subsidence or sinkholes is minimal.

Evaluation of Site conditions and infiltration design shall rely on guidance in the PA BMP Manual (as amended) or other guidance acceptable to the Municipal Engineer.

N. Groundwater quality of the carbonate aquifer shall be protected from infiltration of pollutants. At a minimum, stormwater runoff from Hotspots (i.e., sources of significant pollutant runoff) shall first be discharged through a water quality BMP(s) to remove pollutants prior to infiltration. Where soil characteristics are insufficient to provide removal of pollutants from sources other than Hotspots, stormwater runoff shall first be discharged through a water quality BMP(s) to remove pollutants prior to infiltration.

O. Where sediment transport in the stormwater runoff is anticipated to reach the infiltration system, appropriate permanent measures to prevent or collect sediment shall be installed prior to discharge to the infiltration system.

P. 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.

Q. All infiltration practices shall have appropriate positive overflow controls.

R. No sand, salt or other particulate matter may be applied to a porous surface material for winter ice conditions.

S. The following procedures and materials shall be required during the construction of all subsurface facilities:

1. Excavation for the Infiltration Facility shall be performed with equipment that will not compact the bottom of the seepage bed/trench or like facility.

2. The bottom of the bed and/or trench shall be scarified prior to the placement of aggregate.

3. Only clean aggregate with documented porosity, free of fines, shall be allowed.

4. The tops, bottoms and sides of all seepage beds, trenches, or like facilities shall be covered with drainage fabric. Fabric shall be non-woven fabric acceptable to the Municipal Engineer.

5. Stormwater shall be distributed throughout the entire seepage bed/trench or like facility and provisions for the collection of debris shall be provided in all facilities.

Section 307. Stream Channel Protection Requirements

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

A. The peak flow rate of the Post-construction two (2)-year, twenty-four (24)-hour design storm shall be reduced to the Predevelopment peak flow rate of the one (1)-year, twenty-four (24)-hour duration precipitation, using the SCS Type II distribution.

B. To the maximum extent practicable, and unless otherwise approved by the 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 309.D of this Ordinance.

D. The minimum orifice size in the outlet structure to the BMP shall be three (3) inches in diameter unless otherwise approved by the 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 Management Facilities shall make use of measures to extend the flow path and increase the travel time of flows in the facility.

G. When a Regulated Activity contains or is divided by multiple drainage areas, the peak flow rate control shall be separately addressed for each drainage area.

Section 308. Stormwater Peak Rate Control Requirements

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

A. Post-construction peak flow rates from any Regulated Activity shall not exceed the Predevelopment peak flow rates as shown for each of the design storms specified in Table 308.1.

TABLE 308.1
Peak Rate Control Standards

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

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

B. For modeling purposes, the Predevelopment ground cover conditions shall be determined using the corresponding ground cover assumptions presented in Subsection 309.D of this Ordinance.

C. For Regulated Activities involving only Redevelopment, no peak flow rate controls are required when and **only if** the total Regulated Impervious Surface area is at least twenty percent (20%) less than the total existing Impervious Surface area to be disturbed by the Regulated Activity. In all cases where this requirement is not met, the Redevelopment Regulated Activity shall achieve the peak flow rate controls presented in Table 308.1, using the Redevelopment Ground Cover Assumptions presented in Subsection 309.D. This design criterion for Redevelopment is only permitted with approval of Municipal Engineer. It shall result in no impact on downstream properties.

D. Only the area of the proposed Regulated Activity shall be subject to the peak flow rate control standards of this Ordinance. Undisturbed areas for which the discharge point has not changed are not subject to the peak flow rate control standards.

E. Areas located outside of the Site (i.e., areas outside of the Regulated Activity) that drain through a proposed Site are not subject to peak flow rate control requirements. Drainage facilities located on the Site shall be designed to safely convey flows from outside of the Site through the Site.

F. When a Regulated Activity contains or is divided by multiple drainage areas, the peak flow rate controls shall be separately addressed for each drainage area.

G. The effect of structural and non-structural stormwater management practices implemented as part of the overall Site design may be taken into consideration when calculating total storage volume and peak flow rates.

Section 309. Calculation Methodology

A. Stormwater runoff from all Regulated Activity Sites with a drainage area of greater than five (5) acres shall be calculated using a generally accepted calculation technique(s) that is based on the NRCS Soil Cover Complex Method. Table 309.1 summarizes acceptable computation methods. The method selected for use shall be based on the individual limitations and suitability of each method for a particular Site. The use of the Rational Method to estimate peak discharges for drainage areas greater than five (5) acres shall be permitted only upon approval by the Municipal Engineer.

TABLE 309.1

ACCEPTABLE COMPUTATION METHODOLOGIES FOR SWM SITE PLAN

METHOD	DEVELOPED BY	APPLICABILITY
TR-20 (or commercial computer package based on TR-20)	USDA NRCS	Applicable where use of full hydrology computer model is desirable or necessary.
TR-55 (or commercial computer package based on TR-55)	USDA NRCS	Applicable for land development plans where limitations described in TR-55 are met.
HEC-1/ HEC-HMS	US Army Corps of Engineers	Applicable where use of a full hydrologic computer model is desirable or necessary.
Rational Method (Or commercial computer package based on Rational Method)	Emil Kuichling (1889)	For Sites up to five (5) acres, 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 the latest version of the Precipitation-Frequency Atlas of the United States, National Oceanic and Atmospheric Administration (NOAA), National Weather Service, Hydrometeorological Design

Studies Center, Silver Spring, Maryland (NOAA Atlas 14) values consistent with a partial duration series. When stormwater calculations are performed for routing procedures or infiltration, water quality and runoff volume functions, the duration of rainfall shall be twenty-four (24) hours.

1. The Soil Cover Complex Method shall be modified with a safety factor in order that the C coefficient may account for antecedent precipitation conditions. Antecedent Precipitation Factors are listed below. The rational formula now includes a new variable Q = C C_a I A

Antecedent Precipitation Factors for the Rational Formula	
Recurrence Interval (Years)	C_a
2 to 10	1.0
25	1.1
50	1.2
100	1.25

c. NOTE: the product of C x C_a should not exceed 1.

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.

1. The rational method shall be modified with a safety factor in order that the C coefficient may account for antecedent precipitation conditions. Antecedent Precipitation Factors are listed below. The rational formula now includes a new variable Q = C C_a I A

Antecedent Precipitation Factors for the Rational Formula	
Recurrence Interval (Years)	C_a
2 to 10	1.0
25	1.1
50	1.2
100	1.25

NOTE: the product of C x C_a should not exceed 1.

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), Predevelopment calculations shall assume ground cover of "meadow".

2. For Regulated Activities involving Redevelopment, the following ground cover assumptions shall be used:

   a. For areas that are Woods (as defined in Article II of this Ordinance), Predevelopment calculations shall assume ground cover of "Woods in good condition".

   b. For areas that are not Woods or not Impervious Surfaces, Predevelopment calculations shall assume ground cover of "meadow".

   c. For areas that are Impervious Surfaces, Predevelopment calculations shall assume at least twenty percent (20%) of the existing Impervious Surface area to be disturbed as "meadow" ground cover.

3. The Applicant shall determine which stormwater standards apply to the proposed Regulated Activity as follows:

   a. Stormwater standards for New Development shall apply to all proposed Regulated Activities that involve only New Development activities as defined in this Ordinance.

   b. Stormwater standards for Redevelopment shall apply to all proposed Regulated Activities that involve only Redevelopment activities as defined in this Ordinance.

   c. At the discretion of the Municipal Engineer, Regulated Activities that involve a combination of both New Development and Redevelopment activities, as defined in this Ordinance, may either:

      i. Apply the stormwater standards (Redevelopment or New Development) that are associated with the activity that involves the greatest amount of land

area; or

ii. Apply the Redevelopment and New Development stormwater standards to the corresponding Redevelopment and New Development portions of the proposed Regulated Activity.

E. Runoff curve numbers (CN) for both Predevelopment and proposed (Post-construction) conditions to be used in the Soil Cover Complex Method shall be obtained from Table C-1 in Appendix C of this Ordinance.

F. Runoff coefficients (C) for both Predevelopment and proposed (Post-construction) conditions for use in the Rational Method shall be obtained from Table C-2 in Appendix C of this Ordinance.

G. Weighted averaging of runoff coefficients shall not be used for manual computations or input data for water quality and runoff volume calculations.

H. Hydraulic computations to determine the capacity of pipes, culverts, and storm sewers shall be consistent with methods and computations contained in the Federal Highway Administration Hydraulic Design Series Number 5 (Publication No. FHWA-NHI-01-020 HDS No. 5, as amended). Hydraulic computations to determine the capacity of open channels shall be consistent with methods and computations contained in the Federal Highway Administration Hydraulic Engineering Circular Number 15 (Publication No. FHWA-NHI-05-114 HEC 15, as amended). Values for Manning's roughness coefficient (n) shall be consistent with Table 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).

2. A type II distribution storm (for the Soil Cover Complex Method only for example, TR-55, TR-20).

Section 310. Other Requirements

A. Any BMP intended to hold standing water for four (4) days or longer shall be designed to incorporate biologic controls consistent with the West Nile Guidance found in Appendix D, PADEP document 363-0300-001 "Design Criteria – Wetlands Replacement/Monitoring" (as amended), (or contact the Pennsylvania State Cooperative Wetland Center or the Penn State Cooperative Extension Office for design information.)

B. Any stormwater basin required or regulated by this Ordinance designed to store runoff and requiring a berm or earthen embankment shall be designed to provide an emergency spillway to safely convey flow up to and including the one hundred (100)-year proposed conditions. The height of embankment shall provide a minimum one (1.0) foot of Freeboard above the maximum pool elevation computed when the facility functions for the one hundred (100)-year proposed conditions inflow. Should any BMP require a dam safety permit under PA Chapter 105 regulations, the facility shall be designed in accordance with and meet the regulations of PA Chapter 105 concerning dam safety. PA Chapter 105 may require the safe conveyance of storms larger than one hundred (100)-year event.

C. Any drainage Conveyance facility and/or channel not governed by PA Chapter 105 regulations shall be designed to convey, without damage to the drainage facility or roadway, runoff from the twenty-five (25)-year storm event. Larger storm events (fifty (50)-year and one hundred (100)-year storms) shall also be safely conveyed in the direction of natural flow without creating additional damage to any drainage facilities, nearby structures, or roadways. One hundred (100)-year storm design shall be required for all low points.

D. Conveyance facilities to or exiting from stormwater management facilities (i.e., detention basins) shall be designed to convey the design flow to or from the facility.

E. Roadway crossings or structures located within designated floodplain areas shall be able to convey runoff from a 100-year design storm consistent with Federal Emergency Management Agency National Flood Insurance Program – Floodplain Management Requirements.

F. Any Stormwater Management Facility located within a PennDOT right-of-way shall comply with PennDOT minimum design standards and permit submission and approval requirements.

G. Adequate erosion protection and energy dissipation shall be provided along all open channels and at all points of discharge. Design methods shall be consistent with the Federal Highway Administration Hydraulic Engineering Circular Number 11 (Publication No. FHWA-IP-89-016, as amended) and the PADEP Erosion and Sediment Pollution Control Program Manual (Publication No. 363-2134-008, as amended), or other design guidance acceptable to the Municipal Engineer.

Section 311. Other Conveyance and System Design Standards

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

Section 312. Riparian Buffers

A. In order to protect and improve water quality, a Riparian Buffer Easement shall be created and recorded as part of any subdivision or land development that encompasses a stream to aid in the establishment of a Riparian Buffer.

B. Except as required by Chapter 102, the Riparian Buffer Easement shall be measured to be the greater of the limit of the 100-year floodplain or a minimum of 50 feet from the top of the streambank (on each side).

C. Minimum Management Requirements for Riparian Buffers.

1. Existing native vegetation shall be protected and maintained within the Riparian Buffer Easement.

2. Whenever practicable, invasive vegetation shall be actively removed, and the Riparian Buffer Easement shall be planted with native trees, shrubs, and other vegetation to create a diverse native plant community appropriate to the intended ecological context of the site.

D. The Riparian Buffer Easement shall be enforceable by the municipality and shall be recorded in the Chester County Recorder of Deeds Office, so that it shall run with the land and shall limit the use of the property located therein. The easement shall allow for the continued private ownership and shall count toward the minimum lot area as required by Zoning, unless otherwise specified in the municipal Zoning Ordinance.

E. Any permitted use within the Riparian Buffer Easement shall be conducted in a manner that will maintain the extent of the existing 100-year floodplain, improve or maintain the stream stability, and preserve and protect the ecological function of the floodplain.

F. The following conditions shall apply when public and/or private recreation trails are permitted within Riparian Buffers:

1. Trails shall be for non-motorized use only.

2. Trails shall be designed to have the least impact on native plant species and other sensitive environmental features.

G. Septic drainfields and sewage disposal systems shall not be permitted within the Riparian Buffer Easement and shall comply with setback requirements established under 25 Pa. Code Chapter 73.

ARTICLE IV – STORMWATER MANAGEMENT (SWM) SITE PLAN REQUIREMENTS

Section 401. 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 of a SWM Site Plan from the Municipality.

D. The SWM Site Plan approved by the Municipality shall be on Site throughout the duration of the Regulated Activity.

Section 402. SWM Site Plan Contents

The SWM Site Plan shall consist of a general description of the project including items described in Section 304, calculations, maps, and plans. A note on the maps shall refer to the associated computations and Erosion and Sediment Control Plan by title and date. The cover sheet of the computations and Erosion and Sediment Control Plan shall refer to the associated maps by title and date. All SWM Site Plan materials shall be submitted to the 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.

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

A. General

1. A general description of the proposed project.

2. A listing of all regulatory approvals required for the proposed project and the status of the review and approval process for each. Final approval or adequacy letters must be submitted to the 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 associated with Construction Activities.

b. PADEP permits as needed:

   i. PADEP Joint Permit Application,

   ii. Chapter 105 (Dam Safety and Waterway Management),

   iii. Chapter 106 (Floodplain Management);

c. PennDOT Highway Occupancy Permit.

d. Erosion and Sediment Control Plan letter of adequacy; and

e. Any other permit under applicable State or Federal regulations.

3. A statement, signed by the Applicant, acknowledging that any revision to the approved SWM Site Plan shall be submitted to and approved by the 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.

4. The following signature block signed and sealed by the qualified Licensed Professional responsible for the preparation of the SWM Site Plan:

   "I (name), on this date (date of signature), hereby certify to the best of my knowledge that the SWM Site Plan meets all design standards and criteria of the Ordinance No._____, Borough of Avondale Stormwater Management Ordinance." *[Note: include signature, name, discipline of professional license, and license stamp or seal here*]

The design professional shall bear the responsibility of his or her design and must meet the intent of this ordinance. Any necessary revisions shall be the sole responsibility of the design professional.

B. Maps or Plan Sheets

Map(s) or plan sheets of the Site shall be submitted on 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 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.

2. The name of the project, tax parcel number(s), and the names, addresses and phone numbers of the owner of the property, the Applicant, and firm preparing the plan.

3. Signature, seal, and date of signature of the qualified Licensed Professional(s) responsible for preparation of the maps and plan sheets.

4. The date of SWM Site Plan submission and revision dates, as applicable.

5. A graphic and written scale of one (1) inch equals no more than fifty (50) feet.

6. A north arrow.

7. Legal property boundaries, including:

    a. The total project property boundary and size with distances marked to the nearest one hundredth of a foot and bearings to the nearest second.

    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 one hundredth of foot and bearings to the nearest second.

8. Existing natural resources and natural or man-made hydrologic features that are located within the Site or receiving discharge from, or that may otherwise be impacted by, the proposed Regulated Activity, including but not limited to:

    a. All existing natural resources, hydrologic features and drainage patterns including natural waterways, water bodies, wetlands, streams (intermittent and perennial), ponds, lakes, vernal pools, etc., natural infiltration areas and patterns, areas of significant natural evapotranspiration, and other water features and aquatic resources.

    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 301.Q).

f. For the water bodies, streams and wetlands identified in Subsection 402.B.8.a, label or otherwise show the following attributes, if applicable:

   i. The Designated Use as determined by PADEP (25 PA Code Chapter 93).

   ii. Impairments listed on the PADEP "Integrated List" (as updated) and the listed source and cause of impairment.

   iii. Name, date, and target pollutant(s) for any approved Total Maximum Daily Load (TMDL); and

   iv. Drainages to water supply reservoirs.

g. Areas that are part of the Pennsylvania Natural Diversity Inventory (PNDI) and a list of potential impacts and clearances received (for Regulated Activities involving one (1) acre or more proposed Earth Disturbance).

h. Woods vegetated riparian buffers, and other areas of natural vegetation.

i. Topography using contours (with elevations based on established benchmarks) at intervals of two (2) feet. In areas of slopes greater than fifteen (15) percent five (5)-foot contour intervals may be used. The datum used and the location, elevation and datum of any benchmarks used shall be shown.

j. Areas classified by the Municipality as steep slopes.

k. Soil names and boundaries, general type of soils with Hydrologic Soil Group noted, and 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 –

   i. Location of existing well(s) on the project property and delineation of the(ir) recharge area(s) (if known), or a fifty (50) foot diameter assumed recharge area.

   ii. Location of existing well(s) within fifty (50) feet beyond the boundary of the project property boundary (if public water supply is proposed for the Regulated Activity); and

o. Current FEMA one hundred (100)-year floodplain boundaries, elevations, and Floodway boundaries for any Special Flood Hazard Areas on or within one hundred (100) feet of the property.

p. Boundaries of riparian buffer(s) as required by West Brandywine Township Zoning Section 200-100

q. Boundaries of a fifty (50) foot construction non-disturbance buffer to protect streams (intermittent and perennial), wetlands and other water bodies during construction of the proposed Regulated Activity.

9. Location of the proposed Regulated Activity, limits of Earth Disturbance (Disturbed Area), and BMPs and Conveyances relative to the location of existing natural resources and hydrologic features and special management areas resulting from the Site design process of Section 304.

10. Description of existing and proposed ground cover and land use including the type and total area.

11. Existing and proposed man-made features including roads, paved areas, buildings, and other Impervious and Pervious Surfaces on the project property (or an appropriate portion of the property as determined in consultation with the Municipal Engineer) and within the proposed Disturbed Area, and including the type and total area of the following:

    a. Existing Impervious Surfaces must differentiate Existing Impervious Surfaces installed after January 28, 2014.

    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.

12. The total extent of the upstream area draining through the Site.

13. All BMPs, Conveyances and other stormwater management facilities shall be located on the plan sheets, including design drawings, profile drawings, construction details, materials to be used, description of function, etc.

14. Complete delineation of the flow paths used for calculating the time of concentration for the Predevelopment and Post-construction conditions shall be included.

15. The locations of all existing and proposed utilities, sanitary sewers, on-lot wastewater facilities (including subsurface tanks and leach fields), and water supply lines within the Site and within fifty (50) feet beyond the proposed limits of Earth Disturbance.

16. A grading plan, including all areas of proposed Earth Disturbance and the proposed Regulated Activity and delineating the boundary or limits of Earth Disturbance of the Site. The total Disturbed Area of the Site shall be noted in square feet and acres.

17. Proposed final grade elevations and contours at intervals of two (2) feet. In areas of steep slopes (greater than fifteen (15) percent), five (5)-foot contour intervals may be used.

18. For each proposed BMP and Conveyance included in the SWM Site Plan (including any to be located on any property other than the property being developed by the Applicant), the following shall be included on the SWM Site Plan map or plan sheets:

    a. Identification of the person responsible for ongoing inspections, operation, repair, and maintenance of the BMP or Conveyance after completion of construction.

    b. Delineation of the land area, structures, Impervious Surfaces, and Conveyances draining to and from the BMP or Conveyance.

    c. Easements, as per the requirements of Article VII, that shall include:

        i. Boundaries labeled with distances shown in one hundredth of feet and bearings to the nearest second.

        ii. 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.

        iii. 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.

        iv. Notes or other documentation as needed to grant the owner of any BMP or Conveyance the right of access for the purpose of inspection, operation, maintenance, and repair of the BMP or Conveyance that is to be owned,

operated, and maintained by a person other than the Municipality, and other than the owner of the property on which the BMP or Conveyance is located.

v. A minimum twenty (20)-foot wide perimeter (or other width as determined in consultation with the Municipal Engineer) around all BMPs and Conveyances.

vi. Sufficient vehicular ingress to and egress from a public right-of-way or roadway, as determined in consultation with the Municipal Engineer; and

vii. Accompanying notes or other documentation as needed, and in accordance with Article VII describing the type, purpose, and total area of easements, who the easement is granted to, and the rights, duties, and obligations of the parties with respect to every BMP or Conveyance.

d. Boundaries of land areas (if any) for which deed restrictions are required for the purpose of protecting and prohibiting disturbance to a BMP or Conveyance, indicating the area to which the restriction applies with distances shown to the one hundredth of a foot and bearings to the nearest second, and a written description of the type, purpose, and nature of the restriction.

e. Other items that may be needed to comply with all other requirements of Article VII.

