ORDINANCE APPENDIX G

REFERENCES

REFERENCES

BMP Manuals

California
California Stormwater BMP Handbook: New Development and Redevelopment (January 2003) – separate file available at **http://www.cabmphandbooks.org/Development.asp**

Georgia
Georgia Stormwater Management Manual Volume 2: Technical Handbook (August 2001)- separate file **(http://www.georgiastormwater.com/)**

Maryland
2000 Maryland Stormwater Design Manual – **http://www.mde.state.md.us/Programs/Waterprograms/SedimentandStormwater/stormwater design/index.asp**

Massachusetts
Stormwater Management, Volume Two: Stormwater Technical Handbook (Massachusetts, 1997) – separate file available at **http://www.state.ma.us/dep/brp/stormwtr/stormpub.htm**

Minnesota
Minnesota Urban Small Sites BMP Manual: Stormwater Best Management Practices for Cold Climates (July 2001) – **http://www.metrocouncil.org/environment/Watershed/BMP/manual.htm**

New Jersey
Revised Manual for New Jersey: Best Management Practices for Control of Nonpoint Source Pollution from Stormwater (Fifth Draft May 2000) – **http://www.state.nj.us/dep/watershedmgt/bmpmanual.htm**

New York
New York State Stormwater Management Design Manual (2001) – **http://www.dec.state.ny.us/website/dow/swmanual/swmanual.html**

Pennsylvania

Pennsylvania Department of Environmental Protection ***Pennsylvania Stormwater Best Management Practices Manual***, Pub. No. 363-0300-002, December 30, 2006

Washington
Stormwater Management Manual for Western Washington (August 2001) – **http://www.ecy.wa.gov/programs/wq/stormwater/manual.html**

Federal
Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring (FHWA) – **http://www.fhwa.dot.gov/environment/ultraurb/3fs1.htm**

USEPA Infiltration Trench Fact Sheet (September 1999) – **http://cfpub.epa.gov/npdes/stormwater/menuofbmps/post.cfm**

Riparian Buffer References

Alliance for the Chesapeake Bay, Pennsylvania Department of Environmental Protection, September 2000. *Forest Buffer Toolkit*, Stream ReLeaf Program.

Penn State College of Agricultural Sciences, 1996. *Establishing Vegetative Buffer Strips Along Streams to Improve Water Quality.* Publication # AGRS-67.

Fike, Jean, June 1999. *Terrestrial & Palustrine Plant Communities of Pennsylvania,* Pennsylvania Natural Diversity Inventory, The Nature Conservancy, Western Pennsylvania Conservancy, and Pennsylvania Department of Conservation and Natural Resources.

Pennsylvania Association of Conservation Districts, Inc., Keystone Chapter, Soil and Water Conservation Society, Pennsylvania Department of Environmental Protection, Natural Resources Conservation Service, 1998. P*ennsylvania Handbook of Best Management Practices for Developing Areas.* Prepared by CH2MHill.

Palone, R. S. and A. H. Todd (eds), 1997. *Chesapeake Bay Riparian Handbook: A Guide for Establishing and Maintaining Riparian Forest Buffers.* Chesapeake Bay Program and Northeastern Area State and Private Forestry. Natural Resources Conservation Service Cooperative State Research Education and Extension Services.

Rupprecht, R., Kilgore, C., and Gunther, R., "Riparian and Wetland Buffers for Water-Quality Protection." *Stormwater* Nov.-Dec. 2009, Vol 10, No. 8: 46-51. Print.

The Federal Interagency Stream Restoration Working Group (FISRWG, 10/1998). *Stream Corridor Restoration Principles, Processes, and Practices.* GPO Item No. 0120-A; SuDocs No. A57.6/2:EN3/PT.653. ISBN-0-934213-59-3. Published October 1998. Revised August 2000.

ORDINANCE APPENDIX H

WEST NILE VIRUS 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 I

STORMWATER CONTROLS AND BEST MANAGEMENT PRACTICES OPERATIONS AND MAINTENANCE AGREEMENT

STORMWATER CONTROLS AND BEST MANAGEMENT PRACTICES OPERATIONS AND MAINTENANCE AGREEMENT

THIS AGREEMENT, made and entered into this _____ day of _____, 20__, by and between _____, (hereinafter the "Landowner"), and _____, _____ County, Pennsylvania, (hereinafter "Municipality");

WITNESSETH

WHEREAS, the Landowner is the owner of certain real property as recorded by deed in the land records of _____ County, Pennsylvania, Deed Book _____ at Page _____, (hereinafter "Property").

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

WHEREAS, the Stormwater Controls and BMP Operations and Maintenance Plan approved by the Municipality (hereinafter referred to as the "Plan") for the Property identified herein, 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 Best Management Practices (BMPs); and

WHEREAS, the Municipality and the Landowner, his successors, 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 on-site stormwater BMPs 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 used to manage stormwater impacts from land development, to protect and maintain water quality and infiltration, and to otherwise meet the purposes of the municipal Stormwater Management Ordinance, including but not limited to infiltration trenches, seepage pits, filter strips, bioretention, wet ponds, permeable paving, rain gardens, grassed swales, forested buffers, sand filters, and detention basins.

- Infiltration Trench – A BMP surface structure designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or groundwater aquifer,

- Seepage Pit – An underground BMP structure designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or groundwater aquifer,

- Rain Garden – A BMP overlain with appropriate mulch and suitable vegetation designed, constructed, and maintained for the purpose of providing infiltration or recharge of stormwater into the soil and/or underground aquifer, and

WHEREAS, the Municipality requires, through the implementation of the Plan, that stormwater management BMPs as required by said Plan and the municipal Stormwater Management Ordinance be constructed and adequately operated and maintained by the Landowner, his successors, and assigns.

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

1. The BMPs shall be constructed by the Landowner in accordance with the plans and specifications identified in the Plan.

2. The Landowner shall operate and maintain the BMP(s) as shown on the Plan in good working order acceptable to the Municipality and in accordance with the specific maintenance requirements noted on the Plan.

3. The Landowner hereby grants permission to the Municipality, its authorized agents, and employees to enter upon the property, at reasonable times and upon presentation of proper identification, to inspect the BMP(s) whenever it deems necessary. Whenever possible, the Municipality shall notify the Landowner prior to entering the Property.

4. In the event that the Landowner fails to operate and maintain the BMP(s) as shown on the Plan in good working order acceptable to the Municipality, the Municipality or its representatives may enter upon the Property and take whatever action is deemed necessary to maintain said BMP(s). This provision shall not be construed to allow the Municipality to erect any permanent structure on the land of the Landowner. 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.

5. In the event that the Municipality, pursuant to this Agreement, performs work of any nature or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner shall reimburse the Municipality for all expenses (direct and indirect) incurred within ten (10) days of receipt of an invoice from the Municipality.

6. The intent and purpose of this Agreement is to ensure the proper maintenance of the on-site BMP(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.

7. The Landowner, its executors, administrators, assigns, and other successors in interest shall release the Municipality's employees and designated representatives from all damages, accidents, casualties, occurrences, or claims which might arise or be asserted against said employees and representatives from the construction, presence, existence, or maintenance of the BMP(s) by the Landowner or Municipality. In the event that a claim is asserted against the Municipality, its designated representatives, or employees, the Municipality shall

promptly notify the Landowner, and the Landowner shall defend, at his own expense, any suit based on the claim. If any judgment or claims against the Municipality's employees or designated representatives shall be allowed, the Landowner shall pay all costs and expenses regarding said judgment or claim.

8. The Municipality shall inspect the BMP(s) at a minimum of once every three (3) years to ensure their continued functioning.

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

ATTEST:

WITNESS the following signatures and seals:

(SEAL) For the Municipality:

_____

(SEAL) For the Landowner:

_____

ATTEST:

_____ (City, Borough, Township)

County of _____, Pennsylvania

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

GIVEN UNDER MY HAND THIS _____ day of _____, 20__.

_____ _____

NOTARY PUBLIC **(SEAL)**

Riparian Buffer Trail Guidelines

[Note to Municipality: The following riparian buffer trail guidelines may be modified provided that the buffer meets all minimum width and vegetation requirements detailed in Section 306 of the ordinance as well as all federal, state and local, stormwater, floodplain, and other requirements and regulations.]

Introduction

Riparian buffers are used as non-structural best management practices (BMPs) for protecting and enhancing water quality. Depending on their size, location, and design, riparian buffers often supply additional environmental, economic, aesthetic, and recreational value. Passive recreational trails can be a compatible use within riparian buffers if the trails are sized and placed appropriately. The trail guidelines below are meant to supplement Section 306, Water Quality Requirements, and do not alter or modify the regulations set forth in Section 301 General Requirements. All other applicable rules and requirements should be followed, including all federal, state, permitting, and local stormwater and floodplain ordinances.

Installing a trail does not relieve a developer or municipality of the minimum buffer and vegetation requirements described in Section 306-C, or infiltration and peak rate controls in Sections 305 and 308. Effort shall be made to mitigate water quality and peak rate adjacent the trail structure to avoid collecting runoff in a large facility and creating a point discharge. This can be accomplished by trail-side stone filtration trenches, vegetative filter strips, small bio-retention facilities, and other mechanisms subject to site constraints and municipal engineer approval. See Figure J-1. In situations where site constraints negate the feasibility of trail-side mitigation methods, effort shall be made to collect runoff in multiple stormwater facilities for segmented portions of the trail, in place of detaining stormwater in one large facility. Level spreaders shall be constructed at facility outlets to decrease point-source discharges.

As with all trails, adequate land acquisition, easements, and/or landowner permission should be obtained in advance of any trail placement. Care should be given when designing and installing trails so as not to compromise the buffer's ability to protect water quality. Many factors such as slope, vegetation, and soil type will determine the type, size, and placement of the trail within the riparian buffer. Heavily used trails and trails with wide impervious surfaces should be set back farther from the stream edge to help mitigate the effects of any associated increase in runoff. Note: failure to comply with these guidelines (Installing a trail with inadequate setback from the stream bank) could result in increased stormwater runoff, decreased water quality, stream bank degradation, and damage to the buffer or trail.

Trail Recommendations

Location, Size, and Orientation

All trails should be a reasonable width appropriate for the site conditions. It is not recommended that the width of any paved trail exceed twenty five (25) percent of the total buffer width. All trail designs and specifications are subject to approval by the municipality.

Natural vegetation must be present throughout the buffer as described in Section 306 of the ordinance. Grassy areas should be managed as meadows or be reforested and should not be mowed as lawn in any part of the buffer. Where existing vegetation is insufficient to protect water quality, additional native species should be planted to enhance the buffer.

Paved trails, if appropriate to the site, are permitted and must be located at least twenty-five (25) feet from the top of the stream bank. In limited instances, paved trails be placed closer to a stream due to topography, or in order to accommodate passive educational and recreational activities, but must always be at least ten (10) feet from the top of the stream bank. Although this can be achieved by diverting the entire trail closer to the stream, more conservative methods should be considered, such as smaller spur trails or loop trails. These smaller trails provide access to the stream, but reduce the total traffic along the sensitive stream bank.

In rare instances where the buffer width is reduced due to zoning setback or geographical constraints, the municipality should strongly consider whether the benefits of a trail outweigh the benefits of a wider buffer.

Signage

The installation of interpretive and educational signage is strongly encouraged along the trail. Signs should point out local natural resources and educate the public on how riparian buffers protect the watershed. There should be minimum disturbance in the vegetated buffer between the trail and the stream. Therefore, all appurtenances (e.g. benches, educational signs, kiosks, fountains, etc.) should be installed on the landward side of the trail, if possible. All appurtenances shall be installed in compliance with federal, state, local, stormwater, floodplain, and other regulations and permitting requirements (e.g. anchoring, etc.)

Parking Areas

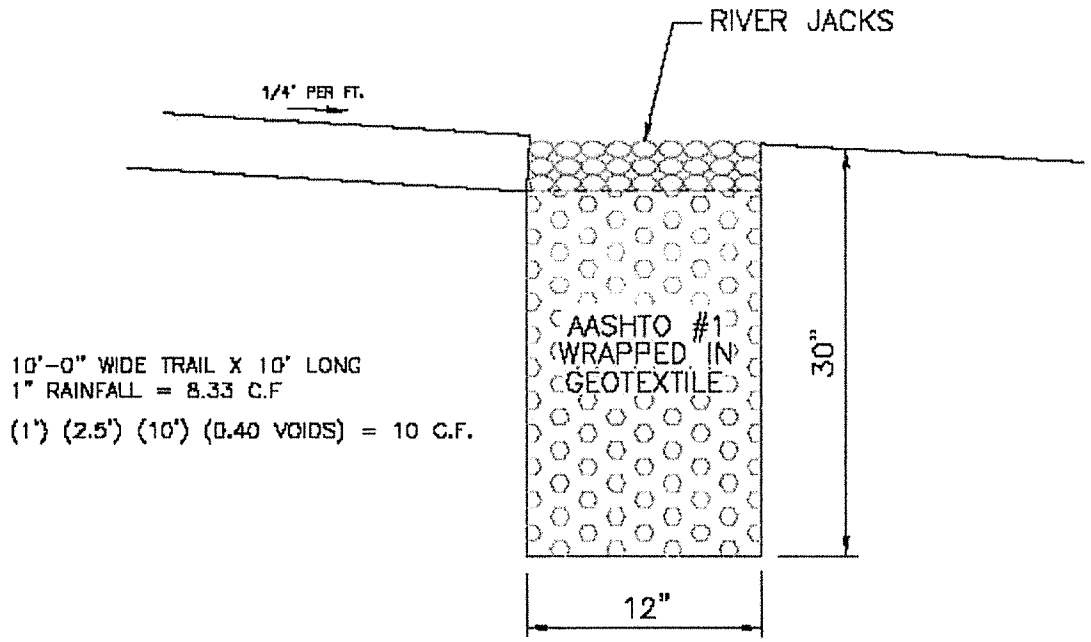
New trailheads and trail parking areas shall meet all the infiltration, rate control, and minimum setback requirements of this ordinance. Every effort should be made to coordinate trail access with existing parking areas. Any new parking areas and trailhead clearings should not encroach on the riparian buffer in any way.

Trail Maintenance

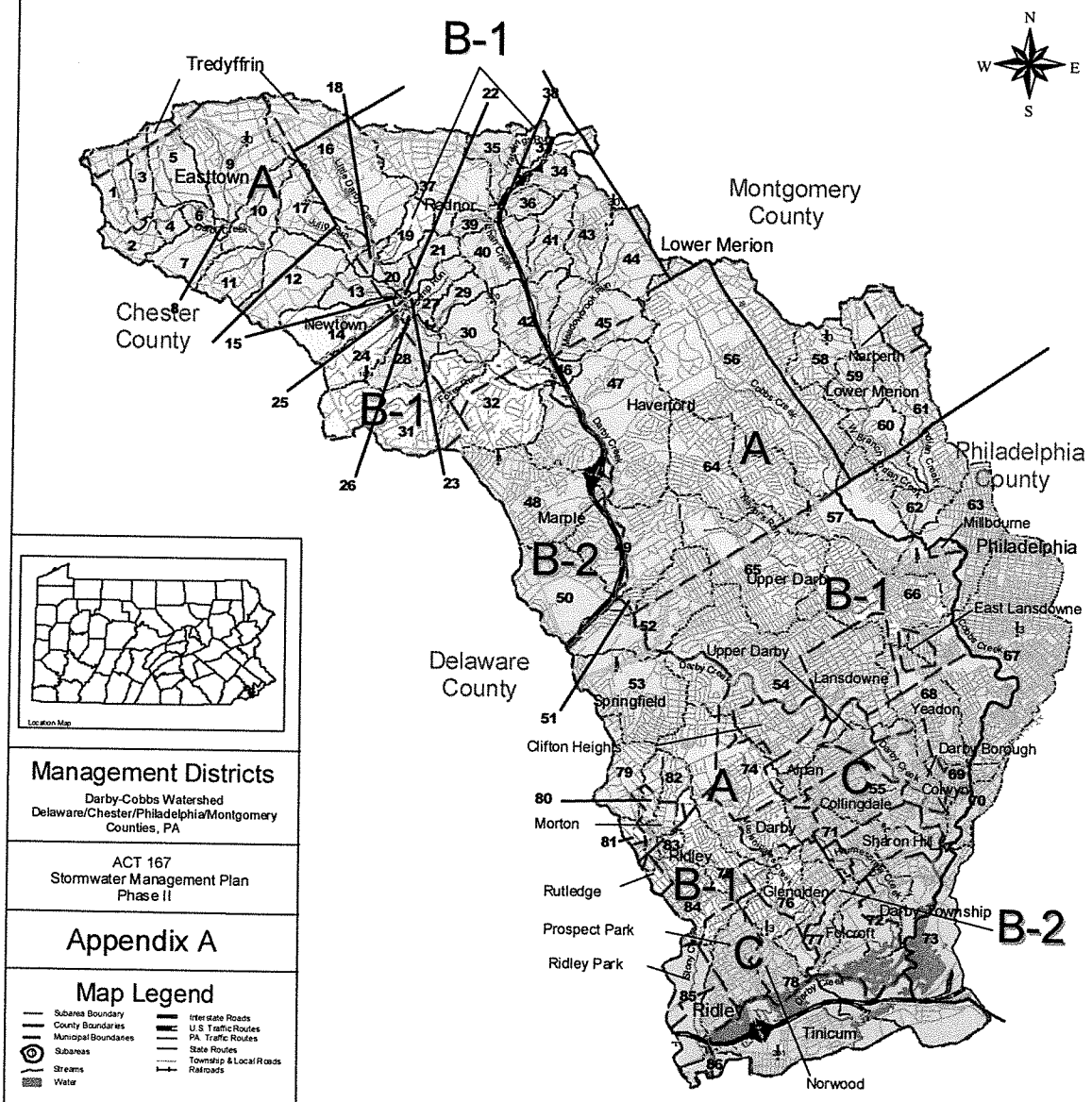
The installation and maintenance of all trails should be performed in a manner that minimizes site disturbance and prevents runoff and erosion. Soil disturbance should be avoided if possible. The removal of native trees and other native vegetation should also be kept to a minimum. If large or heavy equipment is required for trail installation, special care should be given not to damage existing trees and tree roots.

FIGURE J-1

EXAMPLE DESIGN OF A TRAIL-SIDE STONE FILTRATION TRENCH



Source:
James MacCombie, Herbert E. MacCombie Jr. P.E. Consulting Engineers & Surveyors Inc.



Location Map

Management Districts

Darby-Cobbs Watershed
Delaware/Chester/Philadelphia/Montgomery Counties, PA

ACT 167
Stormwater Management Plan
Phase II

Appendix A

Map Legend

- Subarea Boundary
- County Boundaries
- Municipal Boundaries
- Subareas
- Streams
- Water
- Interstate Roads
- U.S. Traffic Routes
- PA. Traffic Routes
- State Routes
- Township & Local Roads
- Railroads

Prepared For:
Delaware County Planning Department
Court House/Government Center
201 West Front Street
Media, PA 19063
610-891-5200

Note

Portions of these maps were generated from existing data sources as listed below. This existing data was utilized for base mapping purposes and is shown on the maps for spatial reference only. This data did not enter into any computations or affect the reliability of the hydrologic analysis. Borton-Lawson Engineering has found some inaccuracies in some of this data and has corrected the data in locations where these discrepancies were obvious, however, it was not a part of this ACT 167 Plan to correct all of the base data.

Data Sources:
DRGs - USGS
Subareas - BLE

Borton Lawson
ENGINEERING
651 Baltimore Drive
Suite 200
Wilkes-Barre, PA 18702-7963
570-821-1999 Fax 570-821-1990
914 Chestnut Drive
Suite 200
Bell, PA 19014
610-837-5918 Fax 610-837-5918
World Wide Web : http://www.borton-lawson.com

Prepared By: CGF | Check By:
Project Number: 99513.01 | Date of Plot: December 2003

Management Districts Legend

	Design Storm Proposed Conditions	Reduce To	Design Storm Existing Conditions
A	2 - Year		1 - Year
	5 - Year		5 - Year
	10 - Year		10 - Year
	25 - Year		25 - Year
	100 - Year		100 - Year
B-1	2 - Year		1 - Year
	10 - Year		5 - Year
	25 - Year		10 - Year
	50 - Year		25 - Year
	100 - Year		100 - Year
B-2	2 - Year		1 - Year
	5 - Year		2 - Year
	25 - Year		5 - Year
	50 - Year		10 - Year
	100 - Year		100 - Year
C*	Provisional Discharge District (see notes below *)		

* If storms greater than the 2 - year storm cannot be conveyed to a stream or watercourse in a safe manner, then District A requirements shall apply. (See model ACT 167 Stormwater Management Ordinance, Article III Section 308 for details.)

In addition to the Management District Criteria above, the groundwater recharge (Section 305), water quality (Section 306), and streambank erosion (Section 307) requirements shall also apply to all Management Districts within the Darby-Cobbs Watershed.

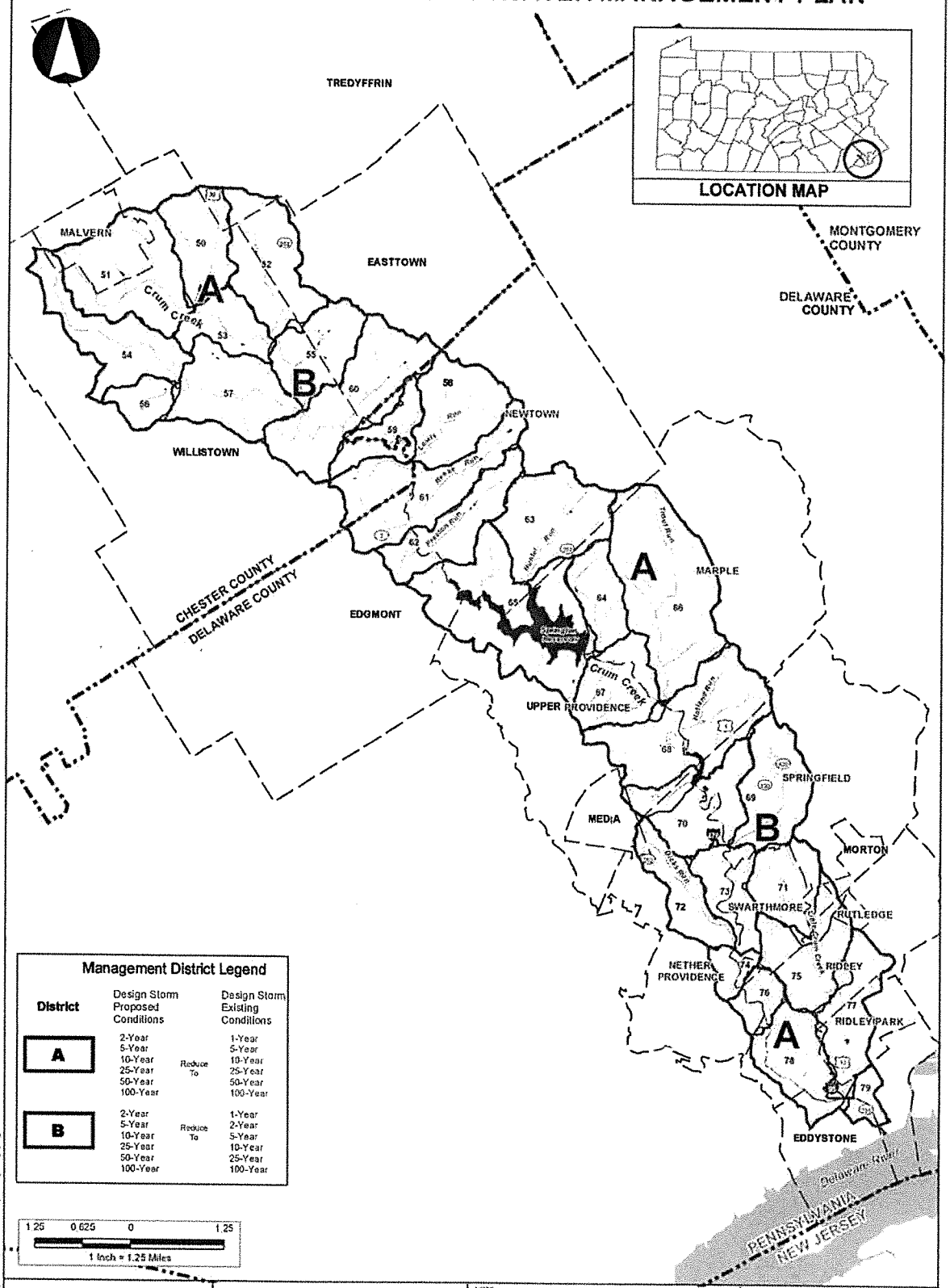
file: p:\99513\01\data\gis\arcinfo\shed.apr\Appendix A - Management Districts.D

ORDINANCE APPENDIX A

WATERSHED STORMWATER MANAGEMENT DISTRICT MAPS

Insert 11" x 17" Watershed Management District Maps Here

CRUM CREEK
PHASE II - ACT 167 STORMWATER MANAGEMENT PLAN



Management District Legend

District	Design Storm Proposed Conditions		Design Storm Existing Conditions
A	2-Year 5-Year 10-Year 25-Year 50-Year 100-Year	Reduce To	1-Year 5-Year 10-Year 25-Year 50-Year 100-Year
B	2-Year 5-Year 10-Year 25-Year 50-Year 100-Year	Reduce To	1-Year 2-Year 5-Year 10-Year 25-Year 100-Year

APPENDIX A
MANAGEMENT DISTRICTS

Prepared For:
Delaware County Planning Department
Courthouse and Government Center Bldg
201 West Front Street
Media, PA 19063
610-891-5200

Legend
- WATERSHED BOUNDARY
- SURFACE WATER
- STREAMS
- SUBAREAS
- COUNTY BOUNDARIES
- MUNICIPAL BOUNDARIES

Roads
- INTERSTATE
- US HIGHWAY
- PA HIGHWAY
- OTHER ROADS

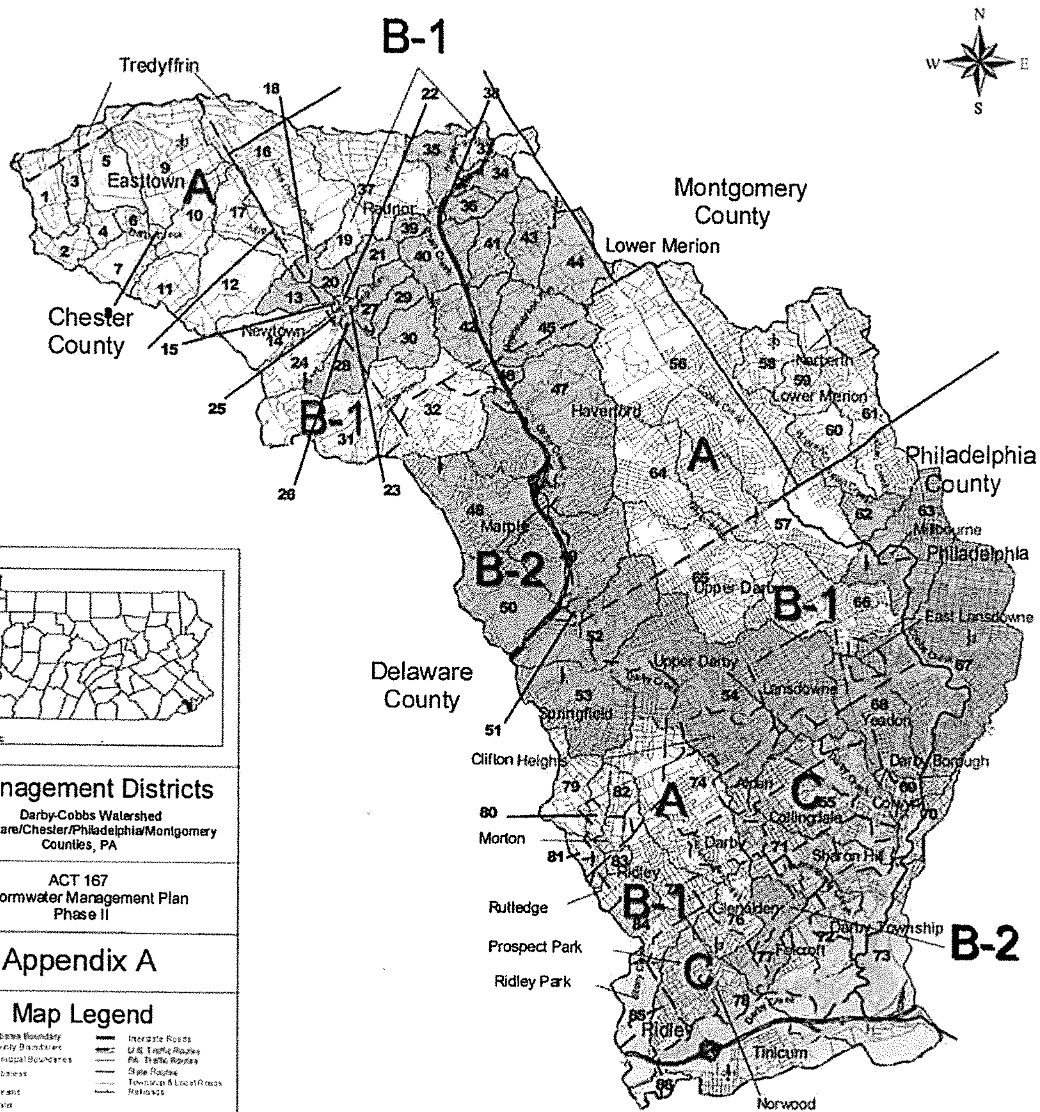
NOTE
Portions of this map were generated from existing data sources as listed below. These data are shown on the map for general reference only. These data do not enter into any computations or affect the reliability of the hydrologic analysis. Berlon Lawson Engineering has found some inaccuracies in some of these data and has corrected the data in locations where discrepancies were obvious. However, it is not a part of this Act 167 Plan to correct all of the mapping data.