C. A written description of the following information shall be included in the SWM Site Plan:

1. Existing features, conditions, natural resources, hydrologic features, and special management areas (as listed in Subsection 402.B.8).

2. How the Site design achieves the requirements of Section 304, and if applicable, where they could not be achieved and why.

3. The overall stormwater management design concept for the project and how the Site design achieves the requirements of Sections 301 through 311 of Article III.

4. Proposed features and conditions, proposed erosion, and sediment control features, proposed BMPs, Conveyances, and any other stormwater facilities.

5. A description of the effect of the project (in terms of flow alteration and runoff volumes, water quality and peak flows, etc.) on existing natural resources, hydrologic features and special management areas, adjacent and downgradient properties, and any existing 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;

6. Proposed nonpoint source pollution controls and justification and confirmation that the proposed project will not result in any increased pollutant loadings to any existing stream or stream impairment identified by PADEP, or to any receiving water body.

7. Expected project time schedule; and

8. Description of construction stages or project phases, if so proposed.

D. A detailed Site evaluation conducted by a qualified Licensed Professional for projects proposed in areas of carbonate geology or karst topography, and other environmentally sensitive areas, such as contaminated sites and brownfields, as described in Subsections 301.O and 301.R of this Ordinance.

E. Stormwater runoff design computations and documentation, such as hydrologic, hydraulic, and structural computations, assumptions, BMP loading ratios, etc., consistent with the guidelines and criteria presented in the PA BMP Manual (as amended) or other guidance acceptable to the 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, specifically including the requirements in Sections 301 and 304 through 309.

F. 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 VII, for each BMP and Conveyance included in the SWM Site Plan (including any to be located on any property other than the property being developed by the Applicant):

1. An O&M Plan.

2. An O&M Agreement.

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 301.G and Article VII of this Ordinance.

G. An Erosion and Sediment Control Plan, where applicable, as prepared for and submitted to the Conservation District and/or Municipality. A letter of adequacy from the Conservation District, if applicable, must be submitted to the Municipality prior to (or as a condition of) the Municipality's final approval of the SWM Site Plan.

H. A Highway Occupancy Permit from the Pennsylvania Department of Transportation (PennDOT) District Office must be submitted to the 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 403. SWM Site Plan Submission

A complete SWM Site Plan that complies with all applicable provisions of Section 402 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 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 in accordance with instructions from the Municipality.

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.

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 thirty (30) days with a notification in writing of the specific manner in which the submission is incomplete.

G. Financial security, per the requirements of Section 110, shall be submitted to the Municipality prior to approval of the SWM Site Plan.

Section 404. 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 any subdivision or land development 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 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 406 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 five (5) years 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 five (5) 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 406 of this Ordinance.

H. All or portions of the final approved SWM Site Plan shall be recorded (as "recorded 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 502 of this Ordinance.

Section 405. Revision of SWM Site Plans

A. A submitted 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 403 and subject to review as specified in Section 404 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 406. Resubmission of Inconsistent or Noncompliant SWM Site Plans

Any SWM Site Plan deemed inconsistent or noncompliant may be revised and resubmitted with the revisions addressing the Municipal Engineer's concerns documented in writing. The submission shall be addressed to the Municipality in accordance with Section 403 of this Ordinance, distributed accordingly, and be subject to review as specified in Section 404 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 V – PERFORMANCE AND INSPECTION OF REGULATED ACTIVITIES, AND FINAL AS-BUILT PLANS

Section 501. Performance and Inspection of Regulated Activities

A. All Regulated Activities shall be conducted, operated, and maintained in accordance with the requirements set forth in Articles III, VII, and VIII of this Ordinance. When a SWM Site Plan is required by this Ordinance, all Regulated Activities shall be performed in accordance with the requirements of the final approved SWM Site Plan.

B. The 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.

C. Periodic inspections may be made by the Municipal Engineer or other designee during construction. A set of design plans approved by the Municipality shall be on file and available for viewing at the Site throughout the duration of the construction activity.

D. Inspections, including but not limited to a final inspection, of all constructed BMPs, Conveyances, or other stormwater facilities, and related improvements may be conducted by the Municipal Engineer or other designee to confirm compliance with this Ordinance and with the final approved SWM Site Plan prior to the issuance of any occupancy permit, use permit, or other form of final approval of the project by the Municipality.

E. If an NPDES Permit for Stormwater Discharges Associated with Construction Activities was required for the Regulated Activity, a Notice of Termination (NOT) approval must be obtained upon completion of construction prior to final approval of the project by the Municipality.

F. Upon completion of construction, every permanent stormwater BMP, Conveyance, or other Stormwater Management Facility constructed or used as part of the Regulated Activity shall be operated, maintained, and inspected by the Landowner, or other designated person, in accordance with the O&M Plan and O&M Agreement approved by the Municipality.

G. The Municipality or its designee may periodically inspect any permanent stormwater BMP, Conveyance or Stormwater Management Facility for compliance with this Ordinance, an approved O&M Plan, or an approved O&M Agreement, per the provisions of Article IX. The 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 IX.

Section 502. 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. 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.

2. Explanation of any discrepancies or variations from the final approved SWM Site Plan, other related approved construction plans, calculations, and specifications (and approved revisions thereto).

C. The final As-Built Plans shall include a certification of completion signed and sealed by a qualified Licensed Professional verifying that all permanent BMPs and Conveyances have been constructed according to the final approved SWM Site Plan and related approved construction plans, calculations, and specifications.

D. All areas of the Regulated Activity draining to BMPs must be stabilized prior to submittal of the As-Built Plans.

E. 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 501.D.

F. 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.

G. 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.

H. 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 VII.

I. All or portions of the final As-Built Plans shall be recorded if required by the Municipality.

ARTICLE VI – FEES AND EXPENSES

Section 601. Municipality SWM Site Plan Review and Inspection Fees

Fees have been established by the Municipality as adopted by a resolution as adopted and amended from time to time, or as otherwise allowed by law to defray plan review and construction inspection costs incurred by the Municipality. All fees listed in Subsection 602.A shall be paid by the Applicant at the time of SWM Site Plan submission as a fee and/or by establishment of an escrow deposit as set forth by resolution.

A review and inspection fee schedule has been established by resolution of the municipal Governing Body based on the size of the Regulated Activity and based on the Municipality's costs for reviewing SWM Site Plans, O&M Plans and Agreements and As-Built Plans and conducting inspections pursuant to Section 501. The Municipality shall periodically update the review and inspection fee schedule to ensure that review costs are adequately reimbursed.

Section 602. 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 the SWM Site Plan 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, 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 VII – OPERATION AND MAINTENANCE (O&M) RESPONSIBILITIES AND EASEMENTS

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

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

A. Continuing operations and maintenance responsibilities of all permanent BMPs, Conveyances, or other stormwater management facilities shall be reviewed and approved by the Municipality along with the SWM Site Plan. The Municipality may require an offer of a dedication of such facilities as part of the requirements for approval of the SWM Site Plan. Such a requirement is not an indication that the 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 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 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 903.G) and any applicable O&M Plan or O&M Agreement; and

3. Right of entry and access for the person owning the BMP or Conveyance and responsible for fulfilling the O&M requirements when that person is not the 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 301.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. The materials, documents and content required by this Article VII may be prepared in conjunction with and incorporated with similar materials, documents and content required for other permit or approval applications, such as those required by PADEP for the Post Construction Stormwater Management Plan.

Section 702. 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 wastewater 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 705.B, 705.C, and 705.D of this Ordinance.

Section 703. Operation and Maintenance Agreements

A. An O&M Agreement shall be required for any BMP or man-made Conveyance to be owned by a person other than the 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 704. Easements and Deed Restrictions

A. Easements shall be established in connection with any Regulated Activity for all permanent BMPs and Conveyances that will not be dedicated to or otherwise owned by the 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 thirty (30) 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 704 A. or B., an easement agreement shall be prepared and executed between the Landowner of the parcel or parcels draining to the BMP or Conveyance and the owner of the BMP or Conveyance. This easement agreement shall:

1. Describe the ownership interests of all parties to the easement agreement, including the ownership of all affected parcels and of the BMP or Conveyance.

2. Provide for the grant of a drainage easement from the owner of the BMP or Conveyance to the Landowner of the parcel(s) draining to the BMP, which shall extend from the shared parcel boundary(ies) to the receiving BMP and shall include the connecting flow path(s) or Conveyance.

3. Include a written legal (metes and bounds) description of the easement area, with reference to a recorded plan sheet showing the legal boundaries of the easement area (or an accompanying plan sheet/map), signed, and sealed by a Licensed Professional.

4. Incorporate by reference or be recorded with the corresponding O&M Plan and O&M Agreement.

5. State that the purpose of the easement agreement is to ensure the continuous right of the discharging parcel to discharge onto the parcel containing the BMP and into the BMP or Conveyance.

6. Restrict the BMP or Conveyance owner's use of the easement area of the parcel upon which the BMP or Conveyance is located, consistent with the purpose of the easement granted.

7. Establish the duty and responsibility of the Landowner of the parcel or parcels draining to the BMP or Conveyance to maintain the existing drainages on the discharging parcel or parcels as designed and constructed to discharge to the receiving BMP.

8. Include language legally sufficient to ensure that the easement will run with the land and will bind all parties to the easement agreement, their heirs, administrators, successors in interest and assigns, into perpetuity.

9. Be submitted to the 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 thirty (30) 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 thirty (30) days of the Municipality's approval of the O&M Plan.

Section 705. Other Post-construction Responsibilities

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

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.

C. Upon 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) working days of the change**.**

Section 706. Municipal Stormwater Control and BMP Operation and Maintenance Fund and Inspection and BMP Operations and Maintenance Requirements

A. The municipality shall inspect SWM BMPs, facilities and/or structures installed under this Ordinance according to the following frequencies, at a minimum, to ensure the BMPs, facilities and /or structures continue to function as intended. Persons installing stormwater controls or BMPs 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. This is to be paid in a manner specified by the Municipality. 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 ten (10) years, at the following minimum frequencies:
    1) Annually for the first 5 years.
    2) Once every 3 years thereafter.
    3) During or immediately after the cessation of a 25-year or greater storm, as determined by the Municipal Engineer.
    4) The Municipal Engineer may request the landowner or landowner's designee to submit an inspection report after the cessation of a 10-year or greater storm event if there is reason to believe that a BMP has sustained damage that impacts its ability to function as designed

and if the BMP's failure would result in damage to downgradient properties.

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 ten (10) years. The Municipality will establish the estimated costs utilizing information submitted by the Applicant. Inspections shall be conducted at the minimum frequencies listed in above referenced section.

3. The above referenced inspections shall be conducted during or immediately following precipitation events or in dry weather conditions if the BMP design parameters include dewatering within a specified period of time. A written inspection report shall be created to document each inspection. The inspection report shall contain the date and time of the inspection, the individual(s) who completed the inspection, the location of the BMP, Stormwater Management Facility or structure inspected, observations on performance, and recommendations for improving performance, if applicable.

4. 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 Municipality may require persons installing the BMP or Conveyance to 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 ten (10) 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. Inspections

2. Long-term maintenance of BMP(s) or Conveyance(s), and

3. Stormwater-related problems which may arise from the land development and Earth Disturbance.

ARTICLE VIII – PROHIBITIONS

Section 801. Prohibited Discharges

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

B. No person shall allow, or cause to allow, discharges into the 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 801.C below; and

2. Discharges allowed under a State or Federal permit.

C. The following discharges are authorized unless they are determined by the 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 firefighting activities.

2. Potable water sources including water line and fire hydrant flushing, if such discharges do not contain detectable concentrations of Total Residual Chlorine (TRC);

3. Non-contaminated irrigation drainage water.

4. Non-contaminated HVAC condensation and water from geothermal systems.

5. Springs.

6. Water from crawl space pumps.

7. Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spill material has been removed) and where detergents are not used.

8. Diverted stream flows.

9. Flows from riparian habitats and wetlands.

10. Uncontaminated water from foundations or from footing drains.

11. Lawn watering.

12. Uncontaminated groundwater.

13. Residential (i.e., not commercial) vehicle wash water where cleaning agents are not utilized.

14. Routine external building washdown (which does not use detergents or other compounds); and

15. Non-contaminated hydrostatic test water discharges if such discharges do not contain detectable concentrations of TRC.

D. If the Municipality determines that any of the discharges identified in Section 801.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 801.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 802. Prohibited Connections

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

A. Any drain or Conveyance, whether on the surface or subsurface, that allows any non-stormwater discharge, including sewage, process wastewater, and wash water to enter a separate storm sewer system, and any connections to the separate storm sewer system from indoor drains and sinks. Any drain or Conveyance that delivers non-stormwater discharges directly into wetlands, Riparian Buffers, or other Waters of the Commonwealth is prohibited.

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

Section 803. 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 804. Alteration of BMPs

A. No person shall modify, remove, fill, landscape, alter, or impair the effectiveness of any stormwater BMPs, Conveyances, Stormwater Management Facilities, areas or structures unless the activity is part of an approved maintenance program, without the written approval of the 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 IX – ENFORCEMENT AND PENALTIES

Section 901. Public Nuisance

A. Any Regulated Activity conducted in the violation of any provision of this Ordinance is hereby deemed a public nuisance.

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

C. A separate violation will be found to exist for each section of this Ordinance found to have been violated.

D. To the extent that the 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 902. Right of Entry

A. Upon presentation of proper credentials, duly authorized officers or agents of the Municipality may 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 Management Facilities both during and after completion of a Regulated Activity, or for compliance with any requirement of this Ordinance.

B. Persons working on behalf of the Municipality shall have the right to temporarily locate on or in any BMP, Conveyance, or other Stormwater Management 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.

C. Failure of the Landowner or representative to grant access to the Municipality within twenty-four (24) hours of notification, verbal or written, is a violation of this Ordinance.

Section 903. Enforcement

A. The Municipal Engineer or other designee is hereby authorized and directed to enforce all the provisions of this Ordinance. The Municipal Governing Body 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. 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, if and as determined to be necessary by the Municipal Engineer or other designee.

E. 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.

F. Such notice may, without limitation, require the following remedies:

1. Performance of monitoring, analyses, and reporting.

2. Elimination of prohibited connections or discharges.

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

4. Abatement or remediation of stormwater pollution or contamination hazards and the restoration of any affected property.

5. Payment of a fine to cover administrative and remediation costs and/or forfeiture of financial security.

6. Implementation of stormwater controls, BMPs, and Conveyances; and

7. Operation, maintenance, or repair of BMPs, Conveyances or other stormwater facilities.

G. Such notice shall set forth the nature of the violation(s), citing the 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 906 of this Ordinance. Said notice shall further advise that, if applicable, should the violator fail to take the required action within the established deadline,

possible sanctions, clearly described, may be imposed, or the work may be done by the Municipality or designee, and the expense thereof shall be charged to the violator.

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

Section 904. Suspension and Revocation of Permits and Approvals

A. Any 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 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. Prior to revocation or suspension of a permit, unless there is immediate danger or threat of such danger to life, public health, or property, at the request of the Applicant, the Municipality's Governing Body shall schedule a hearing on the violation and proposed revocation or suspension, pursuant to public notice. The expense of a hearing shall be the Applicant's responsibility.

C. A suspended permit or approval may be reinstated by the Municipality when:

1. The Municipal Engineer or other designee has inspected and approved the corrections to the BMPs, Conveyances or other Stormwater Management Facilities, or the elimination of the hazard or nuisance; and

2. The Municipality is satisfied that the violation has been corrected.

D. 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 905. Penalties

A. Any person violating or permitting the violation of the provisions of this Ordinance shall be subject to a fine of not more than one thousand ($1,000) dollars 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 906. 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 907. Effective Date

This Ordinance shall take effect on _____.

ORDINANCE APPENDIX A

SIMPLIFIED APPROACH TO STORMWATER MANAGEMENT FOR SMALL PROJECTS

Appendix A
Simplified Approach to Stormwater Management for Small Projects

Appendix A.1 –
Applicability, Submittal and Approval Requirements

Appendix A.2 –
"*Simplified Approach to Stormwater Management for Small Projects – Handbook*" (Revised September 3, 2021)

Appendix A.1
Applicability, Submittal and Approval Requirements

Borough of Avondale
Chester County, Pennsylvania

Applicability:

- Small projects with less than 150 square feet of Regulated Impervious Surfaces (as defined in the Municipality's Stormwater Management Ordinance) and with less than 500 square feet of proposed Earth Disturbance (as defined in the Municipality's Ordinance) may apply the "Simplified Approach to Stormwater Management for Small Projects" (Simplified Approach).

- Only projects that meet the above size thresholds as specified in the Municipality's Stormwater Management Ordinance may use this Simplified Approach and are then not required to submit a fully engineered Stormwater Management Site Plan to the Municipality. However, these projects are still required to address water quality and infiltration requirements as outlined in the Simplified Approach "Handbook". This Handbook is intended to aid applicants in addressing these requirements through the installation of a properly sized underground infiltration trench.

- Any project with more than 150 square feet of Regulated Impervious Surface or more than 500 square feet of proposed Earth Disturbance can NOT apply this Simplified Approach.

- The Applicant should first review the planned project with the Municipal Engineer prior to initiating the Simplified Approach to confirm the following:

    - That the proposed project is not otherwise exempt from the stormwater management control and the engineered Stormwater Management Site Plan requirements of the Municipality's Stormwater Management Ordinance.
    - That the proposed project is eligible to use this Simplified Approach.
    - Which components of the proposed project must be included in the calculation of "impervious surfaces (areas)".
    - Whether any local conditions are known to the Municipal Engineer that would preclude the use of any of the techniques included in this Simplified Approach.

Submittal and Approval Requirements:

Use of the Simplified Approach requires:

- The applicant to submit the following to the Municipality for review and approval prior to beginning construction per the Simplified Approach Handbook:

    - Simplified Approach – Stormwater Management Application
    - Simplified Approach – Stormwater Management Checklist
    - Simplified Approach Stormwater Management Site Plan (i.e., sketch plan)
    - A completed, signed, and notarized "Simplified Operation, Maintenance and Inspection Plan and Agreement".

- The applicant is to record the “Simplified Approach – Stormwater Best Management Practices Operation, Maintenance and Inspection Plan and agreement" at the Chester County Office of the Recorder of Deeds after signature by the Municipality.
- A final inspection conducted by the Municipality after completion of construction.

Appendix A.2
Simplified Approach to Stormwater Management for Small Projects - Handbook

Simplified Approach to Stormwater Management for Small Projects

Handbook

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Updated January 12, 2022

Further revised by:
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Consulting Engineers & Surveyors, Inc.

for:
Borough of Avondale
as part of the
County-wide Act 167 Stormwater Management Plan for Chester County, PA

Revised Date: June 2022

All revisions made by:
Herbert E. MacCombie Jr., P.E.
Consulting Engineers & Surveyors, Inc.
were completed without consultation with CEG and were completed at the sole discretion of:
Herbert E. MacCombie Jr., P.E.
Consulting Engineers & Surveyors, Inc.

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1.0 Introduction

Pennsylvania's Storm Water Management Act (PA Act 167) was enacted in 1978 in response to the impacts of the accelerated stormwater runoff resulting from land development in the state. PA Act 167 requires counties to prepare and adopt watershed-based stormwater management plans. Municipalities are also required to adopt and implement ordinances to regulate development consistent with these plans. The purpose of these regulations is to protect public health, safety and general welfare, property values, and water quality and quantity by implementing drainage and Stormwater Management practices, criteria, and provisions for land development, construction, and Earth Disturbance Activities.

PA Act 167 gave Pennsylvania Municipalities the power to regulate activities affecting flooding, streambank erosion, stormwater runoff, and surface and groundwater quality and quantity. The Municipality's Stormwater Management Ordinance was prepared to comply with the provisions included in PA Act 167. This Ordinance also includes provisions allowing this Simplified Approach to Stormwater Management to be used for small projects.

This Handbook has been developed to allow homeowners or applicants for small projects to comply with stormwater management requirements of the Stormwater Management Ordinance of the Municipality, including sizing, designing, locating, and installing on-lot measures, referred to herein as "Best Management Practices" (BMPs). Only projects that meet the size thresholds specified in the Municipality's Stormwater Management Ordinance may use this Simplified Approach and are then not required to submit a formal fully engineered Stormwater Management Site plan to the Municipality. However, these projects are still required to address certain requirements, such as stormwater quality, infiltration, rate, and volume management goals as outlined in this Simplified Approach Handbook. This Handbook is intended to aid applicants in addressing these requirements through the installation of a properly sized underground infiltration trench.

The purpose of requiring effective stormwater management from small projects is to help reduce stormwater runoff in the community, to maintain groundwater recharge, to prevent degradation of surface and groundwater quality, and to otherwise protect water resources and for public safety.

2.0 Project Eligibility for the Simplified Approach

To be eligible for the Simplified Approach, projects must meet the threshold, roof area, and BMP type requirements described below. It is recommended that prior to submission of an application utilizing the Simplified Approach, a meeting should be scheduled with the Municipal Engineer to confirm eligibility and review the application process. It shall be noted that the plan approval shall not be considered at this meeting.

<u>Threshold</u>

Small projects with 0 to 150 square feet of Regulated Impervious Surface (as defined in the Municipality's Stormwater Management Ordinance) and/or with 0 to 500 square feet of proposed Earth Disturbance (as defined in the Municipality's Stormwater Management Ordinance) may apply the Simplified Approach. Regulated Impervious Surface includes Proposed Impervious Surface as part of a current proposed project and all existing Impervious Surfaces installed after December 19, 2013.

Only projects that meet the above size thresholds as specified may use this Simplified Approach and are then not required to submit a formal Stormwater Management Site Plan to the Municipality. However, these projects are still required to address water quality and infiltration requirements as outlined in this Appendix A.

Any project with more than 150 square feet of Regulated Impervious Surface or more than 500 square feet of proposed Earth Disturbance **cannot** apply this Simplified Approach.

Starting on December 19, 2013, projects and Impervious Surfaces are measured cumulatively. If an applicant completes a project this year that qualifies for the Simplified Approach, but then proposes to complete a second project next year, and the total Impervious Surface for the two projects exceeds the applicable threshold for the Simplified Approach, a fully engineered Stormwater Management Plan for the entirety of the two projects will be required.

Roof Area

For a project to be considered for utilizing the Simplified Approach, sufficient roof area must be available, either existing or proposed, so that the roof area being conveyed to the stormwater BMP (underground infiltration trench) is of equivalent or greater area than the Regulated Impervious Surface proposed, including existing Impervious Surface(s) installed after December 19, 2013. Impervious Surface is defined in Section 202 of the Borough of Avondale Stormwater Management Ordinance. Plans proposing capturing and conveyance of overland flow will not be considered. Sizing of the bed shall be in accordance with Sheet 3B of the Simplified Approach Stormwater Management Plan Packet (Section 5.0 below) and shall be based upon the actual roof area being conveyed to the bed, not the Regulated Impervious Surface.

BMP Type

The only stormwater BMP allowable under the Simplified Approach is the stormwater underground infiltration trench referenced in the Simplified Approach Stormwater Management Plan Application Packet. Refer to Section 5.0 below for the application packet and Section 6.0 for Example Simplified Approach Stormwater Management Site Plans. BMPs other than specifically referenced above shall require engineered plans prepared in accordance with the provisions of the stormwater ordinance.

3.0 Simplified Approach Design Procedure

All Regulated Impervious Surfaces, which include Proposed Impervious Surfaces and existing Impervious Surfaces constructed after December 19, 2013 (as defined by Section

202 of the Borough of Avondale Stormwater Management Ordinance.) must be included in the determination of the amount of Proposed Impervious Surfaces and the size of proposed underground infiltration trench needed to control stormwater. Proposed Impervious Surfaces on an individual residential lot may include, but are not limited to: roof area, pavement, sidewalks, driveways, patios, porches, parking areas, decks, if solid (slatted board decks with pervious surface below are not impervious), pools (not the pool water surface, but surrounding deck if solid) Refer to the definitions provided in Article II of the Ordinance and contact the Municipal Engineer to confirm what features of the proposed project must be included in the calculation of Regulated Impervious Surface area.

Sufficient roof area shall be available and diverted via downspout(s) to the proposed infiltration trench(es). The downspouts 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. Alternative designs, or alternative stormwater structures, shall be reviewed by the Municipal Engineer and shall be subject to the full Municipal Stormwater Ordinance.

Below are the steps that must be undertaken to meet the Ordinance requirements. The size and description of the proposed construction as well as important aspects related to the design of the BMP(s) must be documented in the Simplified Approach - Stormwater Management Worksheet. All individuals planning on using the Simplified Approach are encouraged to review the planned project with the Municipal Engineer prior to initiating the Simplified Approach to confirm the following, as the Municipal Engineer will be responsible for determining eligibility to use the Simplified Approach:

- That the proposed project is not otherwise exempt from the stormwater management control and fully engineered Stormwater Management Site Plan requirements of the Municipality's Stormwater Management Ordinance.
- That the proposed project size is within the range eligible to use this Simplified Approach.
- That sufficient roof area is available to manage and is equal to or greater than the Regulated Impervious Surface.
- Which components of the proposed project must be included in the calculation of "Impervious Surfaces".
- Whether any local conditions are known to the Municipal Engineer that would preclude the use of any of the techniques included in this Simplified Approach.

STEP 1 – PREPARE THE SIMPLIFIED APPROACH STORMWATER MANAGEMENT SITE PLAN THAT INCLUDES:

1. Name and address of the owner of the property.
2. Name and address of the individual preparing the plan (if different).
3. Date of plan preparation.

4. North arrow.
5. Location of all existing features within 50 feet of the property, including (if present):
    - Buildings.
    - Driveways.
    - Roads.
    - Easements.
    - Septic Systems.
    - Streams.
    - Wetlands.
    - Floodplains; and
    - Existing Stormwater Facilities.
6. Show water supply wells within 50 feet of the proposed facility or add a note that no wells are present within 50 feet of the proposed facility.
7. Location and approximate size of the roof area to be captured and diverted to the proposed BMP.
8. Location and approximate size in square feet of proposed:
    a. Structures.
    b. Driveways; and
    c. Other Impervious Surfaces.
9. Location, orientation, slope of the ground, and dimensions of the proposed underground infiltration trench(es). Length, width, and depth must be included on the plan.
10. Distance from the proposed underground infiltration trench(es) to any existing surface water features, such as: streams, lakes, ponds, wetlands, or other natural waterbodies (must be greater than 50 feet from surface water features or outside of an existing legally prescribed buffer (i.e., deed, covenants, easement, etc.), whichever is greater).
11. Distance from the proposed underground infiltration trench(es) to any existing septic system, public sewer line, or service lateral (must be greater than 50 feet unless otherwise approved by Municipal Engineer).
12. Distance from the proposed underground infiltration trench(es) to any existing wells or water service lines (must be greater than 50 feet unless otherwise approved by Municipal Engineer).
13. Distance from the proposed underground infiltration trench(es) to nearest property line (must be > 10 feet).
14. Distance from the proposed underground infiltration trench(es) to all buildings and features with subgrade elements (e.g., basements, foundation walls, etc.) must be > 10 feet.
15. Show distance from at least two existing fixed features to the proposed underground infiltration trench(es). Fixed features include, but are not limited to, corners of existing buildings, driveways, septic system cleanout pipes, and mailboxes.
16. PA ONE CALL (8-1-1 OR 1-800-242-1776) Identification Number received by calling the PA One Call system.

STEP 2 – DETERMINE PROPOSED IMPERVIOUS SURFACES:

1. Determine the total area of all Proposed Impervious Surfaces that will need to drain to one or more infiltration trench(es).
2. Determine the total area of Earth Disturbance needed to complete the project and install the infiltration trench(es).
3. Determine locations where the infiltration trench(es) need to be placed so runoff from all the Proposed Impervious Surfaces can be captured.

Example:

Garage Roof (Front)	33 feet by 25 feet	=	825 square feet
Driveway feet	10 feet by 26	=	260 square feet
---------- -	----------	---	----------
Total Proposed Impervious Surface		=	1,085 square feet
Total proposed Earth Disturbance area		=	2,500 square feet (estimated)

STEP 3 – DETERMINE SIZE OF THE UNDERGROUND INFILTRATION TRENCH:

1. Select the appropriate value of Proposed Impervious Surface in the first column of the table below.
2. Select the width of the trench(es) to be utilized to determine the required length of the trench(es).
3. When appropriate, and when approved by the Municipal Engineer prior to submission, minimum trench length can be achieved using more than one trench.

Note: Trench(es) to be constructed to dimensions indicated below. Modifications of the dimensions are not permitted if utilizing the Simplified Approach. This table is based on an overall trench depth of at least four feet, containing a minimum cover of one foot of soil cover, and three feet of stone with filter fabric, installed in accordance with the diagram included with the Simplified Approach Stormwater Management Plan Application Packet. Infiltration testing is not required when using the Simplified Approach.

Table 1.1 – Underground Infiltration Trench Sizing Table for <1,000 ft² of Regulated Impervious Surface

Regulated Impervious Surface (square feet)	4-foot-wide Trench	5-foot-wide Trench	6-foot-wide Trench	7-foot-wide Trench	8-foot-wide Trench	10-foot wide
	Length of trench (feet)	Length of trench (feet)	Length of trench (feet)	Length of trench (feet)	Length of trench (feet)	Length of trench (feet)
451-500	39.50	31.75	26.50	22.50	20.00	16.00
501-550	43.50	35.00	29.00	25.00	21.75	17.50
551-600	47.50	38.00	31.50	27.00	23.75	19.00
601-650	51.50	41.00	34.50	29.50	25.75	20.50
651-700	55.50	44.50	37.00	31.75	27.75	22.25
701-750	59.50	47.50	39.50	34.00	29.25	23.75
751-800	63.50	50.75	42.25	36.25	31.75	25.50
801-850	67.50	53.75	44.75	38.50	33.75	27.00
851-900	71.50	57.00	47.50	40.75	35.75	28.50
901-950	75.50	60.00	50.25	43.00	37.75	30.00
951-999	79.50	63.25	52.75	45.25	39.50	31.50

STEP 4 – SUBMISSION TO MUNICIPALITY:

1. Prepare the Simplified Approach Stormwater Management Site Plan, which consists of 4 sheets:
    a. **Simplified Site Plan (1 of 4)**
    b. **Infiltration Trench Detail (2 of 4)**
    c. **Infiltration Trench Notes 3B**
    d. **Infiltration Trench Operation & Maintenance Notes (4 of 4)**
2. Complete the **Simplified Approach – Stormwater Management Worksheet**.
3. Complete the **Simplified Approach – Stormwater Management Checklist** to ensure all required information is completed.
4. Submit the completed forms and plan to the Municipality for review and approval prior to beginning construction.
5. After the Municipality has approved the submission, a signed Operation and Maintenance Agreement will be provided to the applicant.
6. Record the Agreement at the County's Office of Recorder of Deeds.
7. Construction can begin only after the Municipality has issued its approval of the proposed project to the applicant and the Agreement has been recorded.
8. Notify the Municipality 3 business days prior to the start of any construction and schedule any needed inspections.

9. If the applicant is using a contractor to construct the project, the approved application including the worksheet and plan must be shared with the contractor to ensure the underground infiltration trench(es) are properly installed.

Note: Property owners building underground infiltration trenches per the Simplified Approach will need to record an Operation and Maintenance Agreement (O&M Agreement) at the Chester County Recorder of Deeds. The O&M Agreement is prepared by municipal staff (or the municipal staff may require that the applicant or its consulting engineer prepare the O&M Agreement subject to review by the municipal staff or the Municipal Engineer) using the template shown in Appendix E. An O&M Agreement is needed to ensure access, inspection, maintenance, operation, repair, and permanent protection for these stormwater management facilities.

4.0 Frequently Asked Questions

Frequently Asked Questions (FAQs) regarding the Simplified Approach and Stormwater Management are located below.

4.1 What is Stormwater Management?

Stormwater Management is the practice of managing surface water runoff from precipitation events. Stormwater Management is a way to reduce the impacts of decreasing infiltration that results from altering the land from natural conditions. The goal of stormwater management is to reduce the volume of stormwater runoff through practices that capture, infiltrate, detain, or evaporate stormwater. These practices help to improve water quality, restore groundwater recharge, and improve stream habitat. Examples of residential Stormwater Management are rain gardens, rain barrels, porous pavers, drywells, and infiltration trenches.

4.2 Why do I have to do Stormwater Management for my small project?

The new Municipal regulations, derived from Federal and State mandates, require that all property owners be responsible for managing stormwater runoff from Impervious Surfaces. All projects requiring a Zoning or Building Permit will be reviewed by the Municipality for stormwater considerations.

4.3 How does the Municipality determine if a stormwater permit is required?

Starting on December 19, 2013, projects and Impervious Surfaces were measured cumulatively. If the project, or combination of projects since December 19, 2013, will result in 150 square feet of total Regulated Impervious Surface, including Proposed Impervious Surface(s) and existing Impervious Surface(s) installed after the above referenced date, or disturbs 500 square feet, a stormwater permit and fully engineered Stormwater Management Plan will be required. Impervious Surface is defined in Section 202 of the Borough of Avondale Stormwater Management Ordinance.

4.4 Is the square footage of the BMP included in the Earth Disturbance calculation?

Yes. All distributed soils are to be included in the calculation for Earth Disturbance.

4.5 What if I am removing and replacing existing Impervious Surface, such as a driveway or shed?

The net change in the land cover is what will be considered for the permit. The replacement in the exact footprint replacement of an existing one- or two-family dwelling unit or existing Impervious Surface such as patios, driveways, garages, sidewalks, or other impervious surfaces that are accessory to an existing one- or two-family dwelling unit in the exact footprint of the existing Impervious Surface are exempt from the requirements of this ordinance listed in Section 106 of the Borough of Avondale Stormwater Management Ordinance.

4.6 What is the penalty if I do not apply for or follow the application process or maintenance obligations?

The Municipality has legal enforcement action defined in the Municipality's Code which may include the right to deny occupancy permits and assess fines as needed for enforcement.

4.7 Are professional engineering services necessary to meet these requirements?

This Appendix has been developed to assist the landowner in meeting the water quality and groundwater recharge goals of the Stormwater Management Ordinance. If the guidelines are followed, the landowner may not be required to utilize professional engineering services to comply with these water quality and groundwater recharge goals.

4.8 What needs to be submitted to the Municipality?

Even though an engineered Stormwater Management Plan is not required for individual lot owners opting for the Simplified Approach, a brief description of the proposed underground infiltration trench, including types of material to be used, total Impervious Surfaces and volume calculations, and a Simplified Approach Stormwater Management Site Plan shall be submitted to the Municipality prior to construction. The following information shall be submitted to the Municipality: (1) Simplified Approach – Stormwater Management Worksheet; and (2) Simplified Approach Stormwater Management Site Plan, which consists of 4 sheets.

4.9 What is an underground infiltration trench?

An underground infiltration trench is a rock-filled trench with no outlet that receives stormwater runoff. Runoff is stored in the void space between the stones and infiltrates through the bottom and into the soil matrix. Infiltration trenches perform well for removal of fine sediment and associated pollutants. Infiltration testing is recommended to ensure

soil is capable of infiltrating stormwater. Underground infiltration trenches shall incorporate or make provisions for the following elements:

- Shall be constructed after all Earth Disturbance associated with the project or site is stabilized to avoid clogging.
- Perforated pipe is to be set level.
- The width is limited to between four feet to eight feet with a fixed stone depth of three feet.
- Trench(es) shall be wrapped in nonwoven geotextile (top, bottom, and sides).
- There shall be a positive overflow that allows stormwater that cannot be stored or infiltrated to be discharged into a nearby vegetated area (clean-out or pop-up emitter).
- It is recommended that there be a two-foot clearance above the regularly occurring seasonal high-water table and have a minimum depth to bedrock of two feet.
- The underground infiltration trench shall be at least 10 feet from buildings, 10 feet from property lines, 50 feet from individual water supply wells, and 100 feet from community or Municipal water supply wells. If no well is present within 50 feet of the underground infiltration trench, a note stating such must be put on the plan.
- The underground infiltration trench shall be at least 50 feet from any septic system absorption area and 50 feet from community or Municipal Sewer lines and laterals, or as otherwise approved by the Municipal Engineer or Municipal Authority Engineer.
- The underground infiltration trench shall not be located near hotspots which are areas where land use or activities generate highly contaminated runoff, with concentrations of pollutants that are higher than those that are typically found in stormwater.
- The underground infiltration trench shall be located a minimum of 10 feet from subsurface structures such as building foundations and basements so that it does not threaten their structural integrity.
- Infiltration areas must be protected from compaction by heavy equipment during and after construction. The ratio of the collected area to the footprint of the facility shall be as small as possible with a ratio of less than 5:1 preferred.
- Where roof drains are designed to discharge to the underground infiltration trench(es), the roof drains shall have appropriate measures to prevent clogging by unwanted debris (for example, silt, leaves and vegetation). Such measures may include but are not limited to leaf traps, gutter guards, or cleanouts.

4.10 How is an underground infiltration trench constructed?

Refer to the standard construction sequence for an underground infiltration trench as required by the Simplified Approach.

1. Contact PA ONE CALL 8-1-1 or 1-800-242-1776.
2. Protect infiltration areas from compaction by heavy equipment during and after construction.
3. Silt sock or silt fence should be installed upslope of the proposed infiltration trench and downslope of all proposed Earth Disturbance and shown on the Plan.
4. Construction of the underground infiltration trench shall only be started after all Earth Disturbance associated with the project or site is stabilized to avoid clogging.
5. Excavate the underground infiltration trench to a minimum depth of four feet. The excavated trench bottom must have uniform, level, uncompacted subgrade free from rocks and debris. Scarify the bottom of the trench, so not to compact the subgrade.
6. Place nonwoven geotextile along all the sides of the trench. Where separate pieces of geotextile meet, they shall overlap by a minimum of 18 inches. Fold back and secure excess geotextile during stone placement.
7. Place clean stone (such as: 2B, three-quarter-inch clean stone, or AASHTO #57) in the trench.
8. Install the continuously perforated pipe and cleanouts within the trench.
9. If a downspout will be connected to the system, install the piping from the downspout to the perforated trench piping. Install appropriate measures to prevent clogging by unwanted debris such as leaf traps, gutter guards, and cleanouts.
10. Backfill with clean stone to establish an overall stone depth of three feet. Fold and secure the nonwoven geotextile over the top of underground infiltration trench with an eighteen-inch overlap.
11. Place a minimum of 12 inches of topsoil over geotextile. Grading shall direct surface runoff toward the center of the trench (The Municipality will consider surface materials on a project-by-project basis).
12. Stabilize the topsoil with seed and straw mulch.

4.11 What are the maintenance requirements for an underground infiltration trench?

Vegetation along the surface of an underground infiltration trench shall be maintained in good condition, and any bare spots shall be revegetated as soon as possible. Vehicles may not be parked or driven on any underground infiltration trench, and care shall be taken to avoid excessive compaction by mowers. Any debris such as leaves blocking flow from reaching an underground infiltration trench shall be routinely moved.

4.12 What if my roof area is larger than the Regulated Impervious Surface I am proposing?

In order to utilize the Simplified Approach, the applicant must size the proposed infiltration trench for the amount of roof area directed into it, even if it is larger than the amount of Regulated Impervious Surface being proposed. This additional roof area may be "credited" toward future Proposed Impervious Surface. If the applicant were to propose additional Impervious Surface in the future and the total Regulated Impervious Surface is still less than the roof area that the infiltration trench was sized for, additional stormwater management requirements may not be applicable if all other requirements of the Ordinance are met.