DATA SOURCES:
Watershed Boundary - PADEP
State Roads - PennDOT, 2004
Local Roads - PennDOT, 2001
Counties - PennDOT, 2002
Municipalities - PennDOT, 2001
Streams - PaDEP/ERRI, 2001
Lakes - Aqua America, 2001
Delaware River - USFWS (derived from NWI coverages)
Management Districts/Subareas - Delineated by Berlon-Lawson, 2006

Berlon Lawson Engineering
Northeast Pennsylvania
613 Baltimore Drive
Wilkes-Barre, PA 18702
Tel: 570-821-1590

Lehigh Valley
3893 Adler Place
Bethlehem, PA 18017
Tel: 484-821-0470

PREPARED BY: WSB CHECKED BY: SJD
Date: 10/6/2008 PROJECT #: 2004-1563.00



Management Districts

Darby-Cobbs Watershed
Delaware/Chester/Philadelphia/Montgomery Counties, PA

ACT 167
Stormwater Management Plan
Phase II

Appendix A

Map Legend

Prepared For:
Delaware County Planning Department
Court House/Government Center
201 West Front Street
Media, PA 19063
610-891-5200

Borton Lawson

Management Districts Legend

	Design Storm Proposed Conditions	Reduce To	Design Storm Existing Conditions
A	2 - Year		1 - Year
	5 - Year		5 - Year
	10 - Year		10 - Year
	25 - Year		25 - Year
	100 - Year		100 - Year
B-1	2 - Year		1 - Year
	10 - Year		5 - Year
	25 - Year		10 - Year
	50 - Year		25 - Year
	100 - Year		100 - Year
B-2	2 - Year		1 - Year
	5 - Year		2 - Year
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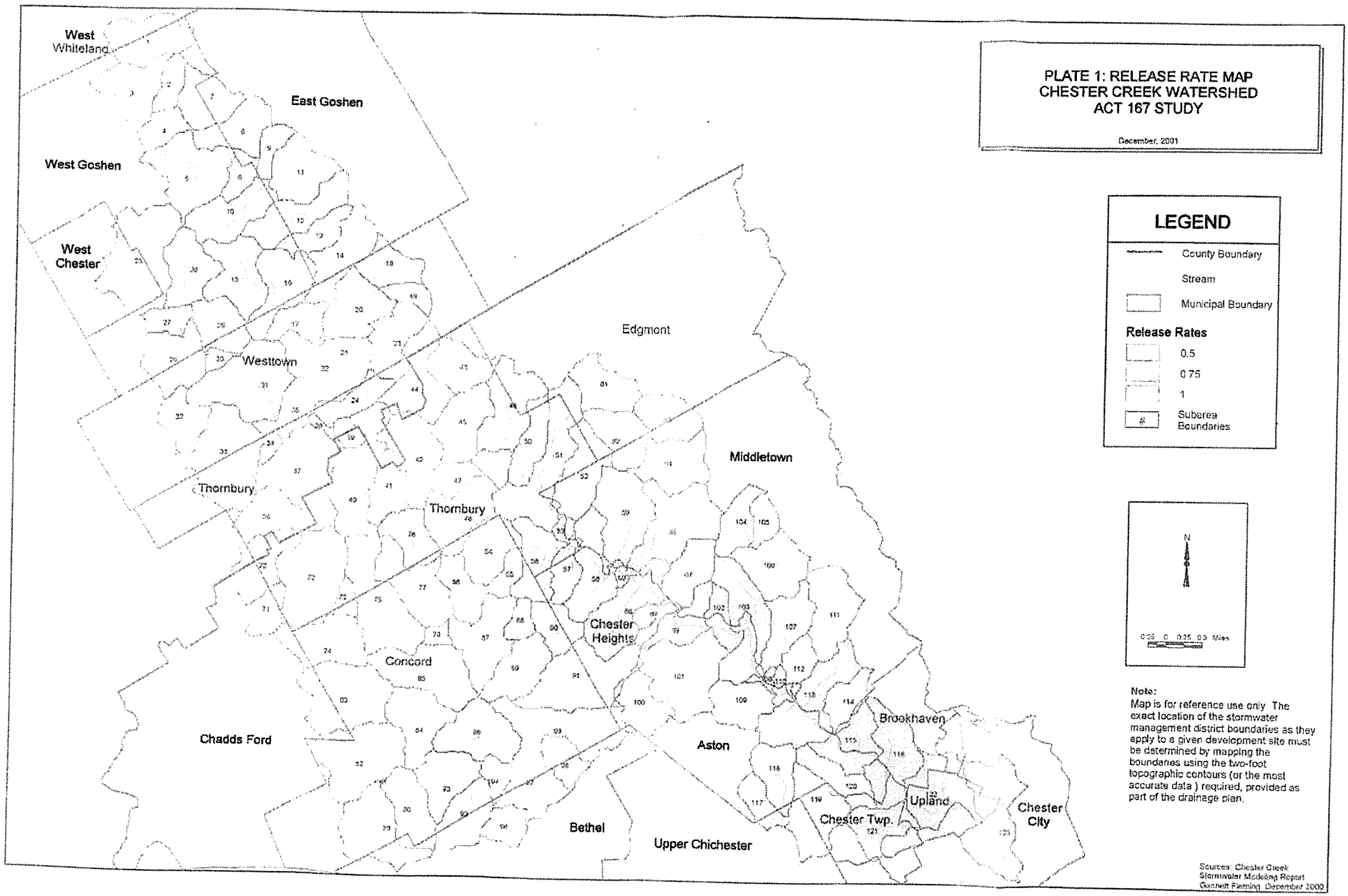
	50 - Year		10 - Year
	100 - Year		100 - Year
C*	Provisional Discharge District (see notes below *)		


West Whiteland
East Goshen
West Goshen
West Chester
Edgmont
Westtown
Middletown
Thornbury
Thornbury
Chester Heights
Concord
Chadds Ford
Aston
Brookhaven
Upland
Chester Twp.
Chester City
Bethel
Upper Chichester
PLATE 1: RELEASE RATE MAP
CHESTER CREEK WATERSHED
ACT 167 STUDY
December, 2001
LEGEND
County Boundary
Stream
Municipal Boundary
Release Rates
0.5
0.75
1
Subarea Boundaries
N
0.25 0 0.25 0.5 Miles
Note:
Map is for reference use only. The exact location of the stormwater management district boundaries as they apply to a given development site must be determined by mapping the boundaries using the two-foot topographic contours (or the most accurate data) required, provided as part of the drainage plan.
Sources: Chester Creek Stormwater Modeling Report Gannett Fleming, December 2000

APPENDIX A

Ridley Creek Watershed
Peak Rate Control Map

[Insert locally prepared map for portions of the municipality in the Ridley Creek watershed or reference the peak rate control map in the Ridley Creek plan]

Note: Areas with a 100% release rate need to follow the Delaware Direct peak rates – additional language may be needed to replace outdated Ridley peak rate requirements.

ORDINANCE APPENDIX B

Simplified Approach to Stormwater Management for Small Projects

Applicability: Stormwater management procedures for projects with between five hundred (500) square feet and (999) square feet of proposed impervious area.

SIMPLIFIED APPROACH TO STORMWATER MANAGEMENT FOR SMALL PROJECTS

Introduction

The following procedures have been developed to allow homeowners to comply with stormwater management criteria for new projects to meet the requirements of the Act 167 Stormwater Management Ordinance of the Municipality including sizing, designing, locating, and installing on-lot measures, referred to herein as "Best Management Practices" (BMPs). Pennsylvania Act 167 was authorized on October 4, 1978 (32 P.S., P.L. 864) and gave Pennsylvania municipalities the power to regulate activities that affect stormwater runoff and surface and groundwater quantity and quality.

Individual home construction projects on single-family lots which result in between 500 square feet and 999 square feet of impervious area (including the building footprint, driveway, sidewalks, and parking areas) are not required to submit formal drainage plans to the Municipality or County; however, they are still required to address water quality and infiltration goals as outlined in this Simplified Approach document. If the guidelines presented in this brochure are followed, the individual homeowner will not require professional services to comply with these water quality and infiltration goals.

Section B.1 describes requirements and a simplified method for designing a suitable BMP, and a description of what needs to be included on the simple sketch plan. Section B.2 presents definitions of key terms. Section B.3 presents options of BMPs that can be considered for on-lot stormwater management. An example of how to obtain the size and dimensions of a BMP is explained in Section B.4. Section B.5 describes the requirements to be met for the modified Operation, Maintenance, and Inspection Plan.

The Simplified Approach requires:

- The first 1" of rainfall runoff from new impervious surfaces to be captured (see definition in Section B.2).

The purpose of this 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 public safety.

What needs to be sent to the Municipality?

Even though a formal drainage plan is not required for individual lot owners, the Simplified Method worksheet found in Table B-4 and a simple sketch plan containing the features described in Step 5 of Section B.1 needs to be submitted to the Municipality, and if applicable, the contractor prior to construction. The Operation and Maintenance Agreement found in Section B.5 needs to be signed and submitted with the simple sketch plan to the Municipality for approval.

B.1 Determination of Simplified Approach Volume Requirements

All proposed impervious areas must be included in the determination of the amount of new impervious areas and the size of proposed BMPs needed to control stormwater. Proposed impervious areas on an individual residential lot include: roof area, pavement, sidewalks, driveways, patios, porches, permanent pools, or parking areas. Sidewalks, driveways, or patios that are constructed with gravel or pervious pavers that will not be converted to an impervious surface in the future need not be included in this calculation. Therefore, the amount of proposed impervious area can be reduced for proposed driveways, patios, and sidewalks through the use of gravel, pervious pavement, and turf pavers. All proposed impervious areas must be constructed so that runoff is conveyed to a BMP; no runoff can be directed to storm sewers, inlets, or other impervious areas (i.e., street).

In addition, the use of low impact development is recommended to further minimize the effect of the new construction on water, land, and air. Low impact development is a method of development that incorporates design techniques that include: minimizing the amount of land disturbance, reducing impervious cover, disconnecting gutters and directing runoff to vegetated areas to infiltrate, and redirecting the flow of runoff from impervious driveways to vegetated areas instead of to the street or gutter.

Below are the steps that must be undertaken to meet the Ordinance requirements. The results obtained for each step must be included in the Simplified Method Worksheet found in Table B-4:

STEP 1 – Determine the total area of all proposed impervious surfaces that will need to drain to one or more BMPs. Determine locations where BMPs need to be placed so that runoff from all of the proposed impervious surfaces can be captured. Select the BMPs to be used and determine the requirements of each from Section B.3. For instance, the back half of a garage may drain 200 square feet of roof to a rain barrel, and the front half of a garage may drain 200 square feet of roof and 540 square feet of driveway to a bioretention area. Then, obtain the required storage volume and surface area needed for each of the proposed BMPs from the appropriate heading below.

For Rain Barrels/Cisterns

STEP 2 –Select the proposed impervious area value in Column 1 of Table B-1 that is closest to, but not less than, the determined value.

STEP 3 – Determine the volume that needs to be provided in cubic feet and gallons to satisfy the volume requirements using Columns 2 and 3 in Table B-1.

Table B-1: Simplified Method - Calculating Rain Barrel/Cistern Storage Volume for 1" Rainfall[1]

Column 1	Column 2	Column 3	
Proposed Impervious Area (square feet)	**Volume of Rain Barrel/Cistern[2] (cubic feet)**	**Volume of Rain Barrel/Cistern (gallons)**	
I	V_{RBcf}	V_{RBgal}	
Sum of all Proposed Impervious Areas	**$(1*(1/12)*I)/0.75=V_{RBcf}$**	**VRBcf * 7.48=VRBgal**	
50	6	42	
100	11	83	
150	17	125	Rain Barrel
200	22	166	
250	28	208	
300	33	249	
350	39	291	
400	44	332	
450	50	374	
500	56	416	
550	61	457	
600	67	499	Cistern
650	72	540	
700	78	582	
750	83	623	
800	89	665	
850	94	706	
900	100	748	
950	106	790	
999	111	830	

[1]The typical volume of a rain barrel is between 50-200 gallons, so more than 1 rain barrel may be needed. Larger volumes may require a cistern.

[2]Assume that the rain barrel/cistern is 25% full

For Rain Gardens/Bioretention or Dry Well #1:

STEP 2 – Select the proposed impervious area value in Column 1 of Table B-2 that is closest to, but not less than, the determined value.

STEP 3 - Determine the volume that needs to be provided in cubic feet to satisfy the volume requirements using Column 2 in Table B-2.

STEP 4 – Using the value from Column 2 determined above, select the depth (D) of the proposed BMP, and then simply determine the surface area needed for that depth from Column 3 of Table B-2.

Note: The arrows under Column 3 in Table B-2 indicate which range of depths is appropriate for each BMP. To determine the depth based on the area, select an area that corresponds to the required volume that is closest to, but not more than the area to be used. To determine the area based on the depth, select a depth that is closest to, but not less than, the depth that is to be used.

Table B-2: Simplified Method - Calculating Rain Garden/Bioretention and Dry Well #1 Storage Volume and Surface Area for 1" Rainfall

Column 1	Column 2	Column 3							
Proposed Impervious Area (square feet)	**Volume of Rain Garden/Bioretention or Dry Well #1[1] (cubic feet)**	**Surface Area of Rain Garden/Bioretention or Dry Well #1** Acceptable Depths for Each BMP are indicated by the arrows below **(square feet)**							
		Area Required for a BMP with a Depth(D) of 0.5'	*Area Required for a BMP with a Depth(D) of 1.0'*	*Area Required for a BMP with a Depth(D) of 1.5'*	*Area Required for a BMP with a Depth(D) of 2.0'*	*Area Required for a BMP with a Depth(D) of 2.5'*	*Area Required for a BMP with a Depth(D) of 3.0'*	*Area Required for a BMP with a Depth(D) of 3.5'*	*Area Required for a BMP with a Depth(D) of 4.0'*
		Rain Garden /Bioretention (0.5'-1.0')		Dry Well #1 (1.5'-4.0')					
I	V	*A(sf)*							
Sum of all Proposed Impervious Areas	**I*(1/12)*I= V**	**V/D=A**							
50	4	8	4	3	2	2	1	1	1
100	8	17	8	6	4	3	3	2	2
150	13	25	13	8	6	5	4	4	3
200	17	33	17	11	8	7	6	5	4
250	21	42	21	14	10	8	7	6	5
300	25	50	25	17	13	10	8	7	6
350	29	58	29	19	15	12	10	8	7
400	33	67	33	22	17	13	11	10	8
450	38	75	38	25	19	15	13	11	9
500	42	83	42	28	21	17	14	12	10
550	46	92	46	31	23	18	15	13	11
600	50	100	50	33	25	20	17	14	13
650	54	108	54	36	27	22	18	15	14
700	58	117	58	39	29	23	19	17	15
750	63	125	63	42	31	25	21	18	16
800	67	133	67	44	33	27	22	19	17
850	71	142	71	47	35	28	24	20	18
900	75	150	75	50	38	30	25	21	19
950	79	158	79	53	40	32	26	23	20
999	83	167	83	56	42	33	28	24	21

[1]Assume that the rain garden/bioretention or the dry well #1 are 0% full

INSERT 11" x 17" Table B-2 HERE

Blank for 2nd page of 11" x 17" Table B-2

Fill in the simplified method worksheet found in Table B-4, then submit the worksheet and the simple site sketch to the Municipality. Additionally, the operation and maintenance agreement found in Section B.5 must be signed and submitted to the Municipality.