5.0 Simplified Approach Stormwater Management Plan Application Packet

The pages below include the following required elements of a Simplified Approach Stormwater Management Plan Application Packet:

- Simplified Approach – Stormwater Management Worksheet
- Simplified Approach – Stormwater Management Checklist
- Simplified Site Plan (1 of 4)
- Infiltration Trench Detail (2 of 4)
- Infiltration Trench Notes 3B
- Infiltration Trench Operation and Maintenance Notes (4 of 4)
- O&M Agreement Template

Simplified Approach – Stormwater Management Worksheet

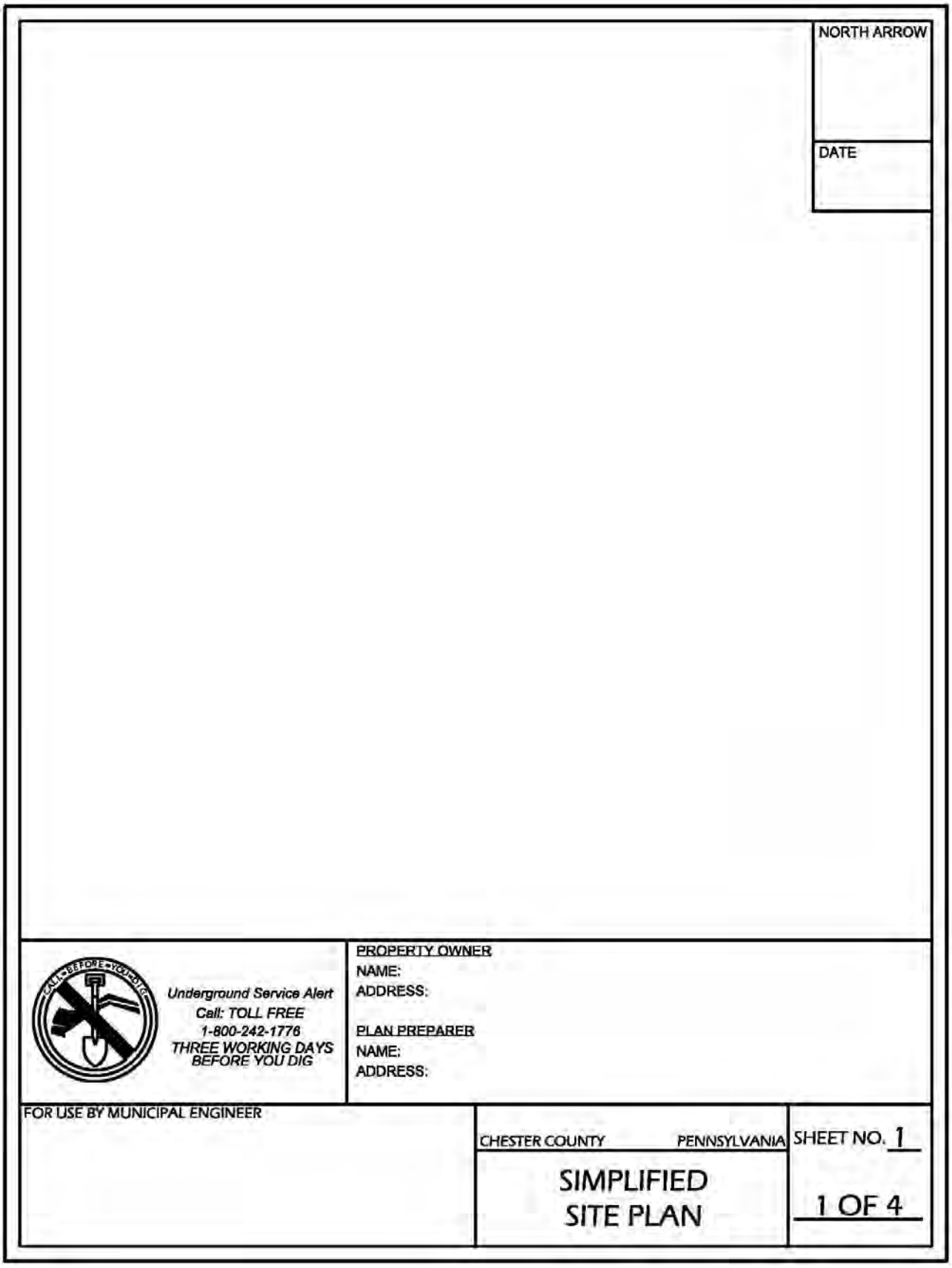
Name of Property Owner:		Date:
Name of Applicant [If different than owner(s)]:		
Contact Phone #:	Email Address:	
Address of Project:		
Description of Project:		
Distance from Earth Disturbance to nearest surface water feature (stream, pond, wetland, etc.): □ 50 feet or less □ More than 50 feet		
REGULATED IMPERVIOUS SURFACES*		
Description of Proposed Impervious Surface	Dimensions [length X width]	Area (square feet)
Total Proposed Impervious Surface* (square feet): (If this is less than 150 feet^2, Stormwater Management is not required; if this is more than 150 feet^2, the Simplified Approach may not be used)		
Cumulative Total Impervious Surface Since December 19, 2013 (square) feet):		
Total Proposed Earth Disturbance Area (square feet):		
PROPOSED UNDERGROUND INFILTRATION TRENCH SIZING		
Proposed Impervious Area to Trench (square feet)	Proposed Dimensions	
1		
2		
Does the project involve new roof area? □ Yes □ No If yes, the downspout must be connected to the proposed Underground Infiltration Trench and must have measures to prevent clogging by unwanted debris. Indicate the measure proposed: □ Leaf trap □ Gutter guards □ Cleanout □ Other: _____		

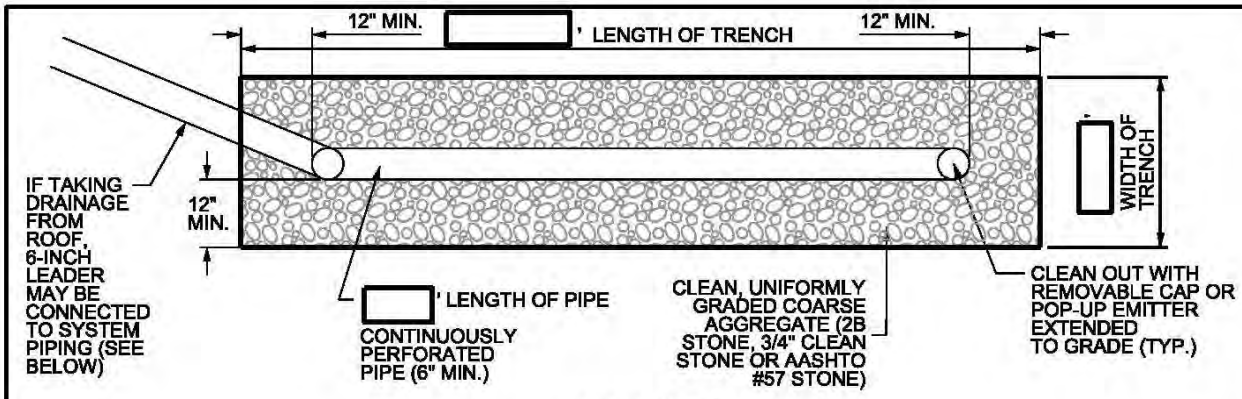
Signature: _____ Date: _____
Printed Name: _____

Simplified Approach – Stormwater Management Checklist

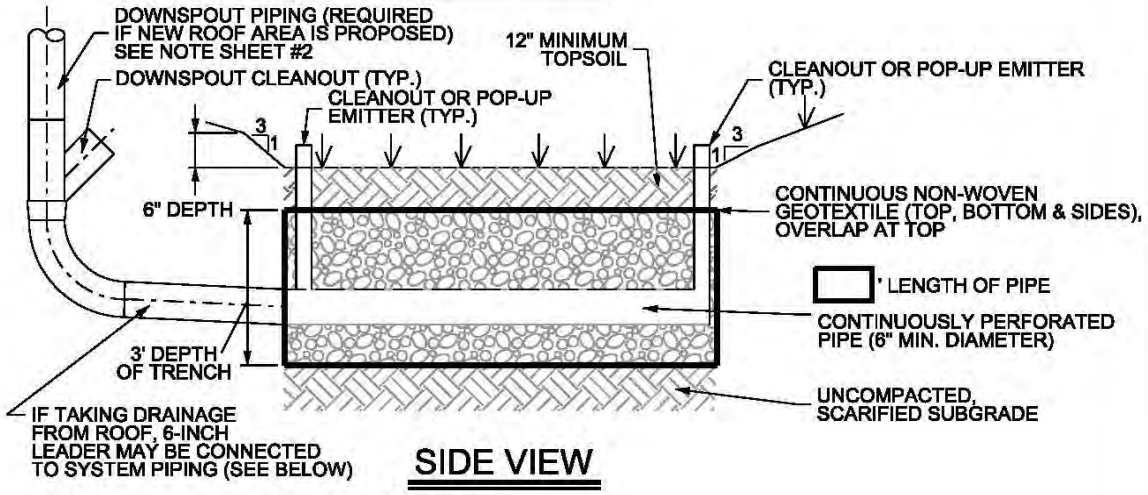
Complete the checklist below to verify all required information is shown on the plan:

Yes	No	Not Applicable	Required Information
☐	☐	☐	Name and address of the owner of the property.
☐	☐	☐	Name and address of individual preparing the plan (if different).
☐	☐	☐	Date of plan preparation.
☐	☐	☐	North arrow.
☐	☐	☐	Location of all existing features within 50 feet of the property, including (if present): • Buildings. • Driveways. • Roads. • Water Lines/Wells (or a note that no wells are present within 50 feet of the proposed facility). • Septic Systems/Sewer Mains and Laterals. • Streams, Wetlands, and Floodplains • Existing Stormwater Facilities; and • Easements.
☐	☐	☐	Location and approximate size in square feet of existing roof area to be captured and diverted to the BMP.
☐	☐	☐	Location and approximate size in square feet of proposed: • Structures. • Driveways. • Other paved/Impervious Surfaces.
☐	☐	☐	Location, orientation, and dimensions of the proposed Underground Infiltration Trench(es). Length and width must be included on the plan.
☐	☐	☐	Distance from the proposed Underground Infiltration Trench(es) to any existing surface water features, such as: streams, lakes, ponds, wetlands, or other natural waterbodies. Must be > 50 feet from surface water features or outside of an existing legally described buffer (i.e., deed, covenants, easement, etc.) whichever is greater. Contact the Municipality if this is not possible.
☐	☐	☐	Distance from the proposed Underground Infiltration Trench(es) to any existing septic system, public sewer line, or lateral.
☐	☐	☐	Distance from the proposed Underground Infiltration Trench(es) to any existing wells or waterlines.
☐	☐	☐	Distance from the proposed Underground Infiltration Trench(es) to any existing wells or waterlines.
☐	☐	☐	Show distance from at least two existing fixed features (e.g., house, shed, driveway) to the proposed Underground Infiltration Trench(es).
☐	☐	☐	PA One Call Serial Number (Dial 8-1-1 or 1-800-242-1776) to receive.

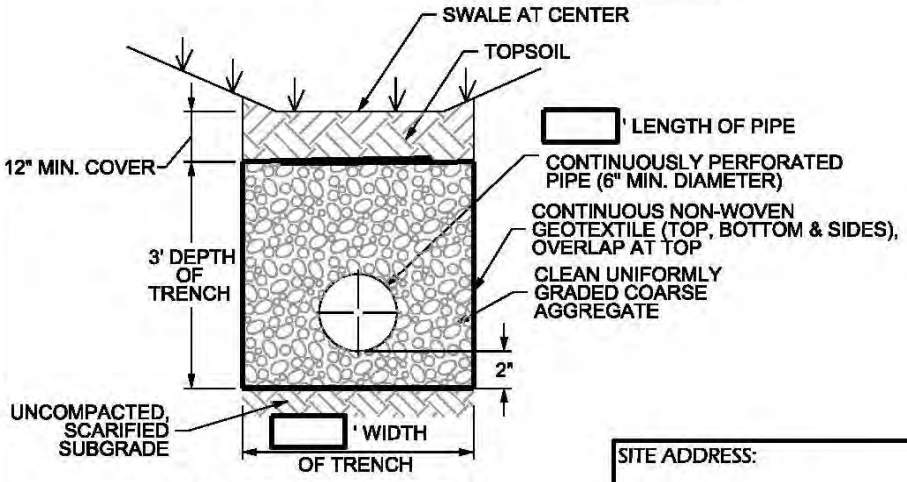

NORTH ARROW
DATE
CALL BEFORE YOU DIG
Underground Service Alert
Call: TOLL FREE
1-800-242-1776
THREE WORKING DAYS
BEFORE YOU DIG
PROPERTY OWNER
NAME:
ADDRESS:
PLAN PREPARER
NAME:
ADDRESS:
FOR USE BY MUNICIPAL ENGINEER
CHESTER COUNTY
PENNSYLVANIA
SHEET NO. 1
SIMPLIFIED
SITE PLAN
1 OF 4



TOP VIEW



SIDE VIEW



CROSS-SECTION VIEW

SITE ADDRESS:

DATE:

SCALE: NOT TO SCALE

CEG CEDARVILLE

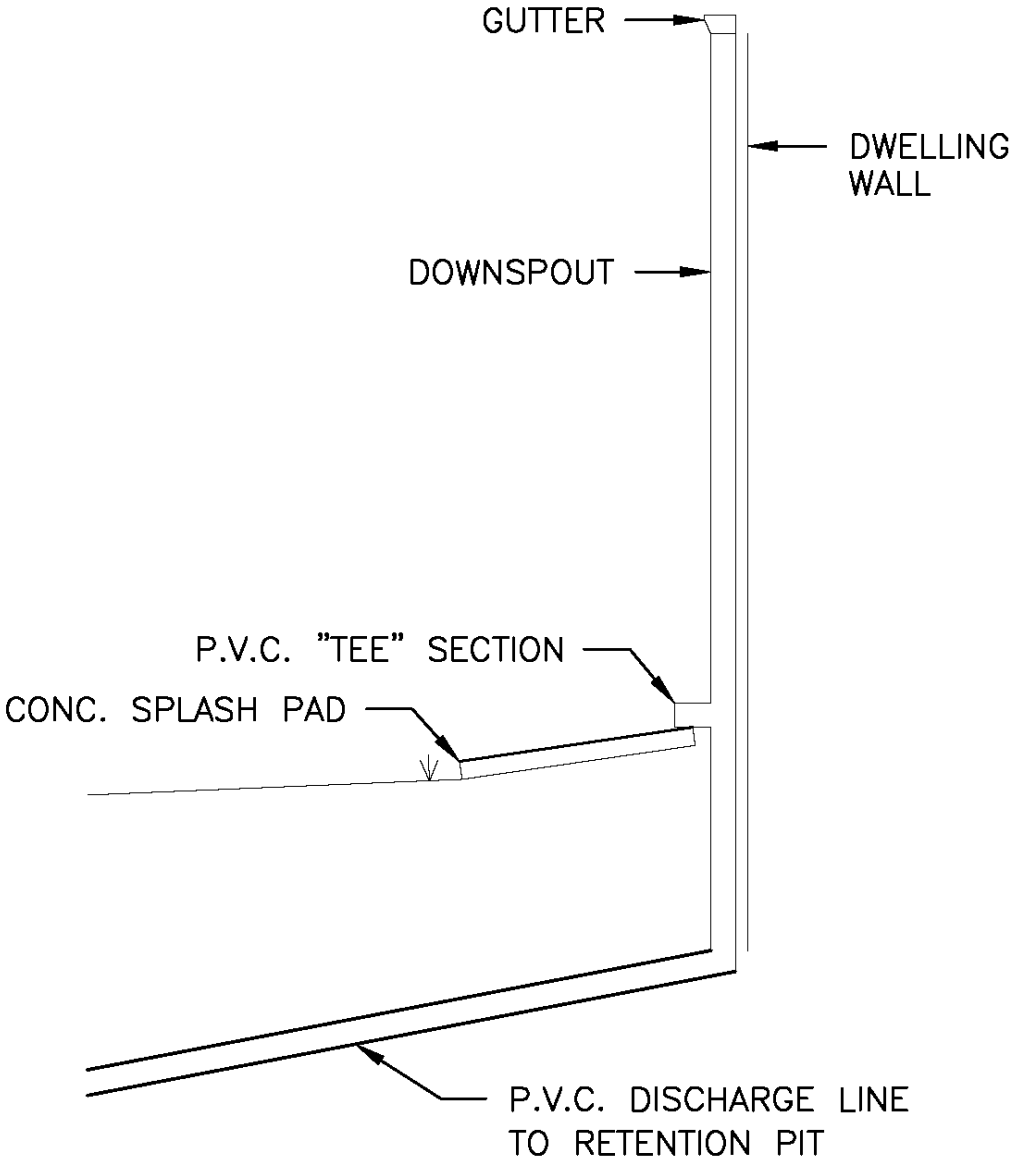
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CHESTER COUNTY PENNSYLVANIA

INFILTRATION TRENCH DETAIL

SHEET NO. 2

2 OF 4



NOTE: PROVIDE P.V.C. "TEE" TO DISCHARGE WATER ONTO CONCRETE SPLASH PAD TO ACT AS OVERFLOW RELIEF FOR RETENTION PIT.

OVERFLOW RELIEF DETAIL

N.T.S.

NOTES

§ 345-306.M: DURING SITE CONSTRUCTION, ALL INFILTRATION PRACTICE COMPONENTS SHALL BE PROTECTED FROM COMPACTION DUE TO HEAVY EQUIPMENT OPERATION OR STORAGE OF FILL OR CONSTRUCTION MATERIAL. INFILTRATION AREAS SHALL ALSO BE PROTECTED FROM SEDIMENTATION. AREAS THAT ARE ACCIDENTALLY COMPACTED OR GRADED SHALL BE REMEDIATED TO RESTORE SOIL COMPOSITION AND POROSITY. ADEQUATE DOCUMENTATION TO THIS EFFECT SHALL BE SUBMITTED TO THE TOWNSHIP ENGINEER FOR REVIEW. ALL AREAS DESIGNATED FOR INFILTRATION SHALL NOT RECEIVE RUNOFF UNTIL THE CONTRIBUTORY DRAINAGE AREA HAS ACHIEVED FINAL STABILIZATION.

§ 345-306.N: WHERE SEDIMENT TRANSPORT IN THE STORMWATER RUNOFF IS ANTICIPATED TO REACH THE INFILTRATION SYSTEM, APPROPRIATE PERMANENT MEASURES TO PREVENT OR COLLECT SEDIMENT SHALL BE INSTALLED PRIOR TO DISCHARGE TO THE INFILTRATION SYSTEM.

§ 345-306.O: 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.

§ 345-306.R: THE FOLLOWING PROCEDURES AND MATERIALS SHALL BE REQUIRED DURING THE CONSTRUCTION OF ALL INFILTRATION TRENCHES:

(1) EXCAVATION FOR THE INFILTRATION TRENCH SHALL BE PERFORMED WITH EQUIPMENT THAT WILL NOT COMPACT THE BOTTOM OF THE INFILTRATION TRENCH.

(2) THE BOTTOM OF THE INFILTRATION TRENCH SHALL BE SCARIFIED PRIOR TO THE PLACEMENT OF AGGREGATE.

(3) ONLY CLEAN AGGREGATE WITH DOCUMENTED POROSITY, FREE OF FINES, SHALL BE ALLOWED.

(4) THE TOPS AND SIDES OF ALL INFILTRATION TRENCH SHALL BE COVERED WITH DRAINAGE FABRIC. FABRIC SHALL BE NONWOVEN FABRIC ACCEPTABLE TO THE TOWNSHIP ENGINEER.

(5) STORMWATER SHALL BE DISTRIBUTED THROUGHOUT THE ENTIRE SEEPAGE BED/TRENCH OR LIKE FACILITY AND PROVISIONS FOR THE COLLECTION OF DEBRIS SHALL BE PROVIDED IN ALL FACILITIES.

(6) PA ONECALL IS REQUIRED BEFORE ANY CONSTRUCTION ACTIVITIES COMMENCE.

TRENCH LENGTH (< 1000 SQUARE FEET OF REGULATED IMPERVIOUS SURFACE)

Impervious Surface	4' Wide Trench Length of Trench (ft)	5' Wide Trench Length of Trench (ft)	6' Wide Trench Length of Trench (ft)	7' Wide Trench Length of Trench (ft)	8' Wide Trench Length of Trench (ft)
451-500	8.75	7.00	6.00	5.00	4.50
501-550	9.75	7.75	6.50	5.50	5.00
551-600	10.50	8.50	7.00	6.00	5.25
601-650	11.50	9.25	7.75	6.50	5.75
651-700	12.25	9.75	8.25	7.00	6.25
701-750	13.25	10.50	8.75	7.50	6.75
751-800	14.00	11.25	9.50	8.00	7.00
801-850	15.00	12.00	10.00	8.50	7.50
851-900	15.75	12.50	10.50	9.00	8.00
901-950	16.50	13.25	11.00	9.50	8.50
951-1000	17.50	14.00	11.75	10.00	8.75

* DIMENSIONS IN THIS TABLE HAVE BEEN DETERMINED FOR MANAGING THE 1-INCH RAINFALL RUNOFF VOLUME.

* TRENCH SHOULD BE SIZED BASED ON SQUARE FEET OF ROOF AREA DIRECTED TO THE PROPOSED TRENCH, WHICH MAY NOT EQUAL THE REGULATED IMPERVIOUS SURFACE PROPOSED.

SITE ADDRESS:

DATE:

SCALE: NOT TO SCALE

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CHESTER COUNTY PENNSYLVANIA

INFILTRATION TRENCH NOTES

SHEET NO. 3A

3A OF 4

NOTES

§ 345-306.M: DURING SITE CONSTRUCTION, ALL INFILTRATION PRACTICE COMPONENTS SHALL BE PROTECTED FROM COMPACTION DUE TO HEAVY EQUIPMENT OPERATION OR STORAGE OF FILL OR CONSTRUCTION MATERIAL. INFILTRATION AREAS SHALL ALSO BE PROTECTED FROM SEDIMENTATION. AREAS THAT ARE ACCIDENTALLY COMPACTED OR GRADED SHALL BE REMEDIATED TO RESTORE SOIL COMPOSITION AND POROSITY. ADEQUATE DOCUMENTATION TO THIS EFFECT SHALL BE SUBMITTED TO THE TOWNSHIP ENGINEER FOR REVIEW. ALL AREAS DESIGNATED FOR INFILTRATION SHALL NOT RECEIVE RUNOFF UNTIL THE CONTRIBUTORY DRAINAGE AREA HAS ACHIEVED FINAL STABILIZATION.

§ 345-306.N: WHERE SEDIMENT TRANSPORT IN THE STORMWATER RUNOFF IS ANTICIPATED TO REACH THE INFILTRATION SYSTEM, APPROPRIATE PERMANENT MEASURES TO PREVENT OR COLLECT SEDIMENT SHALL BE INSTALLED PRIOR TO DISCHARGE TO THE INFILTRATION SYSTEM.

§ 345-306.O: 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.

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(3) ONLY CLEAN AGGREGATE WITH DOCUMENTED POROSITY, FREE OF FINES, SHALL BE ALLOWED.

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(6) PA ONECALL IS REQUIRED BEFORE ANY CONSTRUCTION ACTIVITIES COMMENCE.

TRENCH LENGTH (< 1000 SQUARE FEET OF REG[illegible]ATED IMPERVIOUS SURFACE)

Impervious Surface (sf)	4' Wide Trench Length of Trench (ft)	5' Wide Trench Length of Trench (ft)	6' Wide Tren[illegible] Length of [illegible]	[illegible] Wide Trench [illegible]h of Trench (ft)
451-500	23.00	18.25		11.50
501-550	25.25	20.25		12.75
551-600	27.50	22.00		13.75
601-650	29.75			15.00
651-700	32.00			16.00
701-750	34.25			17.25
751-800	36		21.00	18.25
801-850			22.25	19.50
851-900	4		23.50	20.75
901-950	43		25.00	21.75
951-1000	45.7	30.50	26.25	23.00

Must use values found in:
Appendix A.2
Simplified Approach to Stormwater Management for Small Projects - Handbook
Table 1.1

* DIMENSIONS IN THIS TAB[illegible]NED FOR MANAGING THE DIFFERENCE BETWEEN THE PRE-DEVELOPMENT AND [illegible], 2-YEAR FREQUENCY, 24-HOUR DURATION RAINFALL RUNOFF VOLUME

* TRENCH SHOULD BE SIZED B[illegible]ON SQUARE FEET OF ROOF AREA DIRECTED TO THE PROPOSED TRENCH, WHICH MAY NOT EQUAL THE REGULA[illegible]D IMPERVIOUS SURFACE PROPOSED.

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CHESTER COUNTY PENNSYLVANIA

INFILTRATION TRENCH NOTES

SHEET NO. 3B

3B OF 4

NOTES

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(6) PA ONECALL IS REQUIRED BEFORE ANY CONSTRUCTION ACTIVITIES COMMENCE.

TRENCH LENGTH (1000-2000 SQUARE FEET OF REGULATED IMPERVIOUS SURFACE)

Impervious Surface (sf)	4' Wide Trench Length of Trench (ft)	5' Wide Trench Length of Trench (ft)	6' Wide Trench Length of Trench (ft)	7' Wide Trench Length of Trench (ft)	8' Wide Trench Length of Trench (ft)
1000	45.75	36.50	30.50	26.25	23.00
1001-1050	46.75	37.50	31.25	26.75	23.50
1051-1100	48.00	38.50	32.00	27.50	24.00
1101-1150	49.25	39.25	32.75	28.25	24.75
1151-1200	50.25	40.25	33.50	28.75	25.25
1201-1250	54.75	44.00	36.50	31.50	27.50
1251-1300	59.50	47.50	39.75	34.00	29.75
1301-1350	61.75	49.25	41.25	35.25	71.00
1351-1400	64.00	51.25	42.75	36.50	32.00
1401-1450	66.25	53.00	44.25	38.00	33.25
1451-1500	68.50	54.75	45.75	39.25	34.25
1501-1550	70.75	56.75	47.25	40.50	35.50
1551-1600	73.00	58.50	48.75	41.75	36.50
1601-1650	75.25	60.25	50.25	43.00	37.75
1651-1700	77.75	62.25	51.75	44.50	39.00
1701-1750	80.00	64.00	53.25	45.75	40.00
1751-1800	82.25	65.75	54.75	47.00	41.25
1801-1850	84.50	67.50	56.25	48.25	42.25
1851-1900	86.75	69.50	58.00	49.75	43.50
1901-1950	89.00	71.25	59.50	51.00	44.50
1951-1999	91.25	73.00	61.00	52.75	45.75

* DIMENSIONS IN THIS TABLE HAVE BEEN DETERMINED FOR MANAGING THE DIFFERENCE BETWEEN THE PRE-DEVELOPMENT AND POST-DEVELOPMENT, 2-YEAR FREQUENCY, 24-HOUR DURATION RAINFALL RUNOFF VOLUME
* TRENCH SHOULD BE SIZED BASED ON SQUARE FEET OF ROOF AREA DIRECTED TO THE PROPOSED TRENCH, WHICH MAY NOT EQUAL THE REGULATED IMPERVIOUS SURFACE PROPOSED.

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CHESTER COUNTY PENNSYLVANIA

INFILTRATION TRENCH NOTES

SHEET NO. 3C

3C OF 4

STORMWATER FACILITIES OPERATIONS AND MAINTENANCE PLAN

THE HOMEOWNER WILL BE RESPONSIBLE FOR THE OPERATION AND MAINTENANCE OF ALL STORMWATER AND BMP FACILITIES. THE FACILITIES WILL INCLUDE THE INFILTRATION TRENCH ON THE PROPERTY AS WELL AS ANY YARD OR ROOF DRAINS, PIPING, POP-UP EMITTERS OR CLEAN-OUTS SHOWN ON THIS PLAN.

MAINTENANCE AND OPERATION WILL BE AS FOLLOWS:

1. THE INFILTRATION TRENCH AND CONVEYANCES DESCRIBED IN THIS PLAN SHALL BE INSPECTED ANNUALLY OR AS NEEDED FOLLOWING SIGNIFICANT PRECIPITATION EVENTS TO ASCERTAIN IF ANY SEDIMENT IS ENTERING THE FACILITIES. THE INFILTRATION TRENCH AND CONVEYANCES DESCRIBED IN THIS PLAN SHALL BE CLEANED IF NECESSARY. CLEANING WILL CONSIST OF REMOVING THE ACCUMULATED SILT, DEBRIS, OR SEDIMENT.
2. THE OVERLYING VEGETATION ON THE INFILTRATION TRENCH SHALL BE MAINTAINED IN GOOD CONDITION, AND ANY BARE SPOTS RE-VEGETATED AS SOON AS POSSIBLE.
3. VEHICULAR ACCESS ON THE INFILTRATION TRENCH SHOULD BE PROHIBITED, AND CARE SHOULD BE TAKEN TO AVOID EXCESSIVE COMPACTION BY MOWERS.
4. REPAIR ALL DAMAGED PIPING, CLEAN-OUTS, AND POP-UP EMITTERS PROMPTLY TO PREVENT SEDIMENT FROM ENTERING THE SYSTEM. SPECIAL CARE SHOULD BE TAKEN TO AVOID DAMAGING EXPOSED ELEMENTS WITH MOWERS AND/OR STRING TRIMMERS.
5. GRASSES OVER THE INFILTRATION TRENCH SHALL BE MOWED AT LEAST TWICE EACH YEAR. TREES AND SHRUBS SHOULD NOT BE PERMITTED TO GROW ABOVE THE INFILTRATION TRENCH.

SITE ADDRESS:

DATE:

SCALE: NOT TO SCALE

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CHESTER COUNTY PENNSYLVANIA

INFILTRATION TRENCH OPERATION & MAINTENANCE NOTES

SHEET NO. 4

4 OF 4

Prepared By: *Insert Preparer's Name* *Insert Preparer's Address Line 1* *Insert Preparer's Address Line 2* *Insert Preparer's Phone Number* Return To: Borough of Avondale 10 Pomeroy Avenue P.O. Box 247 Avondale, PA. 19311 Phone: 610-268-8501 UPI#: *Insert UPI(s) of properties with BMPs and/or Conveyances for the O&M Agreement* Property Street Address: *Insert the street address of the property*	LEAVE BLANK For Recorder's Use Only

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 _____, 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 (hereinafter BMP(s)) and Conveyances Operations and Maintenance Plan OR Simplified Approach Stormwater Management Site Plan _____(title of approved plans) approved by the Municipality _____(date) (hereinafter referred to as the "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" – Activities, facilities, designs, measures, or procedures as specifically identified in the Plan, 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 the Municipality's Stormwater Management Ordinance. Stormwater BMPs are commonly grouped into one (1) of two (2) broad categories or measures: "structural" or "nonstructural." Nonstructural BMPs or measures refer to low impact development and conservation design practices used to minimize the contact of pollutants with stormwater runoff. These practices aim to limit the total volume of stormwater runoff and manage stormwater at its source by techniques such as protecting natural systems and incorporating existing landscape features. Nonstructural BMPs include, but are not limited to, the protection of sensitive and special value features such as wetlands and riparian areas, the preservation of open space while clustering and concentrating development, the reduction of impervious cover, and the disconnection of downspouts from storm sewers. Structural BMPs are those that consist of a constructed system that is designed and engineered to capture and treat stormwater runoff. Structural BMPs are those that consist of a physical system that is designed and engineered to capture and treat stormwater runoff. Structural BMPs include, but are not limited to, a wide variety of practices and devices from large-scale retention ponds and constructed wetlands to small-scale underground treatment systems, infiltration facilities, filter strips, bioretention, wet ponds, permeable paving, grassed swales, riparian buffers, sand filters, detention basins, and other manufactured devices designed to mitigate stormwater impacts. The BMPs identified in the Plan are permanent appurtenances to the Property; and

Conveyance – As specifically identified in the Plan, a manmade, existing, or proposed facility, feature 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 Plan are permanent appurtenances to the Property; and

WHEREAS, the Municipality requires, through the implementation of the Plan, that stormwater management BMPs and conveyances, as required by the Plan and the Municipality's Stormwater Management Ordinance, be constructed, and adequately inspected, operated and maintained by the Landowner or their designee.

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 stormwater management site plans and specifications OR Simplified Approach Stormwater Management Site Plan as approved by the Municipality in the Plan.

3. Upon completion of construction, the Landowner shall be responsible for completing final As-Built Plans of all BMPs, Conveyances, or other stormwater management facilities included in the approved stormwater management site plan as per the requirements of Section 502 of the Stormwater Management Ordinance.

4. The Landowner shall inspect, operate, and maintain the BMP(s) and Conveyance(s) as shown on the Plan in good working order acceptable to the Municipality and in accordance with the specific inspection and maintenance requirements in the approved Plan and the current version of the Pennsylvania Stormwater BMP Manual, as amended.

5. 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 Plan and the Municipality's Stormwater Management Ordinance. Whenever possible, the Municipality shall notify the Landowner prior to entering the Property.

6. The Municipality shall inspect the BMP(s) and Conveyance(s) to determine if they continue to function as intended.

7. The BMP(s) and Conveyance(s) shall be inspected according to the following frequencies, at a minimum:

   a. Annually for the first 5 years.

   b. Once every 3 years thereafter.

   c. During or immediately after the cessation of a 25-year or greater storm, as determined by the Municipal Engineer.

Written inspection reports shall be created to document each inspection. The inspection report shall contain the date and time of the inspection, the individual(s) who completed the inspection, the location of the BMP, facility or structure inspected, observations on performance, and recommendations for improving performance, if applicable. Inspection reports shall be submitted to the Municipality within 30 days following completion of the inspection.

Landowners must notify the Municipality of BMP(s) and Conveyance(s) that are no longer functioning as designed and must coordinate with the Municipality to determine a schedule to repair or retrofit these systems to restore designed functionality.

8. 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 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 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 enter any BMP or Conveyance directly or indirectly.

9. In the event that the Landowner fails to operate and maintain the BMP(s) and Conveyance(s) as shown on the 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.

10. If the Municipality, pursuant to this Agreement, performs work of any nature or expends any funds in performance of said work for inspection, labor, use of equipment, supplies, materials, and the like, the Landowner shall reimburse the Municipality for all expenses (direct and indirect) incurred within 30 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.

11. 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.

12. 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' fees, regarding said damages, judgments or claims.

13. 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.

14. Failure or delay in enforcing any provision of this Agreement shall not constitute a waiver by the Municipality of its rights of enforcement hereunder.

15. 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.

16. 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 Chester County, Pennsylvania, and shall constitute a covenant running with the Property, in perpetuity.

WITNESS the following signatures and seals:

ATTEST:

(SEAL) For the Municipality:

_____

(SEAL) For the Landowner:

_____

ATTEST:

_____ (City, Borough, Township)

By Individual:

State of _____

County of _____

On this _____ day of _____, 20__. Before me, the undersigned officer, personally appeared _____, known to me (or satisfactorily proven) to be person whose name(s) is/are subscribed to the within instrument and acknowledged that _____executed the same for the purpose therein contains.

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

_____
Notary Public

My commission expires:

By the Company:

State of _____

County of _____

On this _____ day of _____, 20__, before me, the undersigned officer, personally appeared _____, who acknowledged himself/herself to be _____ of _____, a _____, and that he/she being authorized to do so, executed the forgoing instrument for the purpose therein contained by signing the name of the Company by herself/himself as_____.

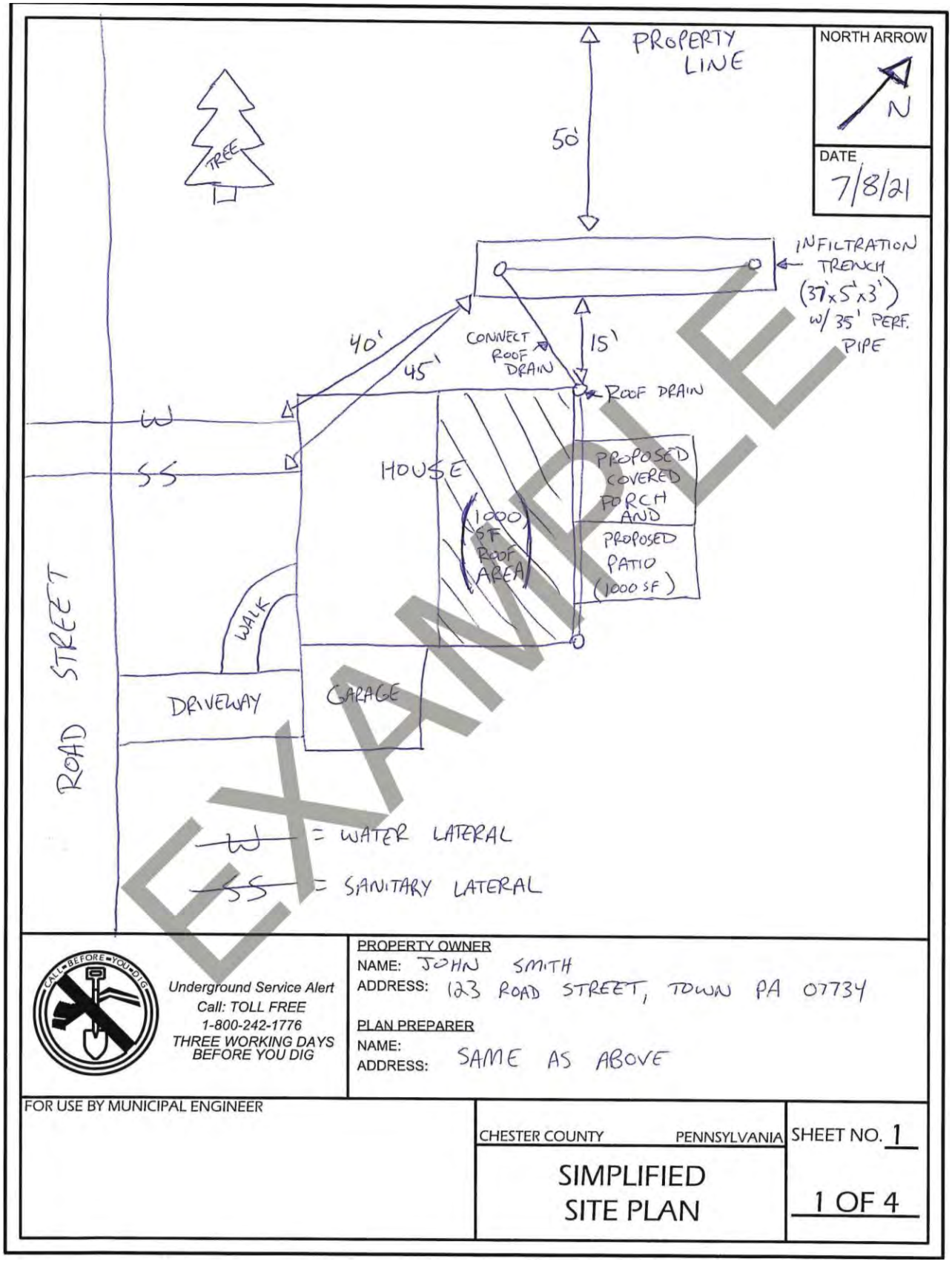
IN WITNESS WHEREOF, I hereunto set my hand and official seal.