Table B-3: Simplified Method - Calculating Infiltration Trench and Dry Well #2 Storage Volume and Surface Area for 1" Rainfall

Column 1	Column 2	Column 3							
Total Proposed Impervious Area (square feet)	**Volume of Infiltration Trench or Dry Well #2[1] (cubic feet)**	**Surface Area of Infiltration Trench or Dry Well #2** Acceptable Depths for Each BMP are indicated by the arrows below (square feet)							
		Area Required for a BMP with a Depth(D) of 1.5'	*Area Required for a BMP with a Depth(D) of 2.0'*	*Area Required for a BMP with a Depth(D) of 2.5'*	*Area Required for a BMP with a Depth(D) of 3.0'*	*Area Required for a BMP with a Depth(D) of 3.5'*	*Area Required for a BMP with a Depth(D) of 4.0'*	*Area Required for a BMP with a Depth(D) of 4.5'*	*Area Required for a BMP with a Depth(D) of 5.0'*
		Dry Well #2 (1.5'-4.0')		Infiltration Trench (2.0'-5.0')					
I	V	*A(sf)*							
Sum of all Proposed Impervious Areas	**(1*(1/12)*I)/Void Ratio (0.4)*=V**	**V/D=A**							
50	10	7	5	4	3	3	3	2	2
100	21	14	10	8	7	6	5	5	4
150	31	21	16	13	10	9	8	7	6
200	42	28	21	17	14	12	10	9	8
250	52	35	26	21	17	15	13	12	10
300	63	42	31	25	21	18	16	14	13
350	73	49	36	29	24	21	18	16	15
400	83	56	42	33	28	24	21	19	17
450	94	63	47	38	31	27	23	21	19
500	104	69	52	42	35	30	26	23	21
550	115	76	57	46	38	33	29	25	23
600	125	83	63	50	42	36	31	28	25
650	135	90	68	54	45	39	34	30	27
700	146	97	73	58	49	42	36	32	29
750	156	104	78	63	52	45	39	35	31
800	167	111	83	67	56	48	42	37	33
850	177	118	89	71	59	51	44	39	35
900	188	125	94	75	63	54	47	42	38
950	198	132	99	79	66	57	49	44	40
999	208	139	104	83	69	59	52	46	42

[1]Assume a void ratio of 40%

INSERT 11" x 17" Table B-3 HERE

Blank for 2nd page of 11" x 17" Table B-3

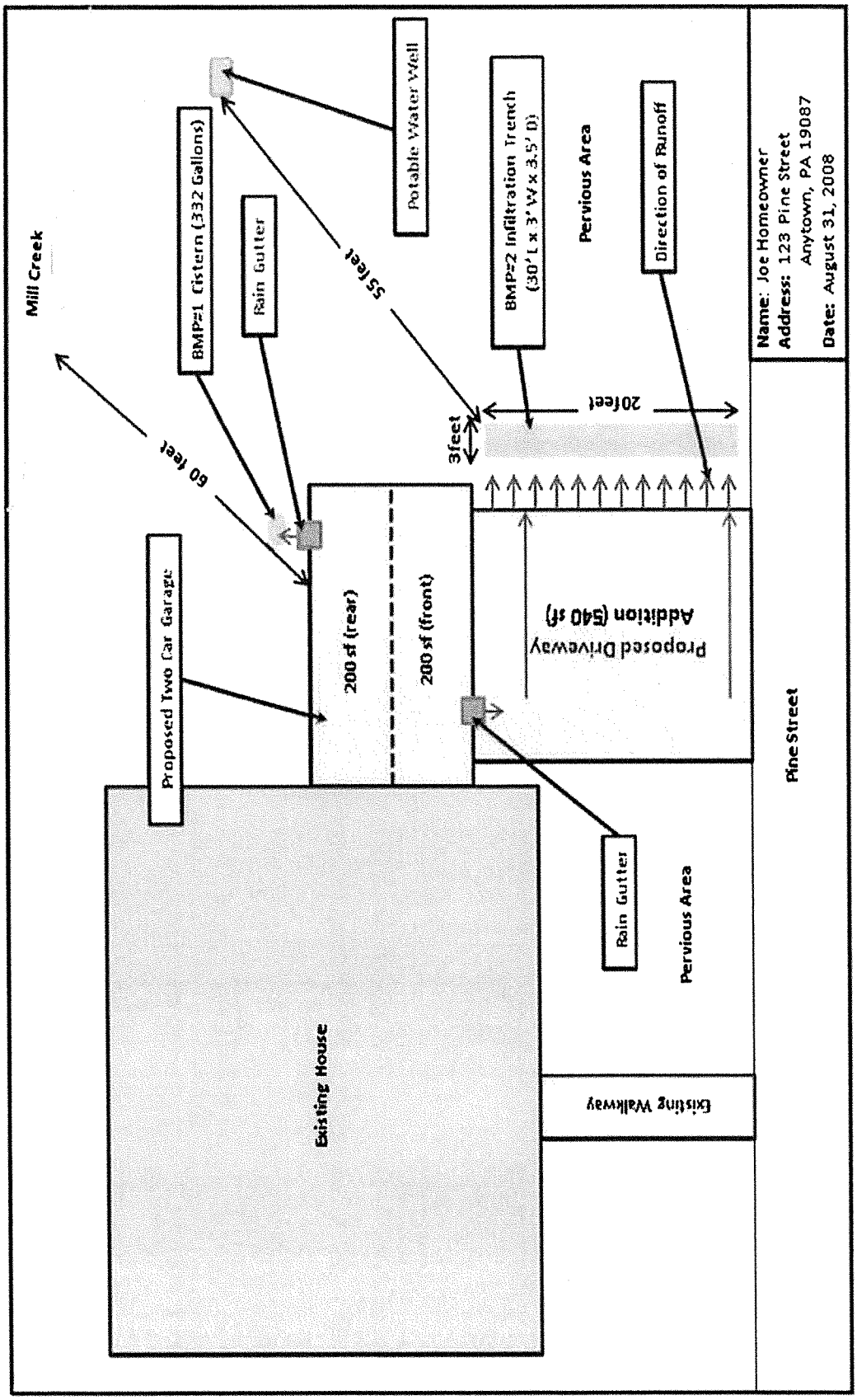


Figure B-1: Typical Dry Well Configuration filled with Stone Fill (Left) and Structural Prefabricated Chamber (Right)

Table B-4: Simplified Method Worksheet

Simplified Method Worksheet			
STEP 1			
Proposed Impervious Surface for BMP #1	**Proposed Impervious Surface for BMP #2**	**Proposed Impervious Surface for BMP #3**	
STEPS 2&3			
Rain Barrel or Cistern			
Proposed Impervious Surface from Column 1 in Table B-1	**Volume from Column 2 or 3 in Table B-1**		
Rain Garden/Bioretention or Dry Well #1			
Proposed Impervious Surface from Column 2 in Table B-2	**Volume of BMP from Column 2 in Table B-2**	**Area of BMP from Column 3 in Table B-2**	**Depth of BMP from Column 3 in Table B-2**	**Types of Material to Be Used**
Infiltration Trench or Dry Well #2				
Proposed Impervious Surface from Column 2 in Table B-3	**Volume of BMP from Column 2 in Table B-3**	**Area of BMP from Column 3 in Table B-3**	**Depth of BMP from Column 3 in Table B-3**	**Types of Material to Be Used**
Note: For additional BMPs, use additional sheets				

B.2 Definitions

Best Management Practice (BMP) - Activities, facilities, designs, measures, or procedures used to manage stormwater impacts from land development, to protect and maintain water quality and groundwater recharge and to otherwise meet the purposes of the Municipal Stormwater Management Ordinance, including but not limited to infiltration trenches, dry wells, bioretention, rain gardens, permeable paving, rain barrels, and cisterns.

Capture - Collecting runoff to be stored for reuse or allowed to slowly infiltrate into the ground.

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.

Hotspot - 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 (e.g., vehicle salvage yards and recycling facilities, vehicle fueling stations, fleet storage areas, vehicle equipment and cleaning facilities, and vehicle service and maintenance facilities).

Impervious Surface - A surface that prevents the infiltration of water into the ground. Impervious surfaces include, but are not limited to, streets, sidewalks, pavements, swimming pools, driveway areas or roofs.

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.

Low Impact Development - A land development and construction approach that uses various land planning, design practices, and technologies to simultaneously conserve and protect natural resource systems, and reduce infrastructure costs.

Pervious Surface - Any surface that is not impervious.

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

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

Void Ratio - The ratio of the volume of void space to the volume of solid substance in any material.

B.3 Description of BMPs

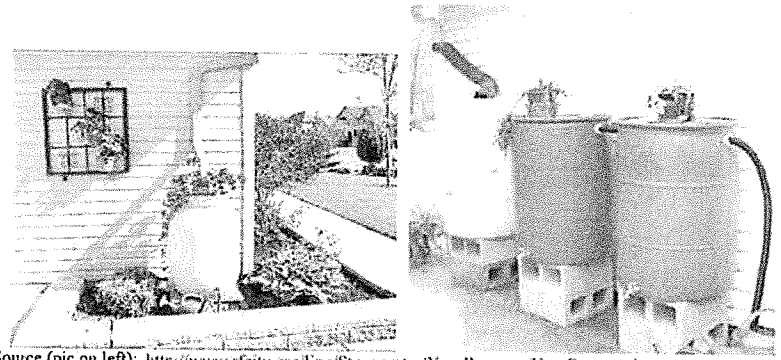
The following is a description of several types of BMPs that could be implemented. The requirements of each BMP as described below are taken directly from the PA BMP Manual. Refer to the PA BMP Manual which can be found on the PA Department of Environmental Protection's website.

Rain Barrels/Cisterns

Rain barrels are large containers that collect drainage from roof leaders and temporarily store water to be released to lawns, gardens, and other landscaped areas after the rainfall has ended. Rain barrels are typically between 50 and 200 gallons in size. The stored water can also be used as a non-potable water supply. Cisterns are larger than rain barrels having volumes of 200 gallons or more, and can be placed on the surface or underground. Figures B-2 and B-3 show examples of rain barrels and cisterns, respectively, that could be used. Rain barrels and cisterns are manufactured in a variety of shapes and sizes. All of these facilities must make provisions for the following items:

- There must be a means to release the water stored between storm events in order for the necessary storage volume to be available for the next storm.
- Stormwater must be kept from entering other potable systems, and pipes and storage units must be clearly marked "Do Not Drink."
- An overflow outlet should be placed a few inches below the top with an overflow pipe to divert flow away from structures.
- Use screens to filter debris, and covers (lids) to prevent mosquitoes.
- Make sure cisterns are watertight and do not leak.
- Rain barrels are typically assumed to be 25% full to calculate volume since they are not always emptied before each storm.*

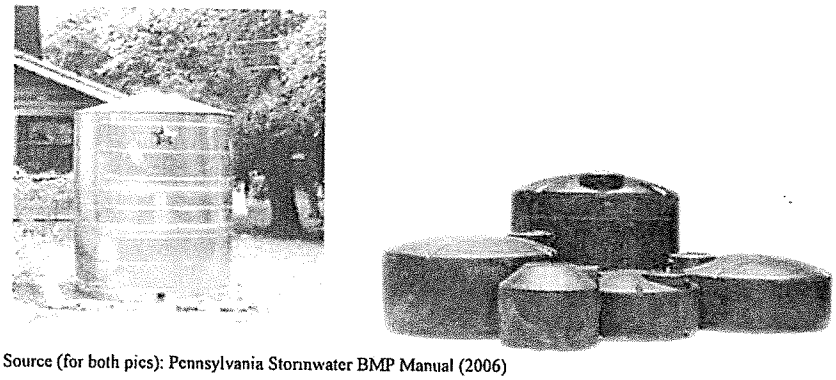
Figure B-2: Rain Barrels



Source (pic on left): http://www.rfcity.org/Eng/Stormwater/YourProperty/YourProperty.htm
Source (pic on right): http://www.floridata.com/tracks/transplantedgardener/Rainbarrels.cfm

*This 25% has already been taken into account in Table 3.

Figure B-3: Cisterns



Source (for both pics): Pennsylvania Stormwater BMP Manual (2006)

Infiltration Trench

An infiltration trench is a long, narrow, rock-filled trench with or without a perforated pipe that receives stormwater runoff and has no outlet. Runoff is stored in the void space between the stones and in the pipe and infiltrates through the bottom and into the underlying soil matrix. Infiltration trenches perform well for removal of fine sediment and associated pollutants. Figure B-4 shows a typical infiltration trench configuration. Infiltration trenches shall incorporate or make provisions for the following elements:

- Perforated pipe is to be set level.
- The width is limited to between **3 and 8 feet**, and the depth ranges from **2 to 6 feet**.
- Trench should be wrapped in nonwoven geotextile (see definition in Section B.2) on the top, sides, and bottom.
- There should be a positive overflow that allows stormwater that cannot be stored or infiltrated to be discharged into a nearby vegetated area.
- Roof downspouts may be connected to infiltration trenches, but should contain a cleanout to collect sediment and debris before entering the infiltration area.
- Infiltration testing is recommended to ensure that the soil is capable of infiltrating stormwater. A description of how an infiltration test is performed is found in Appendix C of the PA BMP Manual.
- It is recommended that there be a 2-foot clearance above the regularly occurring seasonal high water table and a minimum depth to bedrock of 2 feet.
- The infiltration trench should be at least 50 feet from individual water supply wells, 100 feet from community or municipal water supply wells, and 50 feet from any septic system component. It should not be located near hotspots (see definition in Section B.2).
- The infiltration trench should be located so that it presents no threat to sub-surface structures such as building foundations and basements.
- Protect infiltration areas from compaction.
- The ratio of the collected area to the footprint of the facility should be as small as possible with a ratio of less than 5:1 preferred.

Figure B-4: Typical Infiltration Trench

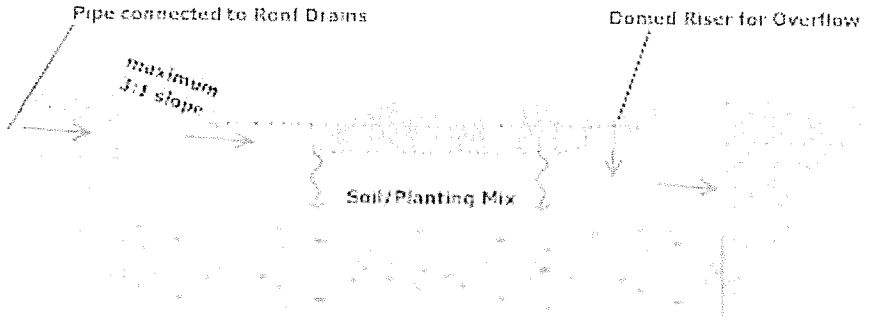
Source: Pennsylvania Stormwater BMP Manual (2006)

Rain Garden/Bioretention Area

A rain garden (bioretention area) is an excavated depression area on the surface of the land in which native vegetation is planted to filter and use stormwater runoff. Runoff ponds on top of the surface of the rain garden and then infiltrates into an enhanced soil below the surface where plants can use the water to grow. Bioretention also improves water quality, vegetation filters the water, and the root systems encourage or promote infiltration. Figure B-5 shows a typical rain garden. Key elements of a rain garden include:

- Ponding depths of **1 foot** or less (recommended).
- Native vegetation that can tolerate dry and wet weather.
- An overflow area where, if the bioretention area were to overflow, the water would flow over pervious area (i.e., grass, meadow), and would not cause harm to property, or;
- An overflow such as a domed riser to allow excess flow from large storms to travel to other substantial infiltration areas or pervious areas.
- Typical side slopes of 3:1 are recommended, with 2:1 being the maximum.
- The soil/planting mix depth should be between 1.5 feet and 6 feet deep.