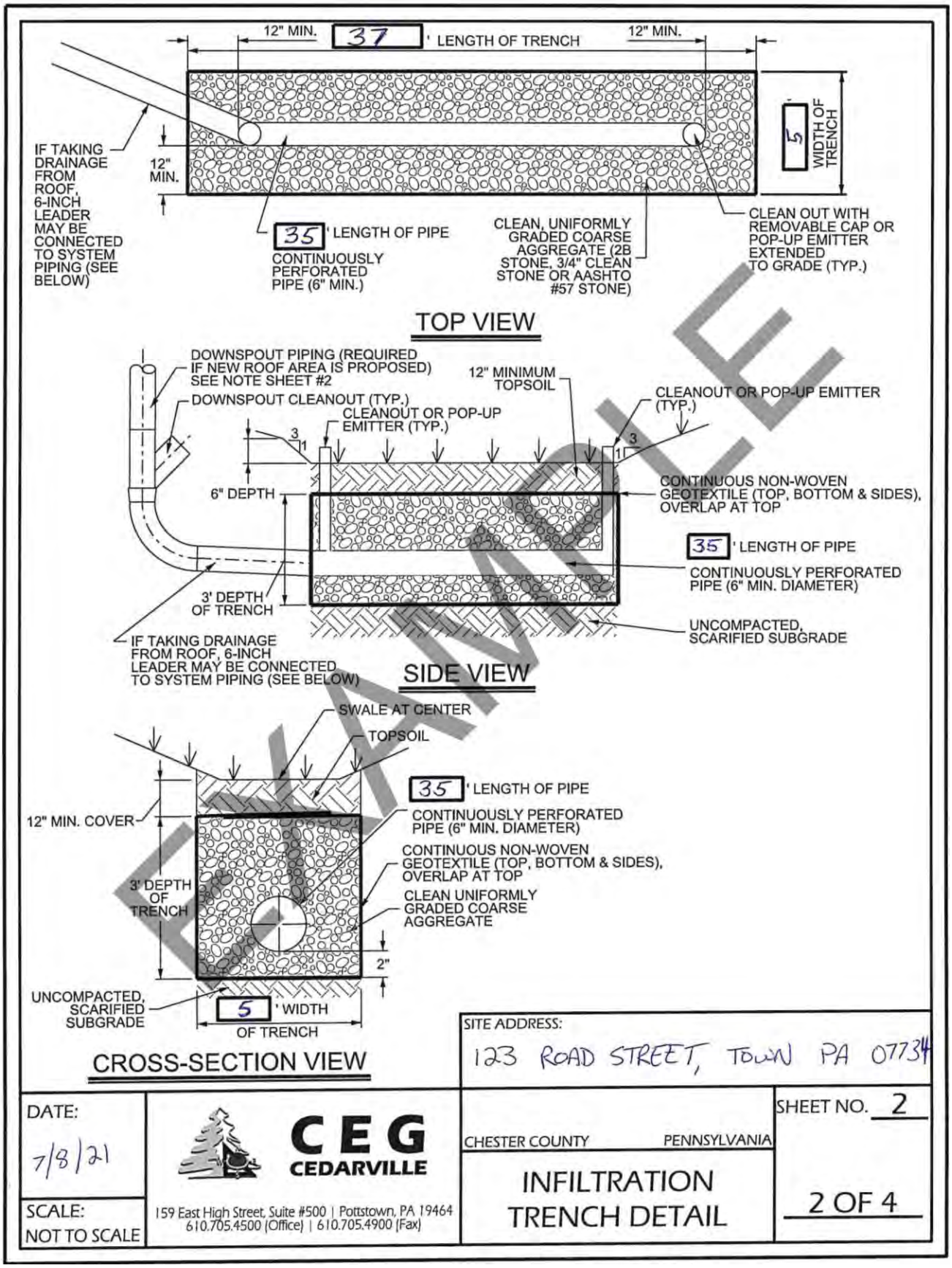
_____
Notary Public

My commission expires:

6.0 Example Simplified Approach Stormwater Management Site Plans

The pages below include an example Simplified Approach Stormwater Management Site Plan (Sheets No. 1 – 4).


PROPERTY LINE
NORTH ARROW
N
DATE
7/8/21
TREE
50'
INFILTRATION TRENCH (37'x5'x3') w/ 35' PERF. PIPE
40'
45'
CONNECT ROOF DRAIN
15'
ROOF DRAIN
W
SS
HOUSE
PROPOSED COVERED PORCH AND
PROPOSED PATIO (1000 SF)
(1000 SF ROOF AREA)
WALK
DRIVEWAY
GARAGE
ROAD STREET
W = WATER LATERAL
SS = SANITARY LATERAL
EXAMPLE
Underground Service Alert
Call: TOLL FREE
1-800-242-1776
THREE WORKING DAYS BEFORE YOU DIG
PROPERTY OWNER
NAME: JOHN SMITH
ADDRESS: 123 ROAD STREET, TOWN PA 07734
PLAN PREPARER
NAME:
ADDRESS: SAME AS ABOVE
FOR USE BY MUNICIPAL ENGINEER
CHESTER COUNTY PENNSYLVANIA
SHEET NO. 1
SIMPLIFIED SITE PLAN
1 OF 4


12" MIN.
37 ' LENGTH OF TRENCH
12" MIN.
5 ' WIDTH OF TRENCH
IF TAKING DRAINAGE FROM ROOF, 6-INCH LEADER MAY BE CONNECTED TO SYSTEM PIPING (SEE BELOW)
12" MIN.
35 ' LENGTH OF PIPE CONTINUOUSLY PERFORATED PIPE (6" MIN.)
CLEAN, UNIFORMLY GRADED COARSE AGGREGATE (2B STONE, 3/4" CLEAN STONE OR AASHTO #57 STONE)
CLEAN OUT WITH REMOVABLE CAP OR POP-UP EMITTER EXTENDED TO GRADE (TYP.)
TOP VIEW
DOWNSPOUT PIPING (REQUIRED IF NEW ROOF AREA IS PROPOSED) SEE NOTE SHEET #2
DOWNSPOUT CLEANOUT (TYP.)
12" MINIMUM TOPSOIL
CLEANOUT OR POP-UP EMITTER (TYP.)
CLEANOUT OR POP-UP EMITTER (TYP.)
3
1
3
1
6" DEPTH
CONTINUOUS NON-WOVEN GEOTEXTILE (TOP, BOTTOM & SIDES), OVERLAP AT TOP
35 ' LENGTH OF PIPE
CONTINUOUSLY PERFORATED PIPE (6" MIN. DIAMETER)
3' DEPTH OF TRENCH
UNCOMPACTED, SCARIFIED SUBGRADE
IF TAKING DRAINAGE FROM ROOF, 6-INCH LEADER MAY BE CONNECTED TO SYSTEM PIPING (SEE BELOW)
SIDE VIEW
SWALE AT CENTER
TOPSOIL
35 ' LENGTH OF PIPE
12" MIN. COVER
CONTINUOUSLY PERFORATED PIPE (6" MIN. DIAMETER)
CONTINUOUS NON-WOVEN GEOTEXTILE (TOP, BOTTOM & SIDES), OVERLAP AT TOP
3' DEPTH OF TRENCH
CLEAN UNIFORMLY GRADED COARSE AGGREGATE
2"
UNCOMPACTED, SCARIFIED SUBGRADE
5 ' WIDTH OF TRENCH
CROSS-SECTION VIEW
SITE ADDRESS:
123 ROAD STREET, TOWN PA 07734
DATE:
7/8/21
SCALE:
NOT TO SCALE
CEG
CEDARVILLE
159 East High Street, Suite #500 | Pottstown, PA 19464
610.705.4500 (Office) | 610.705.4900 (Fax)
CHESTER COUNTY PENNSYLVANIA
INFILTRATION TRENCH DETAIL
SHEET NO. 2
2 OF 4
EXAMPLE

NOTES

§ 345-306.M: DURING SITE CONSTRUCTION, ALL INFILTRATION PRACTICE COMPONENTS SHALL BE PROTECTED FROM COMPACTION DUE TO HEAVY EQUIPMENT OPERATION OR STORAGE OF FILL OR CONSTRUCTION MATERIAL. INFILTRATION AREAS SHALL ALSO BE PROTECTED FROM SEDIMENTATION. AREAS THAT ARE ACCIDENTALLY COMPACTED OR GRADED SHALL BE REMEDIATED TO RESTORE SOIL COMPOSITION AND POROSITY. ADEQUATE DOCUMENTATION TO THIS EFFECT SHALL BE SUBMITTED TO THE TOWNSHIP ENGINEER FOR REVIEW. ALL AREAS DESIGNATED FOR INFILTRATION SHALL NOT RECEIVE RUNOFF UNTIL THE CONTRIBUTORY DRAINAGE AREA HAS ACHIEVED FINAL STABILIZATION.

§ 345-306.N: WHERE SEDIMENT TRANSPORT IN THE STORMWATER RUNOFF IS ANTICIPATED TO REACH THE INFILTRATION SYSTEM, APPROPRIATE PERMANENT MEASURES TO PREVENT OR COLLECT SEDIMENT SHALL BE INSTALLED PRIOR TO DISCHARGE TO THE INFILTRATION SYSTEM.

§ 345-306.O: 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.

§ 345-306.R: THE FOLLOWING PROCEDURES AND MATERIALS SHALL BE REQUIRED DURING THE CONSTRUCTION OF ALL INFILTRATION TRENCHES:

(1) EXCAVATION FOR THE INFILTRATION TRENCH SHALL BE PERFORMED WITH EQUIPMENT THAT WILL NOT COMPACT THE BOTTOM OF THE INFILTRATION TRENCH.

(2) THE BOTTOM OF THE INFILTRATION TRENCH SHALL BE SCARIFIED PRIOR TO THE PLACEMENT OF AGGREGATE.

(3) ONLY CLEAN AGGREGATE WITH DOCUMENTED POROSITY, FREE OF FINES, SHALL BE ALLOWED.

(4) THE TOPS AND SIDES OF ALL INFILTRATION TRENCH SHALL BE COVERED WITH DRAINAGE FABRIC. FABRIC SHALL BE NONWOVEN FABRIC ACCEPTABLE TO THE TOWNSHIP ENGINEER.

(5) STORMWATER SHALL BE DISTRIBUTED THROUGHOUT THE ENTIRE SEEPAGE BED/TRENCH OR LIKE FACILITY AND PROVISIONS FOR THE COLLECTION OF DEBRIS SHALL BE PROVIDED IN ALL FACILITIES.

(6) PA ONECALL IS REQUIRED BEFORE ANY CONSTRUCTION ACTIVITIES COMMENCE.

TRENCH LENGTH (< 1000 SQUARE FEET OF REGULATED IMPERVIOUS SURFACE)

Impervious Surface	4' Wide Trench Length of Trench (ft)	5' Wide Trench Length of Trench (ft)	6' Wide Trench Length of Trench (ft)	7' Wide Trench Length of Trench (ft)	8' Wide Trench Length of Trench (ft)
451-500	8.75	7.00	6.00	5.00	4.50
501-550	9.75	7.75	6.50	5.50	5.00
551-600	10.50	8.50	7.00	6.00	5.25
601-650	11.50	9.25	7.75	6.50	5.75
651-700	12.25	9.75	8.25	7.00	6.25
701-750	13.25	10.50	8.75	7.50	6.75
751-800	14.00	11.25	9.50	8.00	7.00
801-850	15.00	12.00	10.00	8.50	7.50
851-900	15.75	12.50	10.50	9.00	8.00
901-950	16.50	13.25	11.00	9.50	8.50
951-1000	17.50	14.00	11.75	10.00	8.75

* DIMENSIONS IN THIS TABLE HAVE BEEN DETERMINED FOR MANAGING THE 1-INCH RAINFALL RUNOFF VOLUME.

* TRENCH SHOULD BE SIZED BASED ON SQUARE FEET OF ROOF AREA DIRECTED TO THE PROPOSED TRENCH, WHICH MAY NOT EQUAL THE REGULATED IMPERVIOUS SURFACE PROPOSED.

EXAMPLE

SITE ADDRESS: 123 ROAD STREET, TOWN PA 07734

DATE: 7/8/21

SCALE: NOT TO SCALE

CEG CEDARVILLE

159 East High Street, Suite #500 | Pottstown, PA 19464
610.705.4500 (Office) | 610.705.4900 (Fax)

CHESTER COUNTY PENNSYLVANIA

INFILTRATION TRENCH NOTES

SHEET NO. 3A

3A OF 4

NOTES

§ 345-306.M: DURING SITE CONSTRUCTION, ALL INFILTRATION PRACTICE COMPONENTS SHALL BE PROTECTED FROM COMPACTION DUE TO HEAVY EQUIPMENT OPERATION OR STORAGE OF FILL OR CONSTRUCTION MATERIAL. INFILTRATION AREAS SHALL ALSO BE PROTECTED FROM SEDIMENTATION. AREAS THAT ARE ACCIDENTALLY COMPACTED OR GRADED SHALL BE REMEDIATED TO RESTORE SOIL COMPOSITION AND POROSITY. ADEQUATE DOCUMENTATION TO THIS EFFECT SHALL BE SUBMITTED TO THE TOWNSHIP ENGINEER FOR REVIEW. ALL AREAS DESIGNATED FOR INFILTRATION SHALL NOT RECEIVE RUNOFF UNTIL THE CONTRIBUTORY DRAINAGE AREA HAS ACHIEVED FINAL STABILIZATION.

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(1) EXCAVATION FOR THE INFILTRATION TRENCH SHALL BE PERFORMED WITH EQUIPMENT THAT WILL NOT COMPACT THE BOTTOM OF THE INFILTRATION TRENCH.

(2) THE BOTTOM OF THE INFILTRATION TRENCH SHALL BE SCARIFIED PRIOR TO THE PLACEMENT OF AGGREGATE.

(3) ONLY CLEAN AGGREGATE WITH DOCUMENTED POROSITY, FREE OF FINES, SHALL BE ALLOWED.

(4) THE TOPS AND SIDES OF ALL INFILTRATION TRENCH SHALL BE COVERED WITH DRAINAGE FABRIC. FABRIC SHALL BE NONWOVEN FABRIC ACCEPTABLE TO THE TOWNSHIP ENGINEER.

(5) STORMWATER SHALL BE DISTRIBUTED THROUGHOUT THE ENTIRE SEEPAGE BED/TRENCH OR LIKE FACILITY AND PROVISIONS FOR THE COLLECTION OF DEBRIS SHALL BE PROVIDED IN ALL FACILITIES.

(6) PA ONECALL IS REQUIRED BEFORE ANY CONSTRUCTION ACTIVITIES COMMENCE.

TRENCH LENGTH (< 1000 SQUARE FEET OF REGULATED IMPERVIOUS SURFACE)

Impervious Surface (sf)	4' Wide Trench Length of Trench (ft)	5' Wide Trench Length of Trench (ft)	6' Wide Trench Length of Trench (ft)	7' Wide Trench Length of Trench (ft)	8' Wide Trench Length of Trench (ft)
451-500	23.00	18.25	15.25	13.25	11.50
501-550	25.25	20.25	16.75	14.50	12.75
551-600	27.50	22.00	18.25	15.75	13.75
601-650	29.75	23.75	20.00	17.00	15.00
651-700	32.00	26.75	21.50	18.25	16.00
701-750	34.25	27.50	23.00	19.75	17.25
751-800	36.50	29.25	24.50	21.00	18.25
801-850	39.00	31.25	26.00	22.25	19.50
851-900	41.25	33.00	27.50	23.50	20.75
901-950	43.50	34.75	29.00	25.00	21.75
951-1000	~~45.75~~	36.50	30.50	26.25	23.00

* DIMENSIONS IN THIS TABLE HAVE BEEN DETERMINED FOR MANAGING THE DIFFERENCE BETWEEN THE PRE-DEVELOPMENT AND POST-DEVELOPMENT, 2-YEAR FREQUENCY, 24-HOUR DURATION RAINFALL RUNOFF VOLUME

* TRENCH SHOULD BE SIZED BASED ON SQUARE FEET OF ROOF AREA DIRECTED TO THE PROPOSED TRENCH, WHICH MAY NOT EQUAL THE REGULATED IMPERVIOUS SURFACE PROPOSED.

EXAMPLE

SITE ADDRESS: 123 ROAD STREET, TOWN PA 07734

DATE: 7/8/21

SCALE: NOT TO SCALE

CEG CEDARVILLE

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CHESTER COUNTY PENNSYLVANIA

INFILTRATION TRENCH NOTES

SHEET NO. 3B

3B OF 4

NOTES

§ 345-306.M: DURING SITE CONSTRUCTION, ALL INFILTRATION PRACTICE COMPONENTS SHALL BE PROTECTED FROM COMPACTION DUE TO HEAVY EQUIPMENT OPERATION OR STORAGE OF FILL OR CONSTRUCTION MATERIAL. INFILTRATION AREAS SHALL ALSO BE PROTECTED FROM SEDIMENTATION. AREAS THAT ARE ACCIDENTALLY COMPACTED OR GRADED SHALL BE REMEDIATED TO RESTORE SOIL COMPOSITION AND POROSITY. ADEQUATE DOCUMENTATION TO THIS EFFECT SHALL BE SUBMITTED TO THE TOWNSHIP ENGINEER FOR REVIEW. ALL AREAS DESIGNATED FOR INFILTRATION SHALL NOT RECEIVE RUNOFF UNTIL THE CONTRIBUTORY DRAINAGE AREA HAS ACHIEVED FINAL STABILIZATION.

§ 345-306.N: WHERE SEDIMENT TRANSPORT IN THE STORMWATER RUNOFF IS ANTICIPATED TO REACH THE INFILTRATION SYSTEM, APPROPRIATE PERMANENT MEASURES TO PREVENT OR COLLECT SEDIMENT SHALL BE INSTALLED PRIOR TO DISCHARGE TO THE INFILTRATION SYSTEM.

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(4) THE TOPS AND SIDES OF ALL INFILTRATION TRENCH SHALL BE COVERED WITH DRAINAGE FABRIC. FABRIC SHALL BE NONWOVEN FABRIC ACCEPTABLE TO THE TOWNSHIP ENGINEER.

(5) STORMWATER SHALL BE DISTRIBUTED THROUGHOUT THE ENTIRE SEEPAGE BED/TRENCH OR LIKE FACILITY AND PROVISIONS FOR THE COLLECTION OF DEBRIS SHALL BE PROVIDED IN ALL FACILITIES.

(6) PA ONECALL IS REQUIRED BEFORE ANY CONSTRUCTION ACTIVITIES COMMENCE.

TRENCH LENGTH (1000-2000 SQUARE FEET OF REGULATED IMPERVIOUS SURFACE)

Impervious Surface (sf)	4' Wide Trench Length of Trench (ft)	5' Wide Trench Length of Trench (ft)	6' Wide Trench Length of Trench (ft)	7' Wide Trench Length of Trench (ft)	8' Wide Trench Length of Trench (ft)
1000	45.75	36.50	30.50	26.25	23.00
1001-1050	46.75	37.50	31.25	26.75	23.50
1051-1100	48.00	38.50	32.00	27.50	24.00
1101-1150	49.25	39.25	32.75	28.25	24.75
1151-1200	50.25	40.25	33.50	28.75	25.25
1201-1250	54.75	44.00	36.50	31.50	27.50
1251-1300	59.50	47.50	39.75	34.00	29.75
1301-1350	61.75	49.25	41.25	35.25	71.00
1351-1400	64.00	51.25	42.75	36.50	32.00
1401-1450	66.25	53.00	44.25	38.00	33.25
1451-1500	68.50	54.75	45.75	39.25	34.25
1501-1550	70.75	56.75	47.25	40.50	35.50
1551-1600	73.00	58.50	48.75	41.75	36.50
1601-1650	75.25	60.25	50.25	43.00	37.75
1651-1700	77.75	62.25	51.75	44.50	39.00
1701-1750	80.00	64.00	53.25	45.75	40.00
1751-1800	82.25	65.75	54.75	47.00	41.25
1801-1850	84.50	67.50	56.25	48.25	42.25
1851-1900	86.75	69.50	58.00	49.75	43.50
1901-1950	89.00	71.25	59.50	51.00	44.50
1951-1999	91.25	73.00	61.00	52.75	45.75

* DIMENSIONS IN THIS TABLE HAVE BEEN DETERMINED FOR MANAGING THE DIFFERENCE BETWEEN THE PRE-DEVELOPMENT AND POST-DEVELOPMENT, 2-YEAR FREQUENCY, 24-HOUR DURATION RAINFALL RUNOFF VOLUME

* TRENCH SHOULD BE SIZED BASED ON SQUARE FEET OF ROOF AREA DIRECTED TO THE PROPOSED TRENCH, WHICH MAY NOT EQUAL THE REGULATED IMPERVIOUS SURFACE PROPOSED.

SITE ADDRESS: 123 ROAD STREET, TOWN PA 07734

DATE: 7/8/21

SCALE: NOT TO SCALE

CEG CEDARVILLE

159 East High Street, Suite #500 | Pottstown, PA 19464
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CHESTER COUNTY PENNSYLVANIA

INFILTRATION TRENCH NOTES

SHEET NO. 3C

3C OF 4

EXAMPLE

STORMWATER FACILITIES OPERATIONS AND MAINTENANCE PLAN

THE HOMEOWNER WILL BE RESPONSIBLE FOR THE OPERATION AND MAINTENANCE OF ALL STORMWATER AND BMP FACILITIES. THE FACILITIES WILL INCLUDE THE INFILTRATION TRENCH ON THE PROPERTY AS WELL AS ANY YARD OR ROOF DRAINS, PIPING, POP-UP EMITTERS OR CLEAN-OUTS SHOWN ON THIS PLAN.

MAINTENANCE AND OPERATION WILL BE AS FOLLOWS:

1. THE INFILTRATION TRENCH AND CONVEYANCES DESCRIBED IN THIS PLAN SHALL BE INSPECTED ANNUALLY OR AS NEEDED FOLLOWING SIGNIFICANT PRECIPITATION EVENTS TO ASCERTAIN IF ANY SEDIMENT IS ENTERING THE FACILITIES. THE INFILTRATION TRENCH AND CONVEYANCES DESCRIBED IN THIS PLAN SHALL BE CLEANED IF NECESSARY. CLEANING WILL CONSIST OF REMOVING THE ACCUMULATED SILT, DEBRIS, OR SEDIMENT.
2. THE OVERLYING VEGETATION ON THE INFILTRATION TRENCH SHALL BE MAINTAINED IN GOOD CONDITION, AND ANY BARE SPOTS RE-VEGETATED AS SOON AS POSSIBLE.
3. VEHICULAR ACCESS ON THE INFILTRATION TRENCH SHOULD BE PROHIBITED, AND CARE SHOULD BE TAKEN TO AVOID EXCESSIVE COMPACTION BY MOWERS.
4. REPAIR ALL DAMAGED PIPING, CLEAN-OUTS, AND POP-UP EMITTERS PROMPTLY TO PREVENT SEDIMENT FROM ENTERING THE SYSTEM. SPECIAL CARE SHOULD BE TAKEN TO AVOID DAMAGING EXPOSED ELEMENTS WITH MOWERS AND/OR STRING TRIMMERS.
5. GRASSES OVER THE INFILTRATION TRENCH SHALL BE MOWED AT LEAST TWICE EACH YEAR. TREES AND SHRUBS SHOULD NOT BE PERMITTED TO GROW ABOVE THE INFILTRATION TRENCH.

EXAMPLE

SITE ADDRESS: 123 ROAD STREET, TOWN PA 07734

DATE: 7/8/21

SCALE: NOT TO SCALE

CEG CEDARVILLE

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610.705.4500 (Office) | 610.705.4900 (Fax)

CHESTER COUNTY PENNSYLVANIA

INFILTRATION TRENCH OPERATION & MAINTENANCE NOTES

SHEET NO. 4

4 OF 4

ORDINANCE APPENDIX B

CONSERVATION DESIGN AND LOW IMPACT DEVELOPMENT SITE DESIGN

CONSERVATION DESIGN & LOW IMPACT DEVELOPMENT SITE DESIGN

INTRODUCTION

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

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

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

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

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

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

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

IMPLEMENTATION CHALLENGES

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

Dialogue between developers, municipalities, and planners should be encouraged early in the design process to evaluate all potential site design options. Discussions on proposed site layouts often do not occur until after the submission of preliminary/final developments

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

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

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

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

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

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

DESIGN PRINCIPLES AND TECHNIQUES

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

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

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

Figure 1
Conservation Design Principles
Maintaining Site Hydrology and Managing Stormwater

Step 1 – Minimize Generation of Stormwater Runoff through Development Design: Achieved by Designing to the Land & Optimizing the Cumulative Benefits of the Site's Natural Hydrologic Features

- Consider Natural Drainage Patterns and Infiltration Characteristics
- Reduce Grading and Compaction by Utilizing Natural Topography
- Consider Placement and Scale of Streets and Buildings
- Minimize Land Disturbance – both Surface and Subsurface
- Minimize Cumulative Area to be Covered by Impervious and Compacted Surfaces

Step 2 – Manage Stormwater as Close to the Point of Generation as Possible using Distributed LID Practices

- Take Advantage of the Natural Hydrologic Landscape to Achieve Runoff Controls
- Disconnect Impervious Surfaces
- Distribute Storm Flows to Green Infrastructure

Step 3 – Utilize Open Channel Conveyance (as needed)

Step 4 – Management in Common Open Space (or as conveyed to other green infrastructure practices)

- Integrate Management Facilities into the Natural Environment
- Incorporate Natural Site Features into the Design
- Create Site Amenities that can be Enjoyed by Residents and Provide a Community Aesthetic

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

volume, and enhancing water quality), as well as those related to community (protecting natural resources, preserving habitat, interconnecting open space, providing greenways, and achieving better designed communities). (See Figure 2)

Figure 2
Common Objectives Of Conservation Design

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

Common Objectives

Site Design Objectives	*Community Objectives*
Maintain Natural Drainage Patterns	Community Commons/Greens
Preserve Water Budget and Natural Infiltration	Lots that Front or Back to Open Space
Minimize Grading – Design to the Site (Minimum Disturbance, Minimum Maintenance)	"Neighborhoods" within Neighborhoods
Reduce Need for Traditional Structural Stormwater Management Facilities (incorporate the use of Green Infrastructure)	Options for a Variety of Housing Types/Lot Sizes
Reduce Impervious Cover	Incorporate Unique Site Features into the Design (Natural/Scenic/Historic)
Preserve Natural Features & Habitat (Contiguous Open Space) Roads	Preserve Characteristics of Site as Viewed from Adjoining

Provide Open Space Linkages with Adjacent Parcels

Provide Trail Systems and/or Alternative Transportation Options

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

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

Table 1 – Site Design Process Principles and Techniques

Conservation Design Principles	Select Design Techniques
Development Design that Minimizes the Generation of Stormwater Runoff: Achieved by Designing to the Land & Optimizing the Cumulative Benefits of the Site's Natural Hydrologic Features	• Maintain the natural soil structure and vegetative cover that are often critical components of maintaining the hydrologic functions of natural infiltration, bioretention, flow attenuation, evapotranspiration, and pollutant removal. Strive to achieve multiple stormwater objectives (i.e., maintain hydrologic regime including both peak rate and total volume control, water quality control, and temperature control. • Protect, or improve, natural resources to reduce the needs for environmental mitigation, future environmental restoration, and cumulative flow and water quality impacts of unnecessary disturbances within the watershed system. • Minimize the disturbance of natural surface and groundwater drainage features and patterns, discharge points and flow characteristics, natural infiltration and evapotranspiration patterns and characteristics, natural stream channel stability, and floodplain conveyance, etc. • Minimize the size of individual impervious surfaces. • Separate large impervious surfaces into smaller components. • Avoid unnecessary impervious surfaces. • Utilize porous materials where suited in lieu of impervious materials. • Prioritize on-site hydrologic features (i.e., for protection, improvement, utilization, or alteration) and natural site drainage patterns and infiltration characteristics and consider them for the cornerstones of the conceptual site design. Prevent rather than minimize. • Reduce grading and compaction by applying selective grading design methods to provide final grading patterns that preserve existing topography where it most benefits natural hydrologic functions and where needed; this results in graded areas that evenly distribute runoff and minimize concentrated runoff flows. • Consider the scale and placement of buildings and other infrastructure to minimize impact to natural hydrologic features. • Incorporate unique natural, scenic, and historic site features into the configuration of the development, and ensure flexibility in development design to meet community needs for complementary and aesthetically pleasing development.

Conservation Design Principles	Select Design Techniques
Managing Stormwater as Close to the Point of Generation as Possible using Distributed LID Practices	• Incorporate natural hydrologic features that have been selected for their available capacity and function into the overall system of site runoff controls (protect their hydrologic and natural ecosystem functions without directing additional stormwater to them). • Disconnect runoff from one impervious surface to another. • Incorporate LID (or similar) green infrastructure and distribute storm flows to: o Reduce runoff; o Manage stormwater at or as close to the point of generation as possible; o Disconnect discharges from streets and municipal storm sewer systems; and o Select and design BMPs to give first priority to nonstructural and vegetated (landscape-based) BMPs, second priority to surface structural BMPs, third priority to subsurface structural BMPs, and design subsurface BMPs as shallow as possible.
Open Channel Conveyance (as needed)	• Convey concentrated flows by means of innovative pervious vegetated channels rather than piped systems • Provide open channel conveyance, as needed, to: o Treat water quality; o Reduce runoff velocity; and o Promote infiltration and evapotranspiration of runoff.
Management in Common Open Space (or as conveyed to other green infrastructure practices)	• Rely on natural processes within the soil mantle and the plant community to the maximum extent practicable. • Manage remaining conveyed stormwater from small storms in common open space areas to achieve multiple objectives: o Disperse storm flows and reduce velocity; o Treat water quality; and o Promote infiltration and evapotranspiration of runoff. • Provide for appropriate conveyance to retention or detention storage facilities as needed for flows from large storm events (as needed). • Maintain open space functions consistent with common area uses (passive recreation, on-site sewage management, scenic vistas, etc). Management practices should be integrated into the natural environment and be site amenities.

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

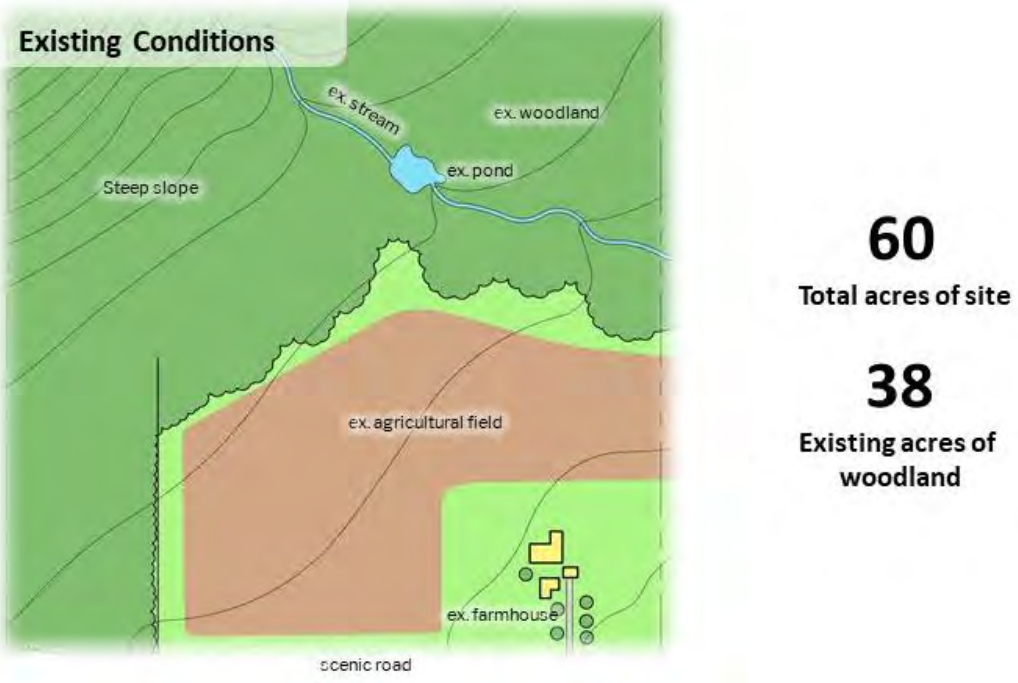


Figure 3.1: Existing conditions on a 60-acre, majority wooded parcel

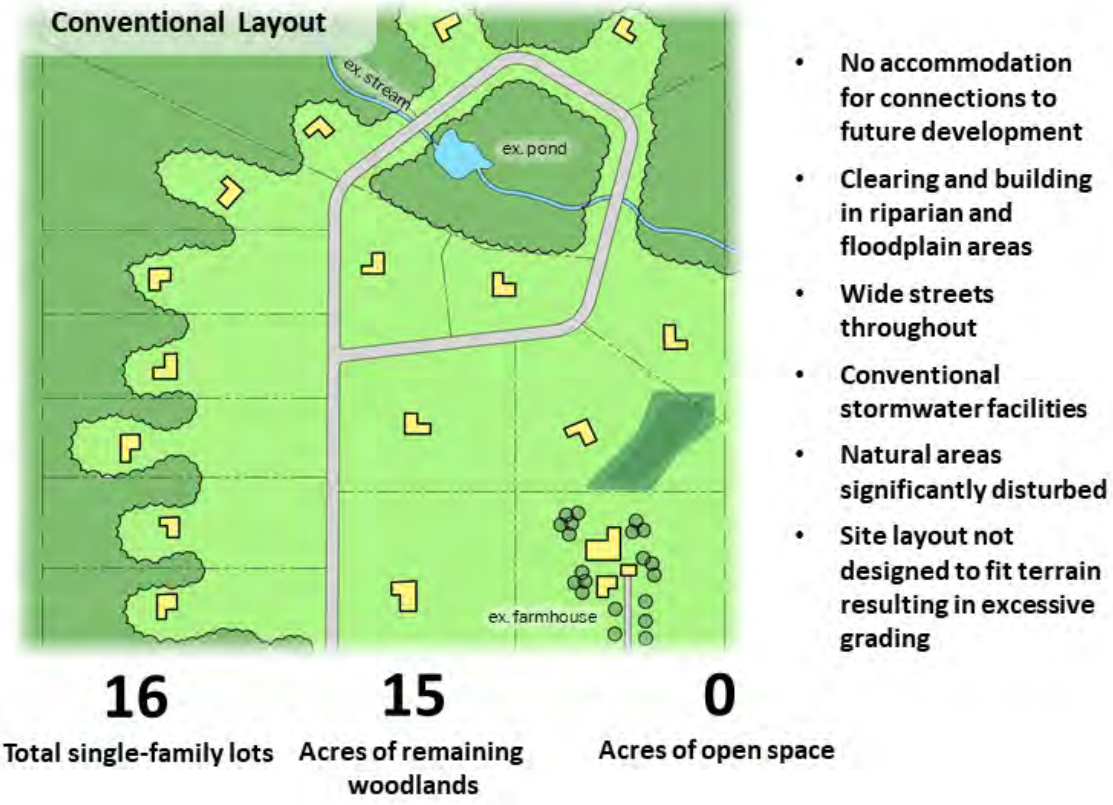


Figure 3.2: Example of how the above parcel may be developed using conventional layout methods

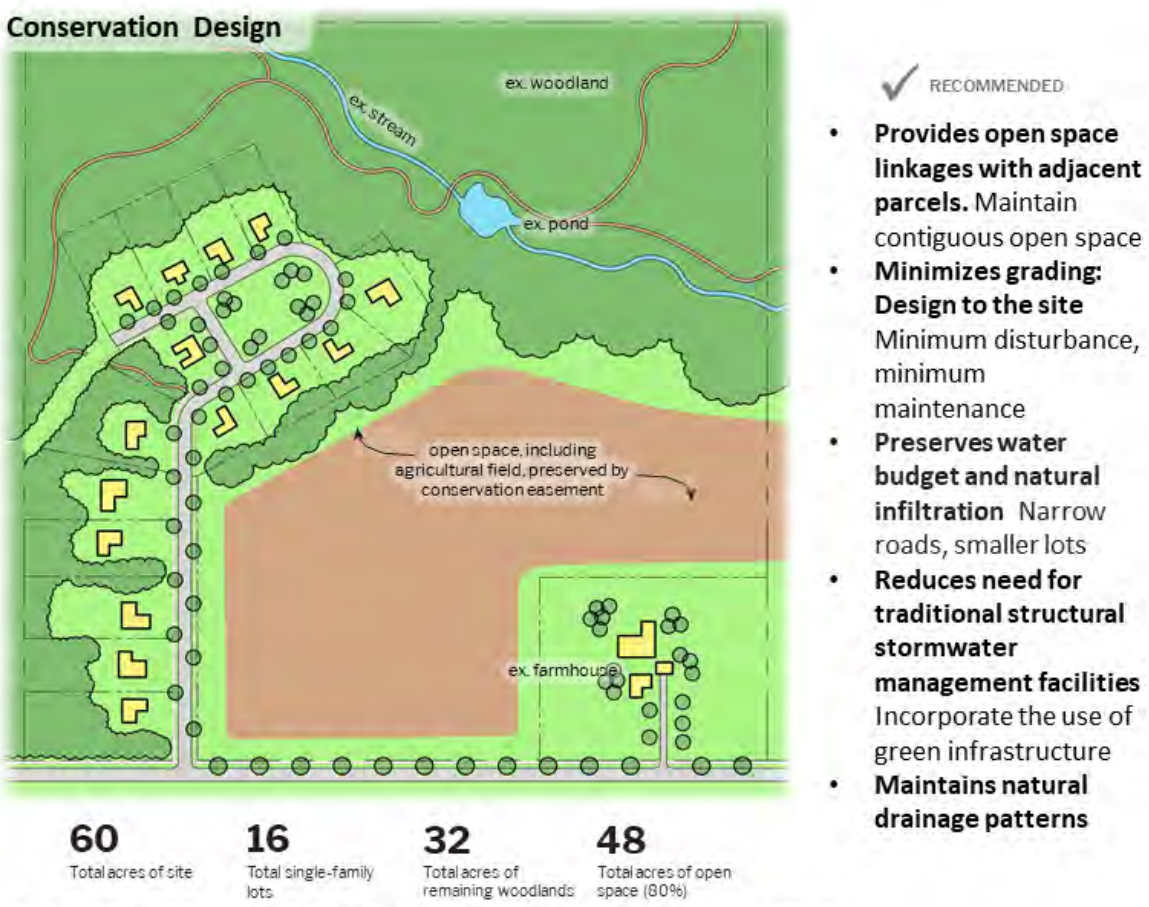


Figure 3.3: Example of a single-family development on the same parcel using the principles of Conservation Design and Low Impact Development

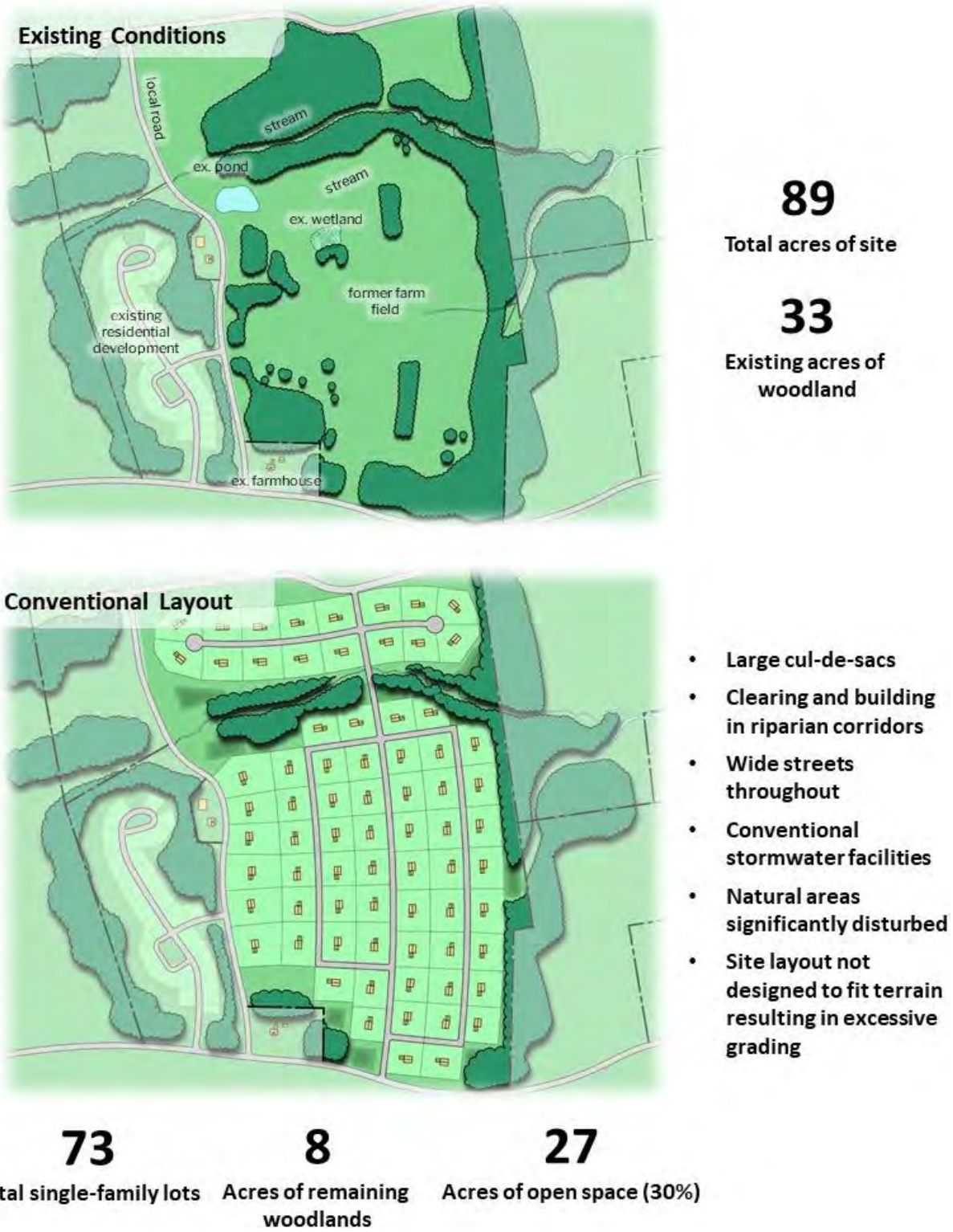


Figure 3.4: Example of how a larger parcel with a mix of open meadows, woodlands, scattered fence rows, and stream corridors may be developed using conventional layout methods. Lot sizes are approximately ¾ of an acre.