Figure B-5: Typical Rain Garden/Bioretention Area



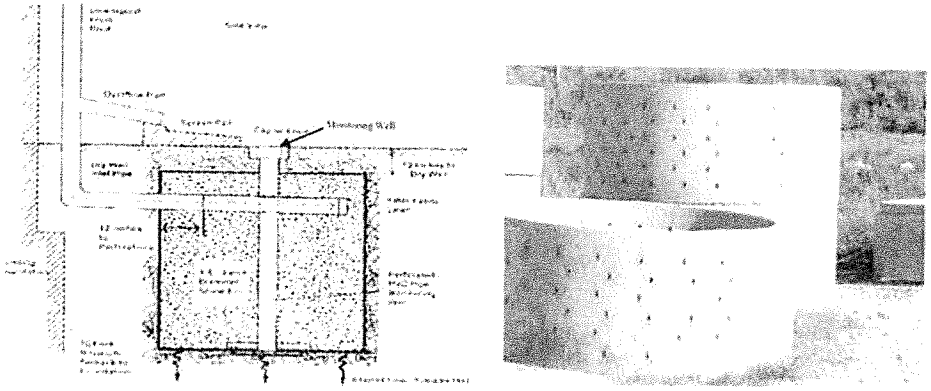
Source: Pennsylvania Stormwater BMP Manual (2006)

Dry Wells

A dry well, also referred to as a seepage pit is a subsurface storage facility that temporarily stores and infiltrates runoff from the roofs of buildings or other impervious surfaces. A dry well can be either a structural prefabricated chamber (Dry Well #1) or an excavated pit filled with stone fill (Dry Well #2). Dry wells discharge the stored runoff via infiltration into the surrounding or underlying soils. Figure B-6 shows a typical prefabricated dry well and a typical dry well configuration with stone fill. The following elements shall be incorporated into all dry well designs:

- These facilities should be located a minimum of ten (10) feet from the building foundation to avoid foundation seepage problems and are not recommended if their installation would create a risk for basement flooding.
- Construction of a dry well should be performed after surface soils in all other areas of the site are stabilized to avoid clogging.
- During construction, compaction of the subgrade soil in the bottom of the dry well should be avoided, and construction should be performed only with light machinery.
- Depth of a dry well should be between **1.5 feet and 4 feet**. Gravel fill should consist of stone of an average of one and one half to three (1.5 – 3.0) inches in diameter with the gravel fill wrapped in a nonwoven geotextile that separates the stone fill from the surrounding soil.
- At least 1 foot of soil needs to be placed over the top of the dry well.
- Dry wells should be inspected at least four (4) times annually as well as after large storm events.
- Dry wells should have overflow pipes to allow high volumes of runoff to connect to other on-site substantial infiltration areas or pervious areas.
- Every dry well needs to have at least one monitoring well.
- Infiltration testing is recommended to ensure that the underlying soil is capable of infiltrating the needed volume of stormwater.

Figure B-6: Typical Dry Well Configuration filled with Stone Fill (DRY WELL #2) (Left) and Structural Prefabricated Chamber (DRY WELL #1) (Right)



Source (for pic on left): http://www.seagrant.sunysb.edu/pages/BMPsForMarinas.htm
Source (for pic on right): http://www.copelandconcreteinc.net/1800652.html

B.4 Example

Simplified Approach Volume Determination:

Joe Homeowner wants to build a 400 square foot two car garage, and a 540 square foot (30' L x 18' W) impervious driveway that is graded so that the stormwater runoff drains to the grassy area along one edge of the driveway. (A duplicate of Table B-1 is provided below in Table B-5, a duplicate of Table B-3 is provided below in Table B-6 and outlines the steps of this example) a duplicate of Figure B-1 (Figure B-7) and a duplicate of Table B-4 are provided in Table B-7.

STEP 1 - Determine the total area of all proposed impervious surfaces to drain to each BMP:

Garage Roof (Front)	10 ft. x 20 ft.	=	200 sq. ft
Garage Roof (Rear)	10 ft. x 20 ft.	=	200 sq. ft.
Driveway (Front)	30 ft. x 18 ft.	=	540 sq. ft.

Total Proposed Impervious Surface			**940 sq. ft.**

Note: If the driveway used pervious pavement (i.e., paving blocks), then the total impervious area would only be 400 square feet, and no stormwater management practices would need to control runoff from the driveway.

Select a BMP or combination of BMPs from Section B.3 to be used to satisfy the volume requirement. Determine the length, width, depth and other requirements for the BMPs in Section B.3. A BMP needs to be placed to catch runoff from the back of the garage, and a BMP needs to be placed to capture runoff from the front of the garage and the driveway. Figure B-7 shows the direction the runoff flows and the locations where the BMPs are to be placed.

Joe Homeowner would like to use a rain barrel (BMP #1) to capture the runoff from the rear of the garage and an infiltration trench (BMP #2) to capture runoff from the front of the garage and the driveway.

STEP 2 and 3 for BMP #1 (Rain Barrel/Cistern)

STEP 2 - Select the proposed impervious area value for BMP #1, the rain barrel or cistern, in Column 1 that is closest to, but not less than 200 in Table B-5:

The value in Column 1 that is closest to but is not less than 200 is 200.

STEP 3 - Determine the volume that BMP #1 must be to satisfy the volume requirements using Columns 2 and 3 in Table B-5:

The volume in gallons of the rain barrel/cistern to be used as BMP #1, assuming the rain barrel/cistern is 25% full, is determined by finding the row in Column 3 that corresponds to the impervious area value determined in Step 1. Therefore, the volume of BMP #1, the rain barrel/cistern must be ≥ 166 gallons. A combination of rain barrels could be used in succession as shown in Figure B-2, or a cistern could be used.

Table B-5: Example – Calculating Storage Volume for Rain Barrel/Cistern

Column 1	Column 2	Column 3	
Proposed Impervious Area (square feet)	**Volume of Rain Barrel/Cistern[1] (cubic feet)**	**Volume of Rain Barrel/Cistern (gallons)**	
I	V_{RBcf}	V_{RBgal}	
Sum of all Proposed Impervious Areas	$(1*(1/12)*I)/0.75=V_{RBcf}$	$V_{RBcf} * 7.48=V_{RBgal}$	
50	6	42	
100	11	83	Rain Barrel
150	17	125	
2 200	22	3 166	
250	28	208	
300	33	249	
350	39	291	
400	44	332	
450	50	374	
500	56	416	
550	61	457	
600	67	499	Cistern
650	72	540	
700	78	582	
750	83	623	
800	89	665	
850	94	706	
900	100	748	
950	106	790	
999	111	830	

[1]Assume that the rain barrel/cistern is 25% full

STEPS 2 through 4 for BMP #2 (Infiltration Trench)

STEP 2 - Select the proposed impervious area value for BMP #2, the infiltration trench, using Column 1 in Table B-6:

Find the row in Column 1 that is closest to but not less than 740 (200 from the front of the garage + 540 from the driveway). Therefore, the value selected is 750.

STEP 3 - Determine the volume that BMP #2, the infiltration trench must be to satisfy the volume requirements using Column 2 in Table B-6:

The volume of the infiltration trench to be used as BMP #2, assuming a void ratio of 40%, is determined by finding the row in Column 2 that is in the same row as 750 square feet from Step 2. Therefore, the volume of BMP #2 must be 156 cubic feet.

STEP 4 - Utilizing the value from Column 2 determined above, and the surface area that the proposed BMP will occupy, identify the proposed depth and corresponding surface area needed using Column 3 in Table B-6:

Joe Homeowner would like to place the infiltration trench along the edge of the driveway that the runoff drains to, so it would have a length of 20 feet. The smallest width that can be used, as stated in the infiltration trench requirements in Section B.3, is 3 feet. Therefore, the area of the infiltration trench is:

$$20 * 3 = 60 \text{ square feet}$$

To find the minimum depth of the trench, move toward the right side of the table from 156 cubic feet in Column 2 to Column 3, and find the column with a value of as close to but not more than 60 square feet, which is 52 square feet. Then obtain the minimum depth of the facility by reading the depth from the column heading at the top of the table. Therefore, the depth of the trench would need to be 3 feet.

Selected BMPs: Rain barrel(s) ≥ 166 gallons and a 20' L x 3' W x 3' D infiltration trench

STEP 5 – Make a sketch of the site plan as shown in Figure B-7, and fill in the simplified method worksheet found as shown in Table B-7.

Table B-6: Example – Calculating Storage Volume Surface Area and Depth for Infiltration Trench

Column 1	Column 2	Column 3							
Total Proposed Impervious Area (square feet)	**Volume of Infiltration Trench or Dry Well #2* (cubic feet)**	**Surface Area of Infiltration Trench or Dry Well #2** Acceptable Depths for Each BMP are indicated by the arrows below (square feet)							
		Area Required for a BMP with a Depth(D) of 1.5'	*Area Required for a BMP with a Depth(D) of 2.0'*	*Area Required for a BMP with a Depth(D) of 2.5'*	*Area Required for a BMP with a Depth(D) of 3.0'*	*Area Required for a BMP with a Depth(D) of 3.5'*	*Area Required for a BMP with a Depth(D) of 4.0'*	*Area Required for a BMP with a Depth(D) of 4.5'*	*Area Required for a BMP with a Depth(D) of 5.0'*
		Dry Well #2 (1.5'-4.0')				Infiltration Trench (2.0'-5.0')			
I	V	*A(sf)*							
Sum of all Proposed Impervious Areas	**(1*(1/12)*I)/Void Ratio (0.4)*=V**	**V/D=A**							
50	10	7	5	4	3	3	3	2	2
100	21	14	10	8	7	6	5	5	4
150	31	21	16	13	10	9	8	7	6
200	42	28	21	17	14	12	10	9	8
250	52	35	26	21	17	15	13	12	10
300	63	42	31	25	21	18	16	14	13
350	73	49	36	29	24	21	18	16	15
400	83	56	42	33	28	24	21	19	17
450	94	63	47	38	31	27	23	21	19
500	104	69	52	42	35	30	26	23	21
550	115	76	57	46	38	33	29	25	23
600	125	83	63	50	42	36	31	28	25
650	135	90	68	54	45	39	34	30	27
700	146	97	73	58	49	42	36	32	29
2 750	3 156	104	78	63	4 52	45	39	35	31
800	167	111	83	67	56	48	42	37	33
850	177	118	89	71	59	51	44	39	35
900	188	125	94	75	63	54	47	42	38
950	198	132	99	79	66	57	49	44	40
999	208	139	104	83	69	59	52	46	42

*Assume a void ratio of 40%

INSERT 11" x 17" Table B-6 HERE

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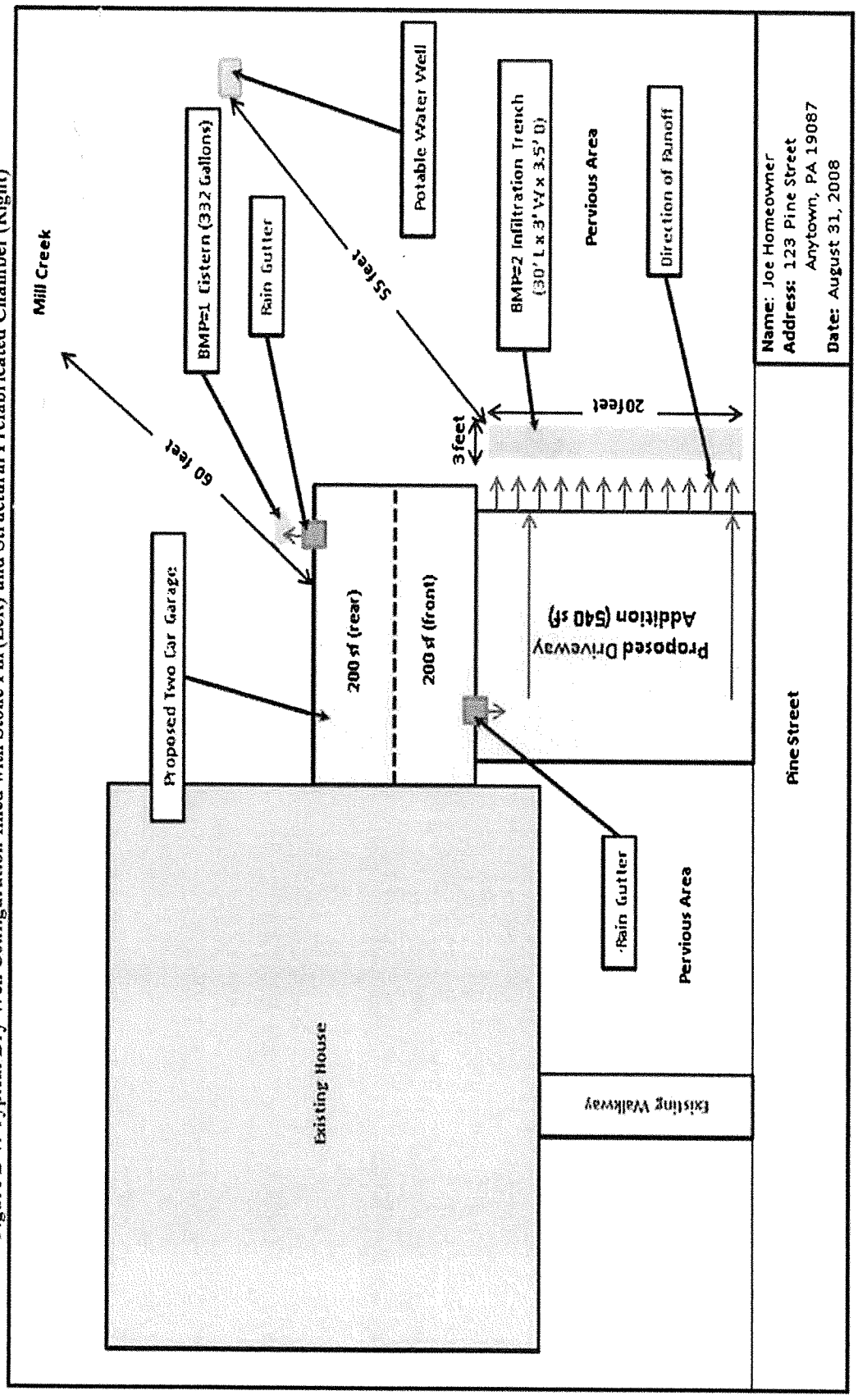

Figure B-7: Typical Dry Well Configuration filled with Stone Fill (Left) and Structural Prefabricated Chamber (Right)

Table B-7: Example – Simplified Method Worksheet with Results

Simplified Method Worksheet				
STEP 1				
Proposed Impervious Surface for BMP #1	**Proposed Impervious Surface for BMP #2**	**Proposed Impervious Surface for BMP #3**		
200	740			
STEPS 2&3				
Rain Barrel or Cistern				
Proposed Impervious Surface from Column 1 in Table B-5	**Volume from Column 2 or 3 in Table B-5**			
200	166 gallons			
Rain Garden/Bioretention or Dry Well #1				
Proposed Impervious Surface from Column 2 in Table B-2	**Volume of BMP from Column 2 in Table B-2**	**Area of BMP from Column 3 in Table B-2**	**Depth of BMP from Column 3 in Table B-2**	**Types of Material to Be Used**
Infiltration Trench or Dry Well #2				
Proposed Impervious Surface from Column 2 in Table B-6	**Volume of BMP from Column 2 in Table B-6**	**Area of BMP from Column 3 in Table B-6**	**Depth of BMP from Column 3 in Table B-6**	**Types of Material to Be Used**
740	156	52	3	Infiltration Trench, Uniformly Graded Aggregate, HDPE 8" pipe, geotextile material, grass planted on top
Note: For additional BMPs, use additional sheets				

B.5 Simplified Operation, Inspection, and Maintenance Plan

It is the property owner's responsibility to properly maintain BMPs. It is also the property owner's responsibility to inform any future buyers of the function, operation, and maintenance needed for any BMPs on the property prior to the purchase of the property. The following maintenance agreement outlines the maintenance required for each type of BMP, the responsibilities of the property owner, and the rights of the Municipality in regards to inspection and enforcement of the maintenance requirements. The Operation and Maintenance Agreement must be signed and submitted to the Municipality.

STORMWATER BEST MANAGEMENT PRACTICES
OPERATIONS, MAINTENANCE, AND INSPECTION AGREEMENT

THIS AGREEMENT, made and entered into this _____ day of _____, 200__, by and between _____, (hereinafter the "Landowner"), and _____, _____ (County, Township, or Borough) Pennsylvania, (hereinafter "Municipality");

WITNESSETH

WHEREAS, the Landowner is the owner of certain real property as recorded by deed in the land records of _____ County, Pennsylvania, Deed Book _____ at Page _____, (hereinafter "Property"); and,

WHEREAS, the Landowner _____

recognizes that the stormwater management best management practices or BMPs (hereinafter referred to as "the BMP" or "BMPs") must be maintained for the development called,

_____, located at _____

_____ (address of property where BMP is located); and,

5. In the event that the Municipality, pursuant to this Agreement, performs work of any nature, or expends any funds in performance of said work for labor, use of equipment, supplies, materials, and the like, the Landowner shall reimburse the Municipality for all expenses (direct and indirect) incurred within ten days of receipt of an invoice from the Municipality.

6. The intent and purpose of this Agreement is to ensure the proper maintenance of the on-site BMP(s) by the Landowner; provided, however, that this Agreement shall not be deemed to create or affect any additional liability of any party for damage alleged to result from or be caused by stormwater runoff.

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

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

ATTEST:

WITNESS the following signatures and seals:

(SEAL) For the Municipality:

_____

(SEAL) For the Landowner:

_____

ATTEST:

_____ (City, Borough, Township)

County of _____, Pennsylvania

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

GIVEN UNDER MY HAND THIS _____ day of _____, 200_.

_____ _____

NOTARY PUBLIC **(SEAL)**

ORDINANCE APPENDIX C – 1

SAMPLE SWM SITE PLAN APPLICATION

SAMPLE SWM SITE PLAN APPLICATION

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

Application is hereby made for review of the SWM Site Plan and related data as submitted herewith in accordance with the _____ Stormwater Management Ordinance.

_____Final Plan _____Preliminary Plan _____Sketch Plan

Date of Submission _____Submission No._____

1. Name of subdivision or development_____

2. Name of Applicant _____ Telephone No._____

   (if corporation, list the corporation's name and the names of two officers of the corporation)
   _____Officer 1
   _____Officer 2

   Address_____
   Zip code_____

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

3. Name of property owner _____Telephone No._____

   Address_____
   Zip code_____

4. Name of engineer or surveyor _____Telephone No._____

   Address_____
   Zip code_____

5. Type of subdivision or development proposed:

____ Single-family Lots	____ Townhouses	____ Commercial (Multi-lot)
____ Two-family Lots	____ Garden Apartments	____ Commercial (One Lot)
____ Multi-family Lots	____ Mobile Home Park	____ Industrial (Multi-lot)
____ Cluster Type Lots	____ Campground	____ Industrial (One Lot)
____ Planned Residential Development	____ Other (_____)	

6. Linear feet of new road proposed _____ L.F.

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

   a. Existing (to remain) _____ S.F. _____ % of property
   b. Proposed _____ S.F. _____ % of property

8. Stormwater

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

   b. Design storm utilized (on-site conveyance systems) (24 hr.)_____
   No. of Subarea_____
   Watershed Name_____

   Explain:_____
   _____
   _____

   c. Does the submission and/or district meet the criteria for the applicable management district?_____

   d. Subarea number(s) from Ordinance Appendix A of the respective watershed stormwater management plan or other subareas identified in other watershed stormwater management plans _____

   e. Type of proposed runoff control_____

   f. Does the proposed stormwater control criteria meet the requirements/guidelines of the Stormwater Ordinance?_____

   If not, what variances/waivers are requested?_____
   _____

   Reasons_____

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

   If not, what variances/waivers are requested?_____

   Reasons why _____
   _____

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

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

_____

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

_____

k. Is a construction schedule or staging attached?_____

l. Is a recommended maintenance program attached?_____

9. Erosion and Sediment Pollution Control (E&S):

a. Have the SWM site plan and E&S plan, supporting documentation, and narrative been submitted to the *[County Name]* County Conservation District?_____

b. Total area of earth disturbance _____ S.F.

10. Wetlands

a. Have the wetlands been delineated by someone trained in wetland delineation?_____

b. Have the wetland lines been verified by a state or federal permitting authority?_____

c. Have the wetland lines been surveyed?_____

d. Total acreage of wetland within the property _____

e. Total acreage of wetland disturbed_____

f. Supporting documentation_____

11. Filing

a. Has the required fee been submitted?_____

Amount_____

b. Has the proposed schedule of construction inspection to be performed by the Applicant's engineer been submitted?_____

c. Name of individual who will be making the inspections_____

d. General comments about stormwater management at the development_____

_____

_____

CERTIFICATE OF OWNERSHIP AND ACKNOWLEDGMENT OF APPLICATION:

COMMONWEALTH OF PENNSYLVANIA
COUNTY OF [*County Name*] .

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

_____Property Owner

My Commission Expires_____20_____
Notary Public_____

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

SIGNATURE OF APPLICANT_____

//

(Information Below This Line To Be Completed By The Municipality)

_____ (Name of) Municipality official submission receipt:

Date complete application received _____plan number_____

Fees _____ date fees paid _____ received by_____

Official submission receipt date _____

Received by_____

_____
Municipality

PROPOSED SCHEDULE OF FEES

[Note: It is recommended that Municipalities adopt a fee schedule independent of the Ordinance so that fee schedules can be adjusted as need arises without having to go through the Ordinance revision public hearing process. This schedule of fees is to be submitted by the applicant with the land development plan]

Subdivision name_____ Submittal No._____

Owner _____ Date_____

Engineer_____

1. Filing fee $_____

2. Proposed land use
   - 2a. Subdivision, campgrounds, mobile home parks, and multi-family dwelling where the units are located in the same local watershed $_____
   - 2b. Multi-family dwelling where the designated open space is located in a different local watershed from the proposed units $_____
   - 2c. Commercial/industrial $_____
   - 2d. Other $_____

3. Relative amount of earth disturbance
   - 3a. Residential
     - road <500 l.f. $_____
     - road 500-2,640 l.f. $_____
     - road >2,640 l.f. $_____
   - 3b. Commercial/industrial and other
     - impervious area <3,500 s.f. $_____
     - impervious area 3,500-43,560 s.f. $_____
     - impervious area >43,560 s.f. $_____

4. Relative size of project
   - 4a. Total tract area <1 ac. $_____
     - 1-5 ac. $_____
     - 5-25 ac. $_____
     - 25-100 ac. $_____
     - 100-200 ac. $_____
     - >200 ac. $_____

5. Stormwater control measures
   - 5a. Detention basins and other controls which require a review of hydraulic routings ($ per control) $_____

5b. Other control facilities which require storage volume calculations but no hydraulic routings ($ per control)	$_____
6. Site inspection ($ per inspection)	$_____
Total	$_____

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

Delaware County Conservation District
Rose Tree Park – Hunt Club
1521 N. Providence Rd.
Media, PA 19063
Phone: 610-892-9484
Fax: 610-892-9489
Email: Info@delcocd.org

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Project: _____
Municipality: _____
Engineer: _____
Submittal No: _____
Date: _____
Project ID: _____ (for County use ONLY)

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ARTICLE I: GENERAL PROVISIONS

Reference: Section 105 Applicability/Regulated Activities

1. List all watersheds within which the proposed project is to take place: _____

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2. Does the Proposed Project meet the definition of a "Regulated Activity" in any of the Stormwater Management Plans? ☐ Yes ☐ No

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STOP – If you have checked NO for either of the above questions, you are not required to submit a SWM plan under the watershed's respective Stormwater Management Ordinance.

ARTICLE I: GENERAL PROVISIONS

Reference: Section 106 Exemptions

Note: Parent tract refers to the total parcel configuration on *[Insert date of ordinance adoption]*, and includes any subdivision of lands which may have occurred after that date.

Parent Tract Area: _____ acres

Total Existing Impervious Area (as of *[Insert date of ordinance adoption]*): _____ acres
Total New Impervious Area (all Phases): _____ acres

Parcel IS Exempt ☐ Parcel IS NOT Exempt ☐

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 304 Nonstructural Project Design

1. Has an Existing Resource and Site Analysis Map (ERSAM) been prepared?

☐ Yes ☐ No, Explain _____

ARTICLE III: STORMWATER MANAGEMENT (continued)

1. Are any of the following Environmentally Sensitive areas identified on site?

Steep Slopes	☐ Yes	☐ No	☐ Unknown
Ponds / Lakes / Vernal Pools	☐ Yes	☐ No	☐ Unknown
Streams	☐ Yes	☐ No	☐ Unknown
Wetlands	☐ Yes	☐ No	☐ Unknown
Hydric Soils	☐ Yes	☐ No	☐ Unknown
Floodplains	☐ Yes	☐ No	☐ Unknown
Stream Buffer Zones	☐ Yes	☐ No	☐ Unknown
Hydrologic Soil Groups A or B	☐ Yes	☐ No	☐ Unknown
Recharge Areas	☐ Yes	☐ No	☐ Unknown
Others: _____	☐ Yes	☐ No	☐ Unknown

2. Does the site layout plan avoid Environmentally Sensitive Areas identified on site?

☐ Yes ☐ No, Explain _____

3. Has a stream buffer been established per Section 306 C ?

☐ Yes ☐ No, Explain _____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 305 Infiltration

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1. Is the proposed activity considered a "Stormwater Hotspot"? (Refer to Section 301.T) ☐ Yes ☐ No

2. Have provisions been installed to promote infiltration on site?

   ☐ Yes ☐ No, Explain _____

   _____

   _____

3. Total Recharge Volume Required:_____cubic feet (using: ☐ Modified CG-1; ☐ Modified CG-2)

4. How is the Required Recharge Volume being addressed?

   ☐ Infiltration Trench
   ☐ Infiltration Basin
   ☐ Bioretention
   ☐ Dry Swales
   ☐ Other: _____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 306 Water Quality Requirements

1. Have provisions been installed to address stormwater runoff water quality on site?

   ☐ Yes ☐ No, Explain _____

   _____

   _____

2. Total Water Quality Volume Required: _____ acre feet

3. Is the site in a Special Protection watershed which includes Exceptional Value (EV) or High Quality (HQ) waters? ☐ Yes ☐ No

4. How is the Required Water Quality Volume being addressed?

   ☐ Wet Detention Basin
   ☐ Extended Dry Detention Basin
   ☐ Bioretention
   ☐ Sand Filter
   ☐ Constructed Wetlands
   ☐ Other: _____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 307 Stream Bank Erosion Requirements

1. Has the 2- year proposed conditions flow been reduced to the 1- year existing conditions flow?

   ☐ Yes ☐ No, Explain _____

   _____

   _____

2. Does the proposed conditions 1- year storm drain over a minimum 24- hour period?

☐ Yes ☐ No, Explain _____

_____

_____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 308 Stormwater Peak Rate Control and Management Districts

1. In which of the following Stormwater Management District(s) is the site located?

☐ A ☐ Other _____
☐ B

ARTICLE III: STORMWATER MANAGEMENT (continued)

2. Does the Proposed Conditions Runoff meet the Criteria established in [Table 308.1, 2, 3, etc.]?

☐ Yes ☐ No If you answered Yes, proceed. If you answered No, consult with Municipality.

a. Are you claiming "Hardship," as described in Section 308.G in lieu of meeting the requirements of this District?

☐ Yes ☐ No, Explain _____

_____

_____

b. If you are claiming "Hardship," has a Downstream Impacts Evaluation been prepared in accordance with Section 308.H?

☐ Yes ☐ No, Explain _____

_____

_____

_____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 309 Calculation Methodology

1 Which method(s) are utilized in the SWM site plan for computing stormwater runoff rates and volumes?

☐ TR-20
☐ TR-55 ☐ Rational Method
☐ HEC-1 / HEC-HMS ☐ Other: _____

2 Was NOAA Atlas 14 utilized in rainfall determination?

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1. Has a Stormwater Control and BMP Operations and Maintenance Plan been approved by the Municipality?

☐ Yes ☐ No, Explain _____

_____

2. Who shall assume responsibility for implementing the Stormwater Control and BMP Operations and Maintenance Plan?

☐ Municipality ☐ Homeowner Association

☐ Private Owner ☐ Other _____

ORDINANCE APPENDIX C – 2

SWM SITE PLAN CHECKLIST

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Chester County Conservation District
688 Unionville Road, Suite 200
Kennett Square, PA 19348
Phone 610-925-4920
Fax: 610-925-4925

Project: _____
Municipality: _____
Engineer: _____
Submittal No: _____
Date: _____
Project ID: _____ (for County use ONLY)

ARTICLE I: GENERAL PROVISIONS

Reference: Section 105 Applicability/Regulated Activities

1. List all watersheds within which the proposed project is to take place:
   _____

2. Does the Proposed Project meet the definition of a "Regulated Activity" in any of the Stormwater Management Plans? ☐ Yes ☐ No

STOP – If you have checked NO for either of the above questions, you are not required to submit a SWM plan under the watershed's respective Stormwater Management Ordinance.

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ARTICLE I: GENERAL PROVISIONS

Reference: Section 106 Exemptions

Note: Parent tract refers to the total parcel configuration on *[Insert date]* and includes any subdivision of lands which may have occurred after the date.

Parent Tract Area: _____ acres

Total Existing Impervious Area (as of *[Insert date]*): _____ acres
Total New Impervious Area (all Phases): _____ acres

Parcel IS Exempt ☐ Parcel IS NOT Exempt ☐

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 304 Nonstructural Project Design

1. Has an Existing Resource and Site Analysis Map (ERSAM) been prepared?

   ☐ Yes ☐ No, Explain _____
   _____
   _____

ARTICLE III: STORMWATER MANAGEMENT (Continued)

2. Are any of the following Environmentally Sensitive areas identified on site?

Steep Slopes	☐ Yes ☐ No ☐ Unknown
Ponds / Lakes / Vernal Pools	☐ Yes ☐ No ☐ Unknown
Streams	☐ Yes ☐ No ☐ Unknown
Wetlands	☐ Yes ☐ No ☐ Unknown
Hydric Soils	☐ Yes ☐ No ☐ Unknown
Floodplains	☐ Yes ☐ No ☐ Unknown
Stream Buffer Zones	☐ Yes ☐ No ☐ Unknown
Hydrologic Soil Groups A or B	☐ Yes ☐ No ☐ Unknown
Recharge Areas	☐ Yes ☐ No ☐ Unknown
Others: _____	☐ Yes ☐ No ☐ Unknown

3. Does the site layout plan avoid Environmentally Sensitive Areas identified on site?

☐ Yes ☐ No, Explain _____

4. Has a stream buffer been established per Section 306.C.?

☐ Yes ☐ No, Explain _____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 305 Infiltration

1. Is the proposed activity considered a "Stormwater Hotspot"? ☐ Yes ☐ No

2. Have provisions been installed to promote infiltration on site?

☐ Yes ☐ No, Explain _____

3. Total Recharge Volume Required: _____ cubic feet (using ☐ Modified CG-1, ☐ Modified CG-2)

4. How is the Required Recharge Volume being addressed?

☐ Infiltration Trench
☐ Infiltration Basin
☐ Bioretention
☐ Dry Swales
☐ Other: _____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 306 Water Quality Requirements

1. Have provisions been installed to address stormwater runoff water quality on site?

☐ Yes ☐ No, Explain _____

_____

_____

2. Total Water Quality Volume Required: _____ acre feet

3. Is the site in a Special Protection watershed which includes Exceptional Value (EV) or High Quality (HQ) waters? ☐ Yes ☐ No

4. How is the Required Water Quality Volume being addressed?

☐ Wet Detention Basin
☐ Extended Dry Detention Basin
☐ Bioretention
☐ Sand Filter
☐ Constructed Wetlands
☐ Other: _____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 307 Stream Bank Erosion Requirements

1. Has the 2- year proposed conditions flow been reduced to the 1- year existing conditions flow?

☐ Yes ☐ No, Explain _____

_____

_____

2. Does the proposed conditions 1- year storm drain over a minimum 24- hour period?

☐ Yes ☐ No, Explain _____

_____

_____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 308 Stormwater Peak Rate Control and Management Districts

1. In which of the following Stormwater Management District(s) is the site located?

☐ A
☐ B

2. Does the Proposed Conditions Runoff meet the Criteria established in Table 308.1?

☐ Yes ☐ No If you answered Yes, proceed. If you answered No, consult with Municipality.

ARTICLE III: STORMWATER MANAGEMENT (continued)

a. Are you claiming "Hardship," as described in Section 308.G in lieu of meeting the requirements of this District?

☐ Yes ☐ No, Explain _____

b. If you are claiming "Hardship," has a Downstream Impacts Evaluation been prepared in accordance with Section 308.H?

☐ Yes ☐ No, Explain _____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 309 Calculation Methodology

1. Which method(s) are utilized in the SWM site plan for computing stormwater runoff rates and volumes?

☐ TR-20
☐ TR-55 ☐ Rational Method
☐ HEC-1 / HEC-HMS ☐ Other: _____

2. Was NOAA Atlas 14 utilized in rainfall determination?

☐ Yes ☐ No, Explain _____

3. Was Table F-1 (Runoff Curve Numbers) or Table F-2 (Rational Runoff Coefficients) in Appendix F utilized in calculations for runoff?

☐ Yes ☐ No, Explain _____

4. For any proposed stormwater detention facility, were the appropriate design storms routed through the facility using the Storage-Indication Method?

☐ Yes ☐ No, Explain _____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 310 Other Requirements

1. Is this project subject to PENNDOT approval?

☐ Yes ☐ No

a. If "YES," have these plans been forwarded to PENNDOT for review?

☐ Yes ☐ No, Explain _____

_____

2. Have proposed wet detention basins incorporated biologic control consistent with the West Nile Guidelines presented in Appendix H?

☐ Yes ☐ No ☐ Not Applicable

3. Are any proposed stormwater facilities subject to PADEP Chapter 105 permitting?

☐ Yes ☐ No

a. If "YES," have these plans been forwarded to PADEP for review?

☐ Yes ☐ No, Explain _____

_____

ARTICLE VII: MAINTENANCE RESPONSIBILITIES

Reference: Section 702 Responsibilities for Operations and Maintenance of Stormwater Controls/BMPs

1. Has a Stormwater Control and BMP Operations and Maintenance Plan been approved by the Municipality?

☐ Yes ☐ No, Explain _____

_____

2. Who shall assume responsibility for implementing the Stormwater Control and BMP Operations and Maintenance Plan?

☐ Municipality ☐ Homeowner Association

☐ Private Owner ☐ Other _____

Delaware County Conservation District
Rose Tree Park – Hunt Club
1521 N. Providence Rd.
Media, PA 19063
Phone: 610-892-9484
Fax: 610-892-9489
Email: Info@delcoed.org

Project: _____
Municipality: _____
Engineer: _____
Submittal No: _____
Date:
Project ID: _____ (for County use ONLY)

ARTICLE I: GENERAL PROVISIONS

Reference: Section 105 Applicability/Regulated Activities

3. List all watersheds within which the proposed project is to take place:
_____

4. Does the Proposed Project meet the definition of a "Regulated Activity" in any of the Stormwater Management Plans? ☐ Yes ☐ No

STOP – If you have checked NO for either of the above questions, you are not required to submit a SWM plan under the watershed's respective Stormwater Management Ordinance.

ARTICLE I: GENERAL PROVISIONS

Reference: Section 106 Exemptions

Note: Parent tract refers to the total parcel configuration on *[Insert date]* and includes any subdivision of lands which may have occurred after that date.

Parent Tract Area: _____ acres

Total Existing Impervious Area (as of *[Insert date]*) _____ acres
Total New Impervious Area (all Phases): _____ acres

Parcel IS Exempt ☐ Parcel IS NOT Exempt ☐

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 304 Nonstructural Project Design

1. Has an Existing Resource and Site Analysis Map (ERSAM) been prepared?

☐ Yes ☐ No, Explain _____
_____

ARTICLE III: STORMWATER MANAGEMENT (Continued)

2. Are any of the following Environmentally Sensitive areas identified on site?

Steep Slopes	☐ Yes ☐ No ☐ Unknown
Ponds / Lakes / Vernal Pools	☐ Yes ☐ No ☐ Unknown
Streams	☐ Yes ☐ No ☐ Unknown
Wetlands	☐ Yes ☐ No ☐ Unknown
Hydric Soils	☐ Yes ☐ No ☐ Unknown
Floodplains	☐ Yes ☐ No ☐ Unknown
Stream Buffer Zones	☐ Yes ☐ No ☐ Unknown
Hydrologic Soil Groups A or B	☐ Yes ☐ No ☐ Unknown
Recharge Areas	☐ Yes ☐ No ☐ Unknown
Others: _____	☐ Yes ☐ No ☐ Unknown

3. Does the site layout plan avoid Environmentally Sensitive Areas identified on site?

☐ Yes ☐ No, Explain _____

_____

_____

4. Has a stream buffer been established per Section 306.C.?

☐ Yes ☐ No, Explain _____

_____

_____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 305 Infiltration

1. Is the proposed activity considered a "Stormwater Hotspot"? ☐ Yes ☐ No

2. Have provisions been installed to promote infiltration on site?

☐ Yes ☐ No, Explain _____

_____

_____

3. Total Recharge Volume Required: _____ cubic feet (using ☐ Modified CG-1, ☐ Modified CG-2)

4. How is the Required Recharge Volume being addressed?

☐ Infiltration Trench
☐ Infiltration Basin
☐ Bioretention
☐ Dry Swales
☐ Other: _____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 306 Water Quality Requirements

1. Have provisions been installed to address stormwater runoff water quality on site?

☐ Yes ☐ No, Explain _____

_____

_____

2. Total Water Quality Volume Required: _____ acre feet

3. Is the site in a Special Protection watershed which includes Exceptional Value (EV) or High Quality (HQ) waters? ☐ Yes ☐ No

4. How is the Required Water Quality Volume being addressed?

☐ Wet Detention Basin
☐ Extended Dry Detention Basin
☐ Bioretention
☐ Sand Filter
☐ Constructed Wetlands
☐ Other: _____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 307 Stream Bank Erosion Requirements

1. Has the 2- year proposed conditions flow been reduced to the 1- year existing conditions flow?

☐ Yes ☐ No, Explain _____

_____

_____

2. Does the proposed conditions 1- year storm drain over a minimum 24- hour period?

☐ Yes ☐ No, Explain _____

_____

_____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 308 Stormwater Peak Rate Control and Management Districts

1. In which of the following Stormwater Management District(s) is the site located?

☐ A
☐ B

2. Does the Proposed Conditions Runoff meet the Criteria established in Table 308.1?

☐ Yes ☐ No If you answered Yes, proceed. If you answered No, consult with Municipality.

ARTICLE IV: STORMWATER MANAGEMENT (continued)

a. Are you claiming "Hardship," as described in Section 308, G in lieu of meeting the requirements of this District?

☐ Yes ☐ No, Explain _____

b. If you are claiming "Hardship," has a Downstream Impacts Evaluation been prepared in accordance with Section 308, H ?

☐ Yes ☐ No, Explain _____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 309 Calculation Methodology

1. Which method(s) are utilized in the site SWM site plan for computing stormwater runoff rates and volumes?

☐ TR-20
☐ TR-55 ☐ Rational Method
☐ HEC-1 / HEC-HMS ☐ Other: _____

2. Was NOAA Atlas 14 utilized in rainfall determination?

☐ Yes ☐ No, Explain _____

3. Was Table F-1 (Runoff Curve Numbers) or Table F-2 (Rational Runoff Coefficients) in Appendix F utilized in calculations for runoff?

☐ Yes ☐ No, Explain _____

4. For any proposed storm water detention facility, were the appropriate design storms routed through the facility using the Storage Indication Method?

☐ Yes ☐ No, Explain _____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 310 Other Requirements

1. Is this project subject to PENNDOT approval?

☐ Yes ☐ No

If "YES," have these plans been forwarded to PENNDOT for review?

☐ Yes ☐ No, Explain _____

_____

Have proposed wet detention basins incorporated biologic control consistent with the West Nile Guidelines presented in Appendix H?

☐ Yes ☐ No ☐ Not Applicable

Are any proposed stormwater facilities subject to PADEP Chapter 105 permitting?

☐ Yes ☐ No

If "YES," have these plans been forwarded to PADEP for review?

☐ Yes ☐ No, Explain _____

_____

ARTICLE VII: MAINTENANCE RESPONSIBILITIES

Reference: Section 702 Responsibilities for Operations and Maintenance of Stormwater Controls/BMPs

Has a Stormwater Control and BMP Operations and Maintenance Plan been approved by the Municipality?

☐ Yes ☐ No, Explain _____

_____

Who shall assume responsibility for implementing the Stormwater Control and BMP Operations and Maintenance Plan?

☐ Municipality ☐ Homeowner Association

☐ Private Owner ☐ Other_____

~~**ORDINANCE APPENDIX C—2**~~

~~SWM SITE PLAN CHECKLIST~~

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Chester County Conservation District
688 Unionville Road, Suite 200
Kennett Square, PA 19348
Phone: 610-925-4920
Fax: 610-925-4925

Project: _____
Municipality: _____
Engineer: _____
Submittal No: _____
Date: _____
Project ID: _____ (for County use ONLY)

ARTICLE I: GENERAL PROVISIONS

Reference: Section 105 Applicability/Regulated Activities

1. List all watersheds within which the proposed project is to take place: _____

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2. Does the Proposed Project meet the definition of a "Regulated Activity" in any of the Stormwater Management Plans? ☐ Yes ☐ No

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STOP – If you have checked NO for either of the above questions, you are not required to submit a SWM plan under the watershed's respective Stormwater Management Ordinance.

ARTICLE I: GENERAL PROVISIONS

Reference: Section 106 Exemptions

Note: Parent tract refers to the total parcel configuration on *[Insert date]*, and includes any subdivision of lands which may have occurred after the date.

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Parent Tract Area _____ acres

Total Existing Impervious Area (as of *[Insert date]*): _____ acres
Total New Impervious Area (all Phases): _____ acres

Parcel IS Exempt ☐ Parcel IS NOT Exempt ☐

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 304 Nonstructural Project Design

1. Has an Existing Resource and Site Analysis Map (ERSAM) been prepared?

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☐ Yes ☐ No, Explain _____

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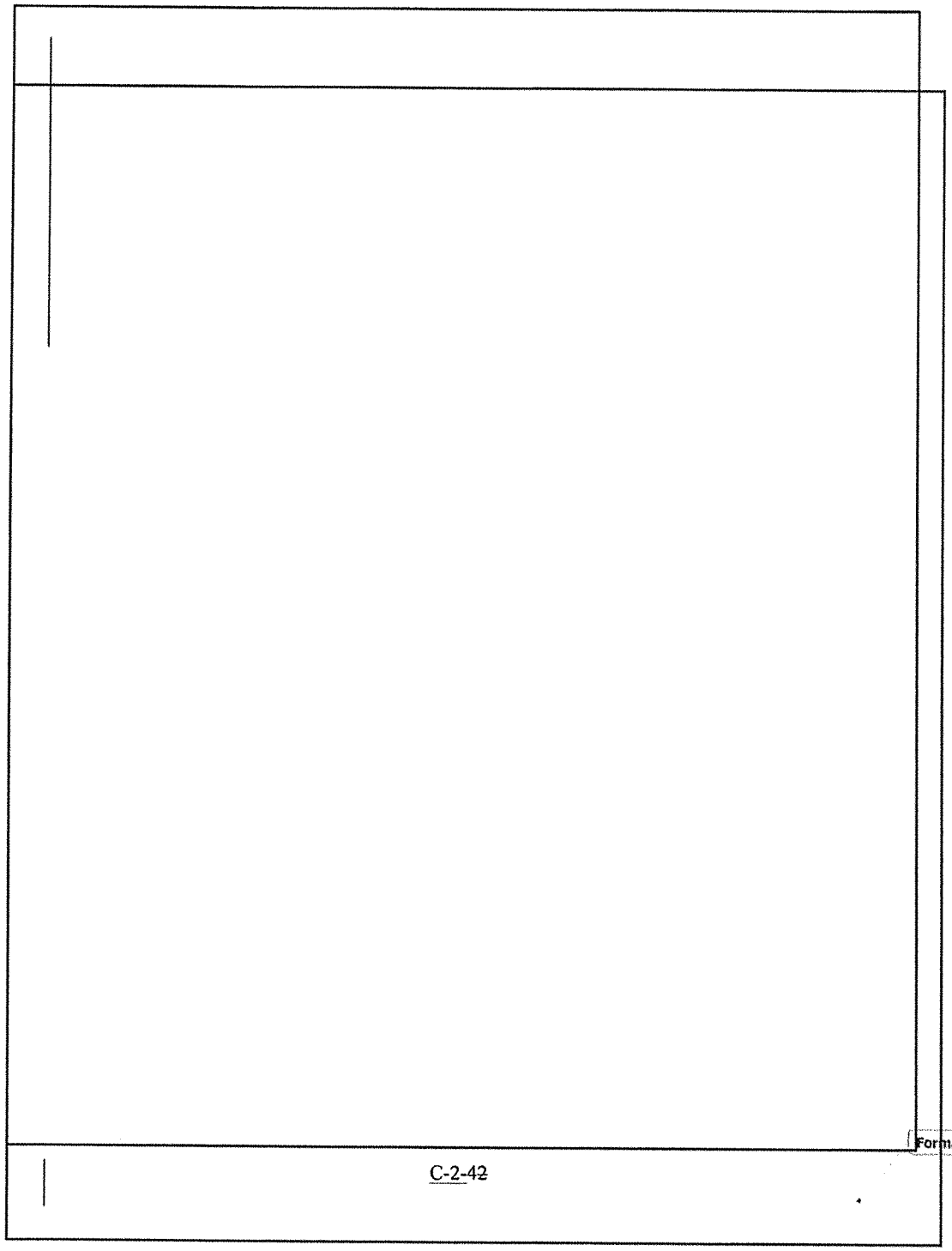

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Delaware County Conservation District
Rose Tree Park – Hunt Club
1521 N. Providence Rd.
Media, PA 19063
Phone: 610-892-9484
Fax: 610-892-9489
Email: Info@delcocd.org

Project: _____
Municipality: _____
Engineer: _____
Submittal No: _____
Date: _____
Project ID: _____ (for County use ONLY)

ARTICLE I: GENERAL PROVISIONS

Reference: Section 105 Applicability/Regulated Activities

List all watersheds within which the proposed project is to take place: _____

Does the Proposed Project meet the definition of a "Regulated Activity" in any of the Stormwater Management Plans? ☐ Yes ☐ No

STOP – If you have checked NO for either of the above questions, you are not required to submit a SWM plan under the watershed's respective Stormwater Management Ordinance.

ARTICLE I: GENERAL PROVISIONS

Reference: Section 106 Exemptions

Note: Parent tract refers to the total parcel configuration on *[Insert date]* and includes any subdivision of lands which may have occurred after that date.

Parent Tract Area: _____ acres

Total Existing Impervious Area (as of *[Insert date]*): _____ acres
Total New Impervious Area (all Phases): _____ acres

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Parcel IS Exempt ☐ Parcel IS NOT Exempt ☐

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 304 Nonstructural Project Design

Has an Existing Resource and Site Analysis Map (ERSAM) been prepared?

☐ Yes ☐ No, Explain _____

ARTICLE III: STORMWATER MANAGEMENT (Continued)

Are any of the following Environmentally Sensitive areas identified on site?

Steep Slopes	☐ Yes ☐ No ☐ Unknown	
Ponds / Lakes / Vernal Pools	☐ Yes ☐ No ☐ Unknown	
Streams	☐ Yes ☐ No ☐ Unknown	
Wetlands	☐ Yes ☐ No ☐ Unknown	
Hydric Soils	☐ Yes ☐ No ☐ Unknown	
Floodplains	☐ Yes ☐ No ☐ Unknown	
Stream Buffer Zones	☐ Yes ☐ No ☐ Unknown	
Hydrologic Soil Groups A or B	☐ Yes ☐ No ☐ Unknown	
Recharge Areas	☐ Yes ☐ No ☐ Unknown	
Others: _____	☐ Yes ☐ No ☐ Unknown	

Does the site layout plan avoid Environmentally Sensitive Areas identified on site?

☐ Yes ☐ No, Explain _____

Has a stream buffer been established per Section 306.C.?

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☐ Yes ☐ No. Explain _____

_____

_____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 305 Infiltration

Is the proposed activity considered a "Stormwater Hotspot"? ☐ Yes ☐ No

Have provisions been installed to promote infiltration on site?

☐ Yes ☐ No. Explain _____

_____

_____

Total Recharge Volume Required: _____ cubic feet (using: ☐ Modified CG-1; ☐ Modified CG-2)

How is the Required Recharge Volume being addressed?

☐ Infiltration Trench ☐ Dry Swales

☐ Infiltration Basin ☐ Other: _____

☐ Bioretention

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 306 Water Quality Requirements

Have provisions been installed to address stormwater runoff water quality on site?

☐ Yes ☐ No. Explain _____

_____

_____

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~~Total Water Quality Volume Required: _____ acre feet~~

~~Is the site in a Special Protection watershed which includes Exceptional Value (EV) or High Quality (HQ) waters? ☐ Yes ☐ No~~

~~How is the Required Water Quality Volume being addressed?~~

~~Wet Detention Basin~~ ~~Sand Filter~~

~~Extended Dry Detention Basin~~ ~~Constructed Wetlands~~

~~Bioretention~~ ~~Other: _____~~

~~ARTICLE III: STORMWATER MANAGEMENT~~

~~Reference: Section 307 Stream Bank Erosion Requirements~~

~~Has the 2-year proposed conditions flow been reduced to the 1-year existing conditions flow?~~

~~☐ Yes ☐ No. Explain _____~~

~~Does the proposed conditions 1-year storm drain over a minimum 24-hour period?~~

~~☐ Yes ☐ No. Explain _____~~

~~ARTICLE III: STORMWATER MANAGEMENT~~

~~Reference: Section 308 Stormwater Peak Rate Control and Management Districts~~

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In which of the following Stormwater Management District(s) is the site located?

Does the Proposed Conditions Runoff meet the Criteria established in Table 308.1?

☐ Yes ☐ No If you answered Yes, proceed. If you answered No, consult with Municipality.

ARTICLE IV: STORMWATER MANAGEMENT (continued)

Are you claiming "Hardship," as described in Section 308. G , in lieu of meeting the requirements of this District?

☐ Yes ☐ No, Explain _____

_____

b. If you are claiming "Hardship," has a Downstream Impacts Evaluation been prepared in accordance with Section 308. H ?

☐ Yes ☐ No, Explain _____

_____

_____

_____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 309 Calculation Methodology

Which method(s) are utilized in the site SWM site plan for computing stormwater runoff rates and volumes?

T
R-20
T
R-55
H
EC-1 / HEC-HMS

Rationa l Method

Other: _____

Was NOAA Atlas 14 utilized in rainfall determination?

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☐ Yes ☐ No, Explain _____

_____

_____

Was Table F-1 (Runoff Curve Numbers) or Table F-2 (Rational Runoff Coefficients) in Appendix F utilized in calculations for runoff?

☐ Yes ☐ No, Explain _____

_____

_____

For any proposed storm water detention facility, were the appropriate design storms routed through the facility using the Storage-Indication Method?

☐ Yes ☐ No, Explain _____

_____

_____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 310 Other Requirements

Is this project subject to PENNDOT approval?

☐ Yes ☐ No

If "YES," have these plans been forwarded to PENNDOT for review?

☐ Yes ☐ No, Explain _____

_____

Have proposed wet detention basins incorporated biologic control consistent with the West Nile Guidelines presented in Appendix H?

☐ Yes ☐ No ☐ Not Applicable

Are any proposed stormwater facilities subject to PADEP Chapter 105 permitting?

☐ Yes ☐ No

If "YES," have these plans been forwarded to PADEP for review?

☐ Yes ☐ No, Explain _____

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~~ARTICLE VII: MAINTENANCE RESPONSIBILITIES~~

~~Reference: Section 702 Responsibilities for Operations and Maintenance of Stormwater Controls/BMPs~~

~~Has a Stormwater Control and BMP Operations and Maintenance Plan been approved by the Municipality?~~

~~☐ Yes ☐ No, Explain~~

~~Who shall assume responsibility for implementing the Stormwater Control and BMP Operations and Maintenance Plan?~~

~~Municipality~~ ~~Homeowner Association~~

~~Private Owner~~ ~~Other~~

Chester County Conservation District
688 Unionville Road, Suite 200
Kennett Square, PA 19348
Phone: 610-925-4920
Fax: 610-925-4925

Project: _____
Municipality: _____
Engineer: _____
Submittal No: _____
Date: _____
Project ID: _____ (for County use ONLY)

ARTICLE I: GENERAL PROVISIONS

Reference: Section 105 Applicability/Regulated Activities

1. List all watersheds within which the proposed project is to take place. _____

2. Does the Proposed Project meet the definition of a "Regulated Activity" in any of the Stormwater Management Plans? ☐ Yes ☐ No

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STOP – If you have checked NO for either of the above questions, you are not required to submit a SWM plan under the watershed's respective Stormwater Management Ordinance

ARTICLE I: GENERAL PROVISIONS

Reference: Section 106 Exemptions

Note: Parent tract refers to the total parcel configuration on *[Insert date of ordinance adoption]*, and includes any subdivision of lands which may have occurred after the date

Parent Tract Area: _____ acres

Total Existing Impervious Area (as of *[Insert date of ordinance adoption]*) _____ acres
Total New Impervious Area (all Phases): _____ acres

Parent IS Exempt ☐ Parent IS NOT Exempt ☐

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 304 Nonstructural Project Design

~~2.~~1. Has an Existing Resource and Site Analysis Map (ERSAM) been prepared?

☐ Yes ☐ No, Explain _____

~~3.~~2. Are any of the following Environmentally Sensitive areas identified on site?

Steep Slopes	☐ Yes	☐ No	☐ Unknown
Ponds / Lakes / Vernal Pools	☐ Yes	☐ No	☐ Unknown
Streams	☐ Yes	☐ No	☐ Unknown
Wetlands	☐ Yes	☐ No	☐ Unknown
Hydric Soils	☐ Yes	☐ No	☐ Unknown
Floodplains	☐ Yes	☐ No	☐ Unknown
Stream Buffer Zones	☐ Yes	☐ No	☐ Unknown
Hydrologic Soil Groups A or B	☐ Yes	☐ No	☐ Unknown
Recharge Areas	☐ Yes	☐ No	☐ Unknown
Others: _____	☐ Yes	☐ No	☐ Unknown

~~4.~~3. Does the site layout plan avoid Environmentally Sensitive Areas identified on site?

☐ Yes ☐ No, Explain _____

~~5.~~4. Has a stream buffer been established per Section 306.C ?

☐ Yes ☐ No, Explain _____

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ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 305 Infiltration

1. Is the proposed activity considered a "Stormwater Hotspot"? (refer to Section 301.T) ☐ Yes ☐ No

2. Have provisions been installed to promote infiltration on site?

   ☐ Yes ☐ No, Explain _____

   _____

   _____

3. Total Recharge Volume Required:_____cubic feet (using: ☐ Modified CG-1; ☐ Modified CG-2)

4. How is the Required Recharge Volume being addressed?

   ☐ Infiltration Trench
   ☐ Infiltration Basin
   ☐ Bioretention
   ☐ Dry Swales
   ☐ Other: _____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 306 Water Quality Requirements

1. Have provisions been installed to address stormwater runoff water quality on site?

   ☐ Yes ☐ No, Explain _____

   _____

   _____

2. Total Water Quality Volume Required: _____ acre feet

3. Is the site in a Special Protection watershed which includes Exceptional Value (EV) or High Quality (HQ) waters? ☐ Yes ☐ No

4. How is the Required Water Quality Volume being addressed?

   ☐ Wet Detention Basin
   ☐ Extended Dry Detention Basin
   ☐ Bioretention
   ☐ Sand Filter
   ☐ Constructed Wetlands
   ☐ Other: _____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 307 Stream Bank Erosion Requirements

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1. Has the 2- year proposed conditions flow been reduced to the 1- year existing conditions flow?

☐ Yes ☐ No, Explain _____

_____

_____

2. Does the proposed conditions 1- year storm drain over a minimum 24- hour period?

☐ Yes ☐ No, Explain _____

_____

_____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 308 Stormwater Peak Rate Control and Management Districts

1. In which of the following Stormwater Management District(s) is the site located?

☐ A ☐ B ☐ Other _____

ARTICLE III: STORMWATER MANAGEMENT (continued)

2. Does the Proposed Conditions Runoff meet the Criteria established in [Table 308.1,2,3, etc.]? Formatted: Highlight

☐ Yes ☐ No If you answered Yes, proceed. If you answered No, consult with Municipality.

a. Are you claiming "Hardship," as described in Section 308.G in lieu of meeting the requirements of this District?

☐ Yes ☐ No, Explain _____

_____

_____

b. If you are claiming "Hardship," has a Downstream Impacts Evaluation been prepared in accordance with Section 308.H?

☐ Yes ☐ No, Explain _____

_____

_____

_____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 309 Calculation Methodology

1. Which method(s) are utilized in the SWM site plan for computing stormwater runoff rates and volumes?

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☐ TR-20
☐ TR-55 ☐ Rational Method
☐ HEC-1 / HEC-HMS ☐ Other: _____

2. Was NOAA Atlas 14 utilized in rainfall determination?

☐ Yes ☐ No, Explain _____

3. Was Table F-1 (Runoff Curve Numbers) or Table F-2 (Rational Runoff Coefficients) in Appendix F utilized in calculations for runoff?

☐ Yes ☐ No, Explain _____

4. For any proposed stormwater detention facility, were the appropriate design storms routed through the facility using the Storage-Indication Method?

☐ Yes ☐ No, Explain _____

ARTICLE III: STORMWATER MANAGEMENT

Reference: Section 310 Other Requirements

1. Is this project subject to PENNDOT approval?

☐ Yes ☐ No

a. If "YES," have these plans been forwarded to PENNDOT for review?

☐ Yes ☐ No, Explain _____

2. Have proposed wet detention basins incorporated biologic control consistent with the West Nile Guidelines presented in Appendix H?

☐ Yes ☐ No ☐ Not Applicable

3. Are any proposed stormwater facilities subject to PADEP Chapter 105 permitting?

☐ Yes ☐ No

a. If "YES," have these plans been forwarded to PADEP for review?

☐ Yes ☐ No, Explain _____

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ARTICLE VII: MAINTENANCE RESPONSIBILITIES

Reference: Section 702 Responsibilities for Operations and Maintenance of Stormwater Controls/BMPs

1. Has a Stormwater Control and BMP Operations and Maintenance Plan been approved by the Municipality?

   ☐ Yes ☐ No, Explain _____

   _____

2. Who shall assume responsibility for implementing the Stormwater Control and BMP Operations and Maintenance Plan?

   ☐ Municipality ☐ Homeowner Association

   ☐ Private Owner ☐ Other _____

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Implementation Flowcharts
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ORDINANCE APPENDIX E

LOW IMPACT DEVELOPMENT (LID) PRACTICES

LOW IMPACT DEVELOPMENT (LID) PRACTICES

ALTERNATIVE APPROACH FOR MANAGING STORMWATER RUNOFF

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

ORDINANCE APPENDIX F

STORMWATER MANAGEMENT DESIGN CRITERIA

TABLE F-1
RUNOFF CURVE NUMBERS

TABLE F-2
RATIONAL RUNOFF COEFFICIENTS

TABLE F-3
MANNING ROUGHNESS COEFFICIENTS

TABLE F-1

RUNOFF CURVE NUMBERS

LAND USE DESCRIPTION	Hydrologic Condition	HYDROLOGIC SOIL GROUP A	B	C	D
Open Space					
Grass cover < 50%	Poor	68	79	86	89
Grass cover 50% to 75%	Fair	49	69	79	84
Grass cover > 75%	Good	39	61	74	80
Meadow		30	58	71	78
Agricultural					
Pasture, grassland, or range – Continuous forage for grazing	Poor	68	79	86	89
Pasture, grassland, or range – Continuous forage for grazing	Fair	49	69	79	84
Pasture, grassland, or range – Continuous forage for grazing	Good	39	61	74	80
Brush—brush-weed-grass mixture with brush the major element	Poor	48	67	77	83
Brush—brush-weed-grass mixture with brush the major element	Fair	35	56	70	77
Brush—brush-weed-grass mixture with brush the major element	Good	30	48	65	73
Fallow Bare soil	-------	77	86	91	94
Crop residue cover (CR)	Poor	76	85	90	93
	Good	74	83	88	90
Woods – grass combination (orchard or tree farm)	Poor	57	73	82	86
	Fair	43	65	76	82
	Good	32	58	72	79
Woods	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	30	55	70	77