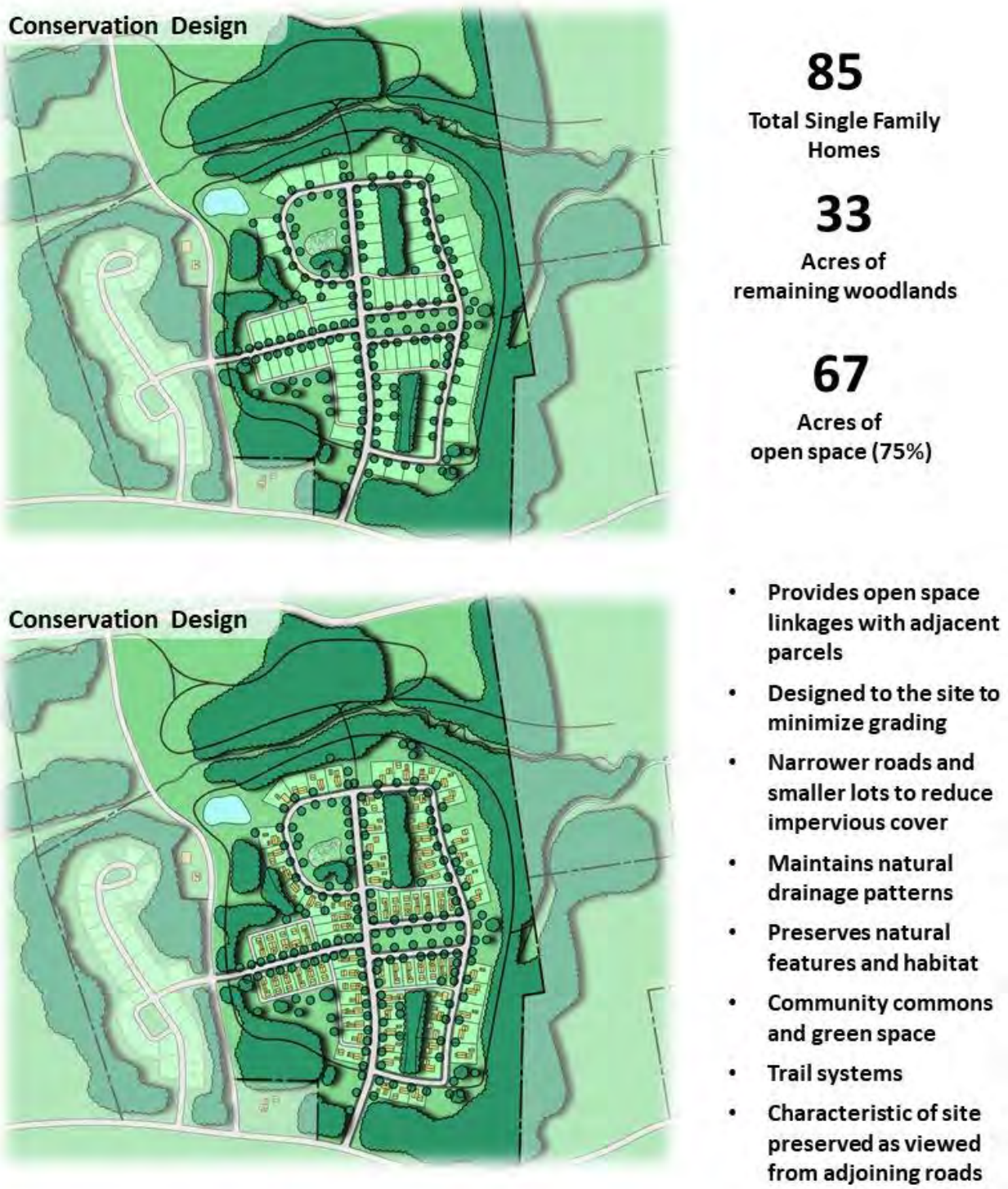


Figure 3.5: Example of single-family development on the same parcel using the principles of Conservation Design and Low Impact Development. Lot sizes are approximately ¼ of an acre.





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

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

DESIGN PROCESS

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

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

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

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

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

<u>Evaluating a Site Using Conservation Design Principles</u>

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

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

1. Determine Development Goals

- Define what is driving the decision to develop the property.

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

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

- Clearly define the goals to work towards – these are the design goals for the project. Goals could be economic and/or personal/family related, as well as visual, ecological, agricultural, historical, and educational.

- Consider the project's time schedule and that of the municipal review process.

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

- Determine the site context (defined above)

- Evaluate current and past land use (agriculture, wooded lot, vacant, brownfield, etc.)

- Assess wind patterns and micro-climate

- Delineate steep slopes and general topography

- Identify existing vegetative cover conditions according to general cover type, and label specimen trees and the canopy line of existing woodlands.

- Map hydrologic features and drainage patterns (wetlands, floodplains, streams, drainage swales, etc.)

- Identify scenic viewsheds (interior and exterior)

- Consider potential historic and cultural resources

- Assess soil patterns (hydric soils, prime agricultural soils, infiltration-capable soils, etc.) and vegetation patterns (landscape texture and patterns)

- Consider local zoning regulations

- Review the site for obvious land fragmentation (agricultural, natural habitat, human use, viewsheds)

- Determine the presence of endangered/threatened species and unusual habitats, critical natural areas, etc.

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

3. Undertake a Site Analysis

- Compare/overlay/combine the natural/scenic/historic resource and land use pattern information to create a general understanding of the site's opportunities and constraints, particularly as they relate to the design goals. Some initial constraints could present opportunities. Particular emphasis should be placed on site contours and existing site hydrology, e.g., drainage patterns, infiltration capability of soils, etc.

- Prepare a site analysis map that outlines the most important opportunities and constraints. The site analysis should identify both the traditionally unbuildable areas (wet, flood-prone, or steep) and the most outstanding aspects of the remaining land (such as scenic vistas, natural meadows, hedgerows, mature woodlands, historic buildings or other structures, stone walls, etc.). It is important to note that CD places significant emphasis on soils (particularly the manner in which water moves across and through them). Disturbance of soils, disturbance of vegetation, and compaction all affect the ability of a site to manage stormwater. For example, while it is imperative that good draining soils be preserved to the maximum extent possible, areas of poor permeability that contain robust vegetation may function quite satisfactorily (a well-developed root zone in conjunction with established vegetation can significantly improve poor soil

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

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

4. Create Conceptual Designs or Sketch Plans

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

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

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

  ii) **Locate desired/permitted structures (housing units, buildings, etc.) on the property (as they relate to Step 1 and the design goals).** Again, Conservation Design principles should be carefully considered here. Will compact development allow for a reduction in road length? Is it possible to interconnect open space, thus permitting stormwater management close to the source of generation and creating biodiversity corridors, etc. (multiple objectives)? Can structures be located so that a majority back or front to open space?

  iii) **Connect buildings or house sites with streets (logical alignment) and trails (where appropriate).** Consider ways to reduce impervious cover (one-way streets where appropriate, planted islands in cul-de-sacs, etc.).

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

- Meet with municipal officials and review plans -- what is liked, not liked, and why.

- Identify a direction for engineering and final design.

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

- Synthesize discussion of conceptual designs (sketch plans) and finalize design.

- Develop legal instruments necessary to realize plan objectives, e.g., conservation easements, deed restrictions, homeowners association, estate planning, etc. (Note: these concepts are considered throughout the design process).

6. ***Obtain Approvals (Follow-up)***

- Obtain municipal and County buy-in of master sketch plan, and

- Proceed to Final Engineered Plan approvals.

DESIGN PRACTICES

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

Site Layout Practices

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

Preserving Natural Drainage Features. Protecting natural drainage features, particularly vegetated drainage swales and channels, is desirable because of their ability to infiltrate and attenuate flows and to filter pollutants. Unfortunately, some common land

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

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

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

Disconnecting Impervious Surfaces. Impervious surfaces are significantly less of a problem if they are not directly connected to an impervious conveyance system (such as storm sewer). Two basic ways to reduce hydraulic connectivity are routing roof runoff over lawns and reducing the use of storm sewers. Site grading should promote increasing travel time of stormwater runoff from these sources and should help reduce concentration of runoff to a single point within the project site. Along roadways, where feasible, low

velocity runoff (i.e., 1-to-2-year storms) can be infiltrated in grass swales.

Routing Roof Runoff Over Lawns. Roof runoff can be easily routed over lawns in most site designs. The practice discourages direct connections of downspouts to "driveway-to-street-to-storm sewers" or parking lots. The practice also discourages sloping driveways and parking lots to the street. Crowning the driveway, to run off to the lawn, uses the lawn as a filter strip.

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

Reducing or Modifying Sidewalk Requirements. A sidewalk on one side of the street may suffice in low-traffic neighborhoods. The lost sidewalk could be replaced with bicycle/recreational trails that follow back-of-lot lines as an alternative to reduced sidewalks, where appropriate. Where used, consideration should be given to constructing trails with pervious materials.

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

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

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

objectives. For example, grading that does occur can be incorporated into terracing or berming near existing vegetation to aid in infiltration, stormwater management and pollutant filtering.

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

LID Practices and Stormwater Control Measures

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

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

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

Vegetated Open Channel Conveyances. By reducing the use of storm sewers to drain streets, parking lots, and back yards, the potential for accelerating runoff from development can be greatly reduced. This practice requires greater use of natural or vegetated drainage swales and may not be practical for some development sites, especially if there are concerns for areas that do not drain in a "reasonable" time. The practice requires educating local citizens, who may expect runoff to disappear shortly after a rainfall event.

Permeable Paving Materials. These materials include permeable interlocking concrete paving blocks or porous bituminous concrete, among others. Such materials should be considered as alternatives to conventional pavement surfaces, especially for low use surfaces such as driveways, overflow parking lots, and emergency access roads. Surfaces for which seal coats may be applied should refrain from using permeable paving materials. Note: ongoing maintenance is required for some surfaces to minimize potential for clogging.

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

BENEFITS OF CONSERVATION DESIGN

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

Given the improved sense of place and community, dollar appreciation of conservation subdivisions outpaces conventional development by upwards of 12% (The Conservation Fund, 2001). In Indiana, the use of conservation subdivision design added $20,000 in worth to each lot without decreasing the total number of lots (ConservationTools.org). Even more compact development (quarter-acre lots) sells for more than half-acre and larger lots where open space exists. Over a 20-year period, the conservation development homes built on quarter-acre lots sold for an average $17,000 more than their counterparts built on half-

acre lots (Northeastern Illinois Planning Commission, 2003). Analyses completed as a part of Chester County's *Return on Environment* report note that in Chester County, average property values have increased by more than $11,000 per lot for those homes located near open space (*Return on Environment*, Chester County, 2019). Furthermore, this same report identifies the reduced need for stormwater infrastructure as a major cost savings for conservation design subdivisions.

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

- Reduced Site preparation costs
  - Elimination of mass re-grading
  - Decrease in erosion and sediment control measures

- Reduced Infrastructure costs
  - Reduced need for storm water basins
  - Reduced roadway lengths
  - Reduced drainage pipe installations

- Increased value of units
  - Located adjacent to open space
  - Positioned to coexist with natural resource areas

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

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

CONCLUSION

The use of Conservation Design (CD), Low Impact Development (LID), and green

infrastructure offers municipalities and developers opportunities to protect and enhance the hydrology of development sites, as well as address other environmental and social issues related to development. In conclusion, development designed using these principles results in a more desirable place to live.

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

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ORDINANCE APPENDIX C

RUNOFF COEFFICIENTS AND CURVE NUMBERS

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. RUNOFF CURVE NUMBERS
(3 pages)

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

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

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

TABLE C-3. MANNING'S 'n' VALUES
(3 pages)

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

ORDINANCE APPENDIX D

WEST NILE VIRUS DESIGN GUIDANCE

WEST NILE VIRUS GUIDANCE

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

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

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

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

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

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

ORDINANCE APPENDIX E

STORMWATER BEST MANAGEMENT PRACTICES AND CONVEYANCES OPERATION AND MAINTENANCE AGREEMENT

SAMPLE AGREEMENT

REVISED
Chester County Water Resources Authority
June 2, 2022

Prepared By: *Insert Preparer's Name* *Insert Preparer's Address Line 1* *Insert Preparer's Address Line 2* *Insert Preparer's Phone Number* Return To: *Insert Municipality's Name* *Insert Municipality's Address Line 1* *Insert Municipality's Address Line 2* *Insert Municipality's Phone Number* UPI#: *Insert UPI(s) of properties with BMPs and/or Conveyances for the O&M Agreement* Property Street Address: *Insert the street address of the property*	LEAVE BLANK For Recorder's Use Only

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 _____, 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 (hereinafter BMP(s)) and Conveyances Operations and Maintenance Plan OR Simplified Approach Stormwater Management Site Plan _____(title of approved plans) approved by the Municipality _____(date) (hereinafter referred to as the "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" – Activities, facilities, designs, measures, or procedures as specifically identified in the Plan, 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 the Municipality's Stormwater Management Ordinance. Stormwater BMPs are commonly grouped into one (1) of two (2) broad categories or measures: "structural" or "nonstructural." Nonstructural BMPs or measures refer to low impact development and conservation design practices used to minimize the contact of pollutants with stormwater runoff. These practices aim to limit the total volume of stormwater runoff and manage stormwater at its source by techniques such as protecting natural systems and incorporating existing landscape features. Nonstructural BMPs include, but are not limited to, the protection of sensitive and special value features such as wetlands and riparian areas, the preservation of open space while clustering and concentrating development, the reduction of impervious cover, and the disconnection of downspouts from storm sewers. Structural BMPs are those that consist of a constructed system that is designed and engineered to capture and treat stormwater runoff. Structural BMPs are those that consist of a physical system that is designed and engineered to capture and treat stormwater runoff. Structural BMPs include, but are not limited to, a wide variety of practices and devices from large-scale retention ponds and constructed wetlands to small-scale underground treatment systems, infiltration facilities, filter strips, bioretention, wet ponds, permeable paving, grassed swales, riparian buffers, sand filters, detention basins, and other manufactured devices designed to mitigate stormwater impacts. The BMPs identified in the Plan are permanent appurtenances to the Property; and

Conveyance – As specifically identified in the Plan, a manmade, existing, or proposed facility, feature 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 Plan are permanent appurtenances to the Property; and

WHEREAS, the Municipality requires, through the implementation of the Plan, that stormwater management BMPs and conveyances, as required by the Plan and the Municipality's Stormwater Management Ordinance, be constructed and adequately inspected, operated and maintained by the Landowner or their designee.

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 stormwater management site plans and specifications OR Simplified Approach Stormwater Management Site Plan as approved by the Municipality in the Plan.

3. Upon completion of construction, the Landowner shall be responsible for completing final As-Built Plans of all BMPs, Conveyances, or other stormwater management facilities included in the approved stormwater management site plan as per the requirements of Section 502 of the Stormwater Management Ordinance.

4. The Landowner shall inspect, operate, and maintain the BMP(s) and Conveyance(s) as shown on the Plan in good working order acceptable to the Municipality and in accordance with the specific inspection and maintenance requirements in the approved Plan and the current version of the Pennsylvania Stormwater BMP Manual, as amended.

5. 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 Plan and the Municipality's Stormwater Management Ordinance. Whenever possible, the Municipality shall notify the Landowner prior to entering the Property.

6. The Municipality shall inspect the BMP(s) and Conveyance(s) to determine if they continue to function as intended.

7. The BMP(s) and Conveyance(s) shall be inspected according to the following frequencies, at a minimum:

   a. Annually for the first 5 years.

   b. Once every 3 years thereafter.

   d. During or immediately after the cessation of a 25-year or greater storm, as determined by the Municipal Engineer.

Written inspection reports shall be created to document each inspection. The inspection report shall contain the date and time of the inspection, the individual(s) who completed the inspection, the location of the BMP, facility or structure inspected, observations on performance, and recommendations for improving performance, if applicable. Inspection reports shall be submitted to the Municipality within 30 days following completion of the inspection.

Landowners must notify the Municipality of BMP(s) and Conveyance(s) that are no longer functioning as designed and must coordinate with the Municipality to determine a schedule to repair or retrofit these systems to restore designed functionality.

8. The Landowner acknowledges that, per the Municipality's Stormwater Ordinance, it is unlawful, without written approval of the Municipality, to:

e. Modify, remove, fill, landscape, alter or impair the effectiveness of any BMP or Conveyance that is constructed as part of the approved Plan.
f. 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.
g. Allow the BMP or Conveyance to exist in a condition which does not conform to the approved Plan or this Agreement; and
h. Dispose of, discharge, place or otherwise allow pollutants including, but not limited to, deicers, pool additives, household chemicals, and automotive fluids to enter any BMP or Conveyance directly or indirectly.

9. In the event that the Landowner fails to operate and maintain the BMP(s) and Conveyance(s) as shown on the 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.

10. If the Municipality, pursuant to this Agreement, performs work of any nature or expends any funds in performance of said work for inspection, labor, use of equipment, supplies, materials, and the like, the Landowner shall reimburse the Municipality for all expenses (direct and indirect) incurred within 30 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.

11. 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.

12. 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' fees, regarding said damages, judgments or claims.

13. 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.

14. Failure or delay in enforcing any provision of this Agreement shall not constitute a waiver by the Municipality of its rights of enforcement hereunder.

15. 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.

16. 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 Chester County, Pennsylvania, and shall constitute a covenant running with the Property, in perpetuity.

WITNESS the following signatures and seals:

ATTEST:

(SEAL) For the Municipality:

_____

(SEAL) For the Landowner:

_____

ATTEST:

_____ (City, Borough, Township)

By Individual:

State of _____

County of _____

On this _____ day of _____, 20__. Before me, the undersigned officer, personally appeared _____, known to me (or satisfactorily proven) to be person whose name(s) is/are subscribed to the within instrument and acknowledged that _____executed the same for the purpose therein contains.

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

_____
Notary Public

My commission expires:

By the Company:

State of _____

County of _____

On this _____ day of _____, 20__, before me, the undersigned officer, personally appeared _____, who acknowledged himself/herself to be _____ of _____, a _____, and that he/she being authorized to do so, executed the forgoing instrument for the purpose therein contained by signing the name of the Company by herself/himself as_____.

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

_____
Notary Public

My commission expires: