



Poquessing Creek Watershed
ACT 167
STORM WATER MANAGEMENT PLAN

Watershed Plan Advisory Committee
 (WPAC) Meeting No. 5
 May 21, 2012

Logos: LWD, NEWELL TERESKAR MACKAY ENGINEERING, pennsylvania DEPARTMENT OF ENVIRONMENTAL PROTECTION, TEMPLE UNIVERSITY, 40th Anniversary Pennsylvania Environmental Council

WPAC Meeting No. 5.
 Status Meeting
 May 21, 2012
 10:00 - 12:00 A.M.
 Glen Foerd Mansion

- Welcome & Introductions
- WPAC Members - Thank you.
- Review of Phase II Work / Useful Products
- Review of DEPs Comments
- Differences Between Pennypack and Poquessing Ordinances
- Review of FINAL DRAFT Ordinance
- Next Steps, Schedule, Timeline

**WELCOME
 &
 INTRODUCTIONS**

Primary WPAC Members:

Bucks County:
 Bensalem Township,
 Lower Southampton Township,
 Upper Southampton Township

Montgomery County:
 Lower Moreland Township
 Conservation Districts
 Planning Commissions

Philadelphia County
 City of Philadelphia
 PWD

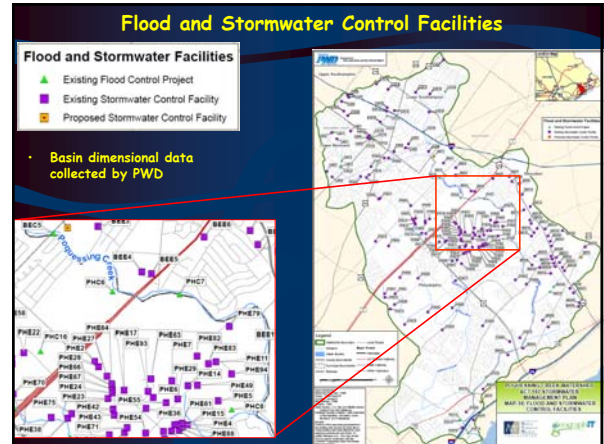
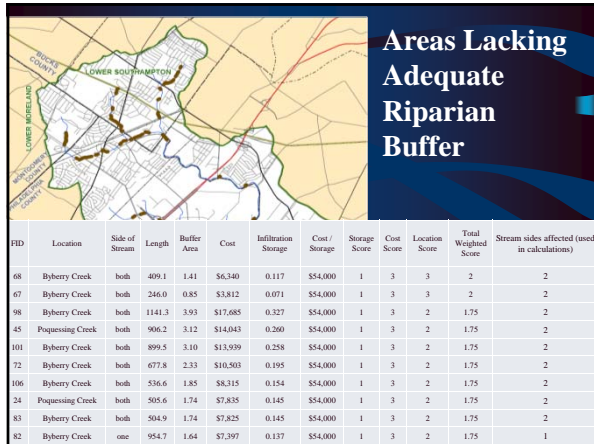
Watershed / Citizen groups
 Others

PHASE II - Plan Preparation

- GIS Database Compilation
 Existing Land Use, Soils,
 Future Land Use, Obstructions,
 Problem Areas
- Detailed Analysis of Problem Areas
- Water Quantity Modeling (Flooding)
- Develop Standards & Criteria
- Develop Model Ordinance
- WPAC Participation

Progress since last meeting:

1. Finalized all GIS maps
2. Finalized Management Districts
3. Finalized and submitted DRAFT Plan and ordinance for review
4. Updated report and ordinance for Municipality, Co., and DEP reviews
5. Submitted FINAL Plan to WPAC and DEP
6. Received DEP unofficial approval (5/4/2012)

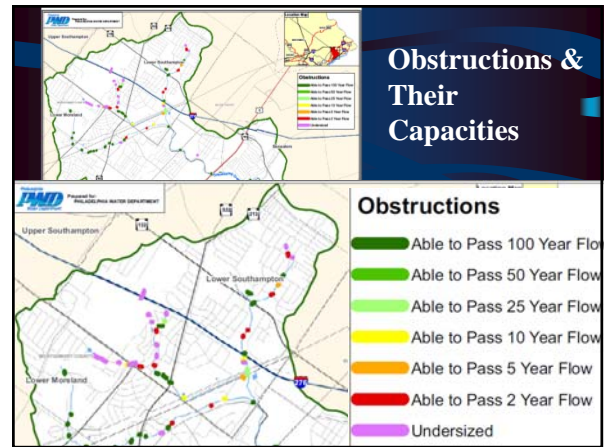


Obstructions & Their Capacities

Obstructions GIS Attribute Table

SP SURVEYID	SP FEATURE	SP LOCATIO	SP CONDI	SP PIPE MA	SP PIPE DI	SP HEIGHT	SP WIDTH	SP LENGTH
4/7/2008	CulvertStart	MID	Good	Conc	0	5	72	0
4/8/2008	BridgeStart	CROSS	Good		0	5	12	5
4/7/2008	BridgeStart	CROSS	Good		0	5	15	5
4/7/2008	BridgeStart	MID	Good		0	10	25	40
4/7/2008	BridgeStart	CROSS	Good		0	5	12	5
4/8/2008	BridgeStart	CROSS	Good		0	10	20	5
4/9/2008	BridgeStart	CROSS	Fair		0	5	12	5
4/9/2008	BridgeStart	CROSS	Good		0	10	40	30
4/9/2008	BridgeStart	CROSS	Fair		0	30	75	8

Bridge Name	Capacity (cfs)	Return Interval Flow (cfs)							Event Passing
		1 Year	5 Year	10 Year	25 Year	50 Year	100 Year		
POQ Bridge 1010	647	432	550	641	811	1031	1333	10	
POQ Bridge 1014	1027	2669	3652	4259	5147	5802	6542	0	
POQ Bridge 1018	1448	2361	3609	4231	5132	5735	6815	0	
POQ Bridge 1036	3582	2826	3601	4209	5082	5687	6548	1	
POQ Bridge 1039	1547	2459	3601	4197	5056	5659	6613	0	
POQ Bridge 105	1353	333	456	528	658	696	832	100	
POQ Bridge 1050	1434	2521	3636	4191	5031	5613	6498	0	
POQ Bridge 1057	5081	2249	3668	4181	5013	5568	6537	25	
POQ Bridge 1065	4927	2228	3646	4155	4989	5536	6481	10	
POQ Bridge 114	1705	321	456	530	670	792	1058	100	
POQ Bridge 1207	6576	664	1287	1642	1872	2192	2687	100	



DEP Review and Recommended Changes

- ### DEP Review
- Mostly changes in verbiage
 - Added multiple references to data
 - No changes to modeling

DEP Track Changes

**SECTION V
WATERSHED TECHNICAL ANALYSIS**

A. Watershed Modeling

An initial step in the preparation of this stormwater management plan was the selection of a stormwater simulation model to be utilized. It was necessary to select a model which:

- Modeled design storms of various durations and frequencies to produce combined routed hydrographs which could be combined.
- Was adaptable to the size of subwatersheds in this study.
- Could evaluate specific physical characteristics of the rainfall-runoff process, and
- Did not require an excessive amount of input data yet yielded reliable results.

The model decided upon was the Environmental Protection Agency's (EPA's) Stormwater Management Model 5.0 (SWMM 5.0) for the following reasons:

- It had been developed by the Environmental Protection Agency (EPA) and Camp Dresser & McKee (CDM) specifically for urban situations, and,
- It has the ability to include stormwater management facilities for modeling purposes,
- Input parameters provide a flexible calibration process,
- It has the ability to analyze reservoir or detention basin routing effects and location in the watershed, and
- It is accepted by the Pennsylvania Department of Environmental Protection (PADEP).

Comment (2018): What does this chapter add to the DEP's Corporate Identity?

- Removed Section V from report and moved to the Technical Appendix

DEP Track Changes

**SECTION VI
Criteria and Standards for New Development and Redevelopment in the Poquessing Creek Watershed**

This section provides a summary of the model stormwater management ordinance for the Poquessing Creek Watershed as presented in **Appendix A**. The standards and criteria for the model ordinance were developed based on information from the following sources:

- The Pennsylvania Department of Environmental Protection's (PADEP's) Best Management Practices (BMP) Manual and Model Stormwater Management Ordinance
- The Philadelphia Stormwater Regulations
- The approved ordinance for the Tockay-Tatary-Frankford Watershed
- The approved ordinance for the Darby-Cobby Watershed
- The recently completed ordinance for the Pennypack Watershed
- Discussions with representatives from PADEP, Philadelphia, Bucks, and Montgomery Counties
- Hydrologic modeling results used to establish management districts for peak rate control
- Experience and professional judgment of the study team regarding effectiveness of stormwater requirements.

Comment (2011): Which approved municipal ordinance is this ordinance? Could change to "Approved Ordinance" (e.g., "Model Stormwater Management Plan" and "Approved Darby-Cobby Creek Stormwater Management Plan")

Comment (2012): See Section 3 of Act 181, which provides for implementation of water use by impacts to transportation facilities.

The objective of the model ordinance is to minimize the hydrologic and water quality impacts of future development and redevelopment in the watershed. As described in **Section III**, all stream reaches in the watershed are classified as impaired by the Pennsylvania Department of Environmental Protection (PADEP) and the cause of the impairment for 95 percent of the impaired stream reaches is attributed to urban runoff. While adoption and enforcement of the ordinance would address the impacts of future development, the proposed improvements in **Section VII** are also recommended to address the current level of impairment by reducing stormwater flows and runoff volumes.

- Changed verbiage to follow Act 167 better

Differences Between Pennypack and Poquessing Ordinances

103. Purpose

- A. Promote alternative project designs and layouts that minimize the impacts on surface and groundwater. Meet legal water quality requirements under state law, including regulations of 25 Pa. Code 92 to protect, maintain, reclaim, and restore the existing and designated uses of the waters of this Commonwealth.**
- B. Promote stormwater Best Management Practices (BMPs) Preserve the natural drainage systems as much as possible.**
- C. Minimize increases in runoff stormwater volume. Manage stormwater close to the source.**
- D. Minimize impervious surfaces. Provide procedures and performance standards for stormwater planning and management.**
- E. Manage accelerated stormwater runoff, erosion and sedimentation problems, and stormwater runoff impacts at their source by regulating activities that cause these problems. Maintain groundwater recharge to prevent degradation of surface and groundwater quality and to otherwise protect water resources.**
- F. Provide review procedures and performance standards for stormwater planning and management. Prevent scour and erosion of streambanks and streambeds.**
- G. Utilize and preserve existing natural drainage systems as much as possible. Provide proper operation and maintenance of all Stormwater Best Management Practices (BMPs) that are implemented within the Municipality.**
- H. Manage stormwater impacts close to the runoff source, requiring a minimum of structures and relying on natural processes. Provide standards to meet National Pollutant Discharge Elimination System (NPDES) requirements.**
- I. Focus on infiltration of stormwater to maintain groundwater recharge, prevent degradation of surface and groundwater quality, and protect water resources.**

105. Applicability

b) (The following note applies to those portions of the Poquessing Creek Watershed that lie within Bucks and Montgomery Counties.)
This Ordinance applies to any earth disturbance activity equal to or greater than five thousand (5,000) square feet that is associated with a development or redevelopment project. Earth disturbance activities of between 5,000 square feet and one (1) acre that are associated with either development or redevelopment projects have drainage plan requirements per Table 106-1, and those that are associated with redevelopment are exempt from the Section 407 stream bank erosion requirements. Earth disturbance activities and associated stormwater management controls are also regulated under existing state law and implementing regulations.

401. General requirements

- D. For all regulated earth disturbance activities, Erosion and Sediment (E&S) control Best Management Practices (BMPs) shall be designed, implemented, operated and maintained during the Regulated Earth Disturbance activities (e.g., during construction) to meet the purposes and requirements of this Ordinance and to meet all requirements under Title 25 of the Pennsylvania Code and the Clean Streams Law. DEP regulations require an erosion and sediment control plan for any earth disturbance activity of five thousand (5,000) square feet or more, under 25 Pennsylvania Code § 102.1(b). In addition, under 25 Pennsylvania Code Chapter 92, a DEP "NPDES Construction Activities" Permit is required for regulated earth disturbance activities. A copy of the erosion and sediment control plan and any required permit, as required by DEP regulations, shall be available on the project site at all times. Various BMPs and their design standards are listed in the Erosion and Sediment Pollution Control Program Manual (E&S Manual), No. 363-2134-008 (April 15, 2000), as amended and updated. However, the municipality may require E&S controls for projects with lesser areas of earth disturbance (e.g., the Bucks County Conservation District requires E&S controls for projects with 1,000 square feet or more of earth disturbance.)**
- E. For all Regulated Activities, implementation of the water volume controls in Section 406 is required.**

409. Calculation Methodology

*Note: Successors to the above methods are also acceptable. *These successors include WmTR55 for TR-55 and WmTR20 for TR-20.*

- B. If a hydrologic computer model such as HydroCAD or HEC-HMS is used for stormwater runoff calculations, then the duration of rainfall shall be 24 hours. The rainfall distribution should reference NRCS Type II.
- C. For the purposes of existing conditions flow rate determination, undeveloped land shall be considered as "meadow" **in good condition**, unless the natural ground cover generates a lower curve number or Rational 'C' value (i.e., forest).
- D. *For Montgomery and Bucks Counties only, all calculations using the Rational Method shall use rainfall intensities from the PennDOT Drainage Manual Appendix 7A or NOAA 14 Precipitation Frequency Atlas of the United States (2004, revised 2006).* Times-of-concentration for overland flow shall be calculated using the methodology presented in Chapter 3 of Urban Hydrology for Small Watersheds, NRCS, TR-55 (as amended or replaced from time to time by NRCS). Times-of-concentration for channel and pipe flow shall be computed using flow velocities as determined by Manning's equation.

Model Act 167 Stormwater Management Ordinance

Ordinance Provisions:

Article:	Description:
I.	General Provisions
II.	Definitions
III. (303)	SWM Site Plan Requirements
IV. (403-411)	Stormwater Management
V.	Inspections
VI.	Fees And Expenses
VII.	Maintenance Responsibilities
VIII.	Prohibitions
IX.	Enforcement and Penalties

Stormwater Management Requirements

- Section 401 - General Requirements
- Section 402 - Permit Requirements for Other Government Entities
- Section 403 - Erosion and Sediment Control During Regulated Earth Disturbance
- Section 404 - Nonstructural Project Design
- Section 405 - Ground Water Criteria
- Section 406 - Water Quality Criteria
- Section 407 - Stream Bank Erosion Criteria
- Section 408 - Stormwater Peak Rate Control and Management Districts
- Section 409 - Calculation Methodologies
- Section 410 - Other Requirements

Definitions:

Regulated Activities- Any Earth Disturbances or any activities that involve the alteration or development of land in a manner that may affect stormwater runoff.

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

Definitions:

Directly Connected Impervious Area (DCIA) - An impervious or impermeable surface which is directly connected to a stormwater drainage or conveyance system, leading to direct runoff, decreased infiltration, decreased filtration, and decreased time of concentration.

Disconnected Impervious Area (DIA) - An impervious or impermeable surface which is disconnected from any stormwater drainage or conveyance system and is redirected or directed to a pervious area which allows for infiltration, filtration, and increased time of concentration.

Section 105 - Applicability/Regulated Activities

The following activities are defined as "regulated activities" and shall be regulated by this Ordinance unless exempted by Section 106:

- A. Land development,
- B. Subdivisions,
- C. Alteration of the natural hydrologic regime,
- D. Construction or reconstruction of or addition of new impervious or semi-pervious surfaces (i.e., driveways, parking lots, roads, etc.),
- E. Construction of new buildings or additions to existing buildings,
- F. Redevelopment,
- G. Diversion piping or encroachments in any natural or man-made channel,
- H. Stormwater BMPs or appurtenances thereto,
- I. Earth disturbance activities of greater than five thousand (5,000) square
- J. Any of the above regulated activities which were approved more than five (5) years prior to the effective date of this Ordinance and resubmitted for municipal approval.

Section 106. Exemptions

A. Table 106.1a - Eligibility for Exemptions for the Bucks and Montgomery Portions of the Watershed

Ordinance Article or Section	Type of Project	Proposed New Impervious Cover						
		< 1,000 sq. ft.		≥ 1,000 to < 5,000 sq. ft.		≥ 5,000 sq. ft.		
		Earth Disturbance < 5,000 sq. ft.	Earth Disturbance ≥ 5,000 sq. ft. - 1 acre	Earth Disturbance > 1 acre	Earth Disturbance < 5,000 sq. ft.	Earth Disturbance ≥ 5,000 sq. ft. - 1 acre	Earth Disturbance > 1 acre	All Earth Disturbance Categories
Article III SWM Site Plan Requirements	Development and Redevelopment	Yes	No*	No	No*	No	No	No
Section 401 Nonstructural Project Design	Development and Redevelopment	Yes	No*	No	No*	No*	No	No
Section 405 Groundwater Recharge	Development and Redevelopment	Yes	No*	No	No*	No*	No	No
Section 406 Water Volume Control Requirements	Development and Redevelopment	Yes	No*	No	No*	No*	No	No
Section 407 Streambank Erosion Requirements	Development and Redevelopment	Yes	No*	No	No*	No*	Yes	No
Section 408 Stormwater Peak Rate Control and Management Districts	Development and Redevelopment	Yes	No*	No	Yes	No*	No	No
Erosion and Sediment Pollution Control Plan	Earth Disturbance	See Earth Disturbance Requirements	See Earth Disturbance Requirements	See Earth Disturbance Requirements	See Earth Disturbance Requirements	See Earth Disturbance Requirements	See Earth Disturbance Requirements	See Earth Disturbance Requirements

(Refer to municipal earth disturbance requirements, as applicable)

Section 106. Exemptions (cont.)

A. Table 106.1b - Eligibility for Exemptions for the Philadelphia Portion of the Watershed

Ordinance Article or Section	Type of Project	Earth Disturbance Associated with Development		
		< 5,000 sq. ft.	≥ 5,000 sq. ft. but < 1 acre	≥ 1 acre
Article III SWM Site Plan Requirements	New Development	N/A**	No	No
	Redevelopment	N/A**	No	No
Section 405 Groundwater Recharge Requirements	New Development	N/A**	No	No
	Redevelopment	N/A**	No	No
Section 406 Water Volume Control Requirements	New Development	N/A**	No	No
	Redevelopment	N/A**	No	No
Section 407 Streambank Erosion (Channel Protection) Requirements	New Development	N/A**	No	No
	Redevelopment	N/A**	Yes	Yes (Alternate Criteria)
Section 408 Flood Control/Stormwater Peak Rate Control and Management Districts Requirements	New Development	N/A**	No	No
	Redevelopment	N/A**	No	Yes (Alternate Criteria)

Yes (Alternate Criteria) - Redevelopment disturbing one acre or more that reduces the DCIA from predevelopment conditions by at least 20% is exempt from the Channel Protection/Streambank Erosion (Section 407) and Flood Control/Peak Rate Control (Section 408) Requirements of this Ordinance; and redevelopment that results in an area of earth disturbance equal to or greater than 5,000 square feet, but less than one (1) acre, is exempt from the Channel Protection/Streambank Erosion Requirements of this Ordinance (See Section 106, Exemptions, Philadelphia County Portion of the Watershed).

N/A - Not Applicable, development project is not subject to requirements of the indicated sections of this Ordinance. Voluntary controls are encouraged.

Exempt - Development project is not subject to requirements of indicated section of this Ordinance.

** - If the proposed development results in stormwater discharge that exceeds stormwater system capacity, increases the FEMA regulated water surface elevation, causes a combined sewer overflow, or discharges receiving waters, the design specifications presented in this Ordinance may be applied to proposed development activities as warranted to protect public health, safety, or property.

Section 106. Exemptions (cont.)

B. Bucks and Montgomery County Portions of the Watershed

1. Disconnected Regulated Activities smaller in area than 500 sq. ft. are exempt from the peak rate control and SWM Site Plan preparation requirement of this Ordinance, except when associated earth disturbance is equal to or greater than 5,000 square feet.
2. Disconnected Regulated Activities having an area equal to or greater than 500 square feet and less than 1,500 sq. ft., and with an associated earth disturbance area of less than 5,000 square feet, are exempt only from the peak rate control requirements of this Ordinance in the case of new development, and are exempt from peak rate control and streambank erosion requirements in the case of redevelopment.
3. Agricultural plowing and tilling are exempt from the rate control and SWM Site Plan preparation requirements of this Ordinance provided the activities are performed according to the requirements of 25 Pa. Code Chapter 102.

Section 106. Exemptions (cont.)

B. Bucks and Montgomery County Portions of the Watershed

4. Forest management and timber operations are exempt from the rate control and SWM Site Plan preparation requirements of this Ordinance provided the activities are performed according to the requirements of 25 Pa. Code Chapter 102.
5. For a development taking place in stages, the entire development plan must be used in determining compliance with these exemption criteria. The starting point from which to consider tracts as "parent tracts" in which future subdivisions and respective impervious area computations are cumulatively considered shall be the date of the municipality's adoption of the original Poquessing Creek Watershed Stormwater Management Plan Ordinance.

Section 106. Exemptions (cont.)

B. Philadelphia County Portion of the Watershed

1. Development, including new development and redevelopment, that result in an area of Earth Disturbance less than 5,000 square feet is exempt from certain requirements as outlined in Table 106.1. Applicants must still meet Erosion and Sediment (E&S) Control requirements and coastal water quality requirements from other programs if applicable as described in Philadelphia County's Table 106.1.
2. Redevelopment that results in an area of Earth Disturbance equal to or greater than 5,000 sq. ft., but less than 1 acre, is exempt from the Channel Protection/Streambank Erosion Requirements of this Ordinance.
3. Redevelopment that results in an area of Earth Disturbance equal to or greater than 1 acre and reduces the predevelopment DCIA on the site by at least 20% is exempt from the Channel Protection/Streambank Erosion and Flood Control/Peak Rate Control Requirements of this Ordinance.

Section 106. Exemptions (cont.)

B. Philadelphia County Portion of the Watershed

- In District C, development sites that can discharge directly to the Poquessing Creek Main Channel (east of I-95) and to the Delaware River main channel major tributary without use of City infrastructure may do so without control of proposed conditions peak rate of runoff. When adequate capacity in the downstream system does not exist and will not be provided through improvements, the proposed conditions peak rate of runoff must be controlled to the Predevelopment Conditions peak rate as required in District A provisions for the specified Design Storms. The Predevelopment Condition for new development is the existing condition. For redevelopment purposes, the Predevelopment Condition is determined according to the procedures found in the Philadelphia Stormwater Guidance Manual.

Section 106. Exemptions (cont.)

C. Infiltration Exemptions

- Depth to Limiting Zone - A minimum of two (2) feet of soil suitable for infiltration must exist between the invert of the infiltration BMP and the top of the nearest limiting zone. Otherwise, the Re requirement shall not be applied to the development site, and the entire WQ_v must be treated.
- Hotspots - Stormwater Hotspots - If a site is a potential hotspot, it has important implications for how stormwater is managed. First and foremost, untreated stormwater runoff from hotspots concentrated into a collection system, shall not be recharged into groundwater where it may contaminate water supplies. Therefore, the Re requirement shall NOT be applied to development sites that lie within a hotspot (the entire WQ_v must still be treated). Second, a greater level of stormwater treatment shall be applied at hotspot sites to prevent pollutant washoff after construction.
- Rate of Infiltration - When infiltration is not feasible due to poor infiltration rates or hotspot, the water quality volume must be treated by an approved SMP.

Section 106. Exemptions (cont.)

D. Additional Exemption Criteria

- Exemption Responsibilities - An exemption shall not relieve the Applicant from implementing such measures as are necessary to protect public health, safety, and property.
- Drainage Problems - If a drainage problem is documented or known to exist downstream of or is expected from the proposed activity, then the Municipality may require the Applicant to comply with this entire Ordinance.
- Exemptions are limited to specific portions of this Ordinance.

Section 106. Exemptions (cont.)

D. Additional Exemption Criteria

- HQ and EV Streams - The Municipality shall deny exemptions in High Quality or Exceptional Value waters and Source Water Protection Areas (SWPA).
- For a development taking place in stages, the entire development plan must be used in determining compliance with these exemption criteria. The starting point from which to consider tracts as "parent tracts" in which future subdivisions and respective impervious area computations are cumulatively considered shall be the date of the municipal ordinance adoption of the original Poquessing Creek Watershed Stormwater Management Plan Ordinance.

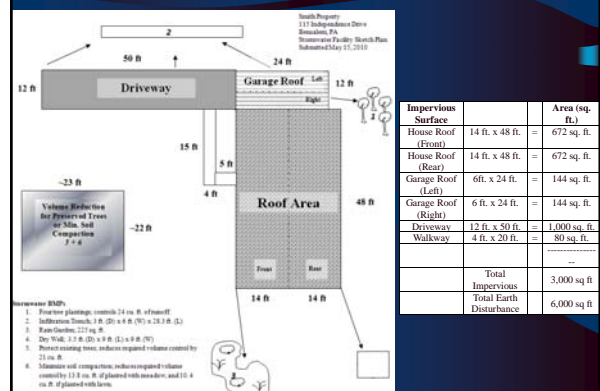
Section 106. Exemptions (cont.)

Small Project Stormwater Management Site Plan

This Small Project SWM Site Plan is included as an option for municipalities to adopt to give small regulated activities the opportunity to submit a non-engineered stormwater management plan.

Sites with less than one thousand (1,000) square feet of new impervious surface, but between five thousand (5,000) square feet and one (1) acre of earth disturbance must submit a SWM Site Plan to the Municipality and can use the protocols in the Small Project SWM Site Plan if Municipality has adopted Ordinance Appendix B.

Small Project Stormwater Management Site Plan



Small Project Stormwater Management Site Plan

Ordinance Article or Section	Type of Project	Proposed New Impervious Cover							
		- 1,000 sq. ft.		- 1,000 sq. ft. - 5,000 sq. ft.		- 5,000 sq. ft. - 1 acre		- 1 acre or more	
		Earth Disturbance < 5,000 sq. ft.	Earth Disturbance > 5,000 sq. ft.	Earth Disturbance < 1 acre	Earth Disturbance > 1 acre	Earth Disturbance < 5,000 sq. ft.	Earth Disturbance > 5,000 sq. ft.	Earth Disturbance < 1 acre	Earth Disturbance > 1 acre
Article III VDOT Site Plan Requirements	Development and Redevelopment	Yes	No*	No	No*	No*	No*	No	No
Section 404 Stormwater Project Design	Development and Redevelopment	Yes	No*	No	No*	No*	No*	No	No
Section 406 Groundwater Recharge	Development and Redevelopment	Yes	No*	No	No*	No*	No*	No	No
Section 408 Erosion Control Requirements	Development and Redevelopment	Yes	No*	No	No*	No*	No*	No	No
Section 407 Storm Drain Erosion Requirements	Development and Redevelopment	Yes	No*	No	No*	No*	No*	No	No
Section 409 Stormwater Flow Rate Control and Management Devices	Development and Redevelopment	Yes	No*	No	No*	No*	No*	No	No
Erosion and Sediment Pollution Control Plan	Earth Disturbance	See Earth Disturbance Requirements	See Earth Disturbance Requirements	See Earth Disturbance Requirements	See Earth Disturbance Requirements	See Earth Disturbance Requirements	See Earth Disturbance Requirements	See Earth Disturbance Requirements	See Earth Disturbance Requirements

No* - Modified SWM Site Plan required, Small Project Site Plan possible.

Small Project Stormwater Management Site Plan

- Less than one thousand (1,000) square feet of new impervious surface, but between five thousand (5,000) square feet and one (1) acre of earth disturbance

Applicant is required to submit:

A brief description of the proposed stormwater facilities, including types of materials to be used, total square footage of proposed impervious areas, volume calculations, and a simple sketch plan showing the following information:

- Location of proposed structures, driveways, or other paved areas with approximate surface area in square feet.
- Location of any existing or proposed onsite septic system and/or potable water wells showing proximity to infiltration facilities.
- Bucks or Montgomery County Conservation District erosion and sediment control "Adequacy" letter as required by Municipal, County or State regulations.

Section 405 - Groundwater Recharge

A. Infiltration Best Management Practices (BMPs) shall meet the following minimum requirements unless the site qualifies for an exemption from the infiltration requirements of this ordinance as listed in Section 106:

- Infiltration BMPs intended to receive runoff from developed areas shall be selected based on suitability of soils and site conditions and shall be constructed on soils that have the following characteristics:
 - A minimum soil depth of twenty-four (24) inches between the bottoms of the infiltration BMPs and bedrock or other limiting zones.
 - An infiltration rate sufficient to accept the additional stormwater load and dewater completely as determined by field tests conducted by the Applicant's Qualified Person.

Section 405 - Groundwater Recharge

- All open-air infiltration facilities shall be designed to completely infiltrate the recharge (infiltration) volume (Re_v) within three (3) days (72 hours) from the end of the design storm.
- All subsurface and contained facilities such as capture-and-reuse systems must have storage available equivalent to the Water Volume Control amount within three (3) days (72 hours) from the end of the design storm.
- Pretreatment (See Section 202) shall be provided prior to infiltration.

Section 405 - Groundwater Recharge

- The size of the infiltration facility shall be based upon the following volume criteria:

Bucks and Montgomery County Portions of the Watershed:

Where practicable and appropriate the recharge volume shall be infiltrated on site. The recharge volume shall be equal to one (1.0) inch of runoff (I) over all proposed impervious surfaces.

$$Re_v = (1/12) * (I)$$

Re_v = Recharge Volume (cubic feet)
 I = Impervious Area within the limits of earth disturbance (square feet)

Section 405 - Groundwater Recharge

Philadelphia County Portion of the Watershed:

The recharge volume shall be equal to one (1.0) inch of runoff over all DCIA within the limits of Earth Disturbance.

$$Re_v = (1/12) * (I)$$

Re_v = Recharge Volume (cubic feet)
 I = DCIA within the limits of earth disturbance (square feet)

Section 406 - Water Volume Control Requirements

Bucks and Montgomery County Portions of the Watershed:

The low impact development practices provided in the BMP Manual shall be utilized for all regulated activities to the maximum extent practicable. Water Volume Controls shall be implemented using the *Design Storm Method* in Subsection A or the *Simplified Method* in Subsection B below. For regulated activity areas equal to or less than one (1) acre that do not require hydrologic routing to design the stormwater facilities, this Ordinance establishes no preference for either methodology; therefore, the applicant may select either methodology on the basis of economic considerations, the intrinsic limitations on applicability of the analytical procedures associated with each methodology, and other factors. All regulated activities greater than one (1) acre must use the Design Storm Method.

Section 406 - Water Volume Control Requirements

Bucks and Montgomery County Portions of the Watershed:

- A. The *Design Storm Method* (CG-1 in the BMP Manual) is applicable to any size of regulated activity. This method requires detailed modeling based on site conditions.
1. The post-development total runoff volume for all storms equal to or less than the 2-year, 24-hour storm event shall not be increased.

Section 406 - Water Volume Control Requirements

Bucks and Montgomery County Portions of the Watershed:

B. The *Simplified Method* (CG-2 in the BMP Manual) provided below is independent of site conditions and should be used if the *Design Storm Method* is not followed. This method is not applicable to regulated activities greater than one (1) acre, or for projects that require design of stormwater storage facilities. For new impervious surfaces:

1. Stormwater facilities shall capture at least the first two (2) inches of runoff from all new impervious surfaces.

$$\text{Volume (cubic feet)} = (2/12) * \text{Impervious Surfaces (square feet)}$$

Section 406 - Water Volume Control Requirements

Bucks and Montgomery County Portions of the Watershed:

2. At least the first one (1) inch of runoff from new impervious surfaces shall be permanently removed from the runoff flow-- i.e., it shall not be released into the surface waters of the Commonwealth. Removal options include reuse, evaporation, transpiration, and infiltration.

$$\text{Volume (cubic feet)} = (1/12) * \text{Impervious Surfaces (square feet)}$$

Section 406 - Water Volume Control Requirements

Philadelphia County Portion of the Watershed:

The following equation is to be used to determine the Water Volume Control storage requirement in cubic feet for regulated activities within the Poquessing Creek Watershed in Philadelphia County:

$$\text{Water Volume Control (cubic feet)} = (1/12) * (I)$$

Where: I = DCIA within the limits of earth disturbance (square feet)

Section 407 - Streambank Erosion (Channel Protection)

- Bucks County and Montgomery County - Two year post to one year pre.
- Philadelphia County - 1 year storm detained between 24 and 72 hours

Section 407 - Streambank Erosion (Channel Protection)

Bucks County and Montgomery County Portions

A. In addition to the control of water quality volume (in order to minimize the impact of stormwater runoff on downstream stream bank erosion), the primary requirement is to design a BMP to detain the proposed conditions 2-year, 24-hour design storm to the existing conditions 1-year flow using the SCS Type II distribution. Additionally, provisions shall be made (such as adding a small orifice at the bottom of the outlet structure) so that the proposed conditions 1-year storm takes a minimum of twenty-four (24) hours to drain from the facility from a point where the maximum volume of water from the 1-year storm is captured (i.e., the maximum water surface elevation is achieved in the facility). Release of water can begin at the start of the storm (i.e., the invert of the water quality orifice is at the invert of the facility).

Section 407 - Streambank Erosion (Channel Protection)

Philadelphia County Portion

Redevelopment sites with less than one (1) acre of Earth Disturbance or redevelopment sites that demonstrate a 20% reduction in DCIA from predevelopment conditions are exempt from this requirement.

A. To meet the requirement, Stormwater Management Practices shall retain or detain the runoff from all DCIA within the limits of Earth Disturbance from a 1-year, 24-hour Natural Resources Conservation Service (NRCS) Type II design storm in the proposed site condition such that the runoff takes a minimum of 24 hours and a maximum of 72 hours from the end of the storm to drain from the facility.

Section 407 - Streambank Erosion (Channel Protection)

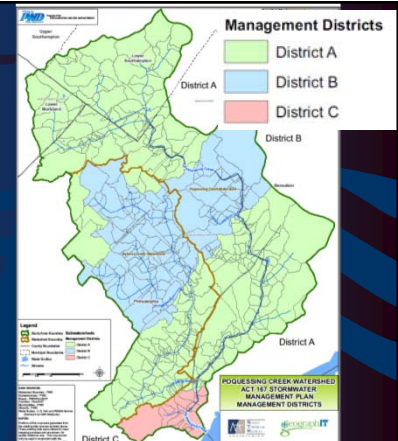
Philadelphia County Portion

Redevelopment sites with less than one (1) acre of Earth Disturbance or redevelopment sites that demonstrate a 20% reduction in DCIA from predevelopment conditions are exempt from this requirement.

B. The infiltration and water quality volumes may be incorporated into the channel protection portion of the design provided the design meets all requirements concurrently.

C. In "Conditional Direct Discharge Districts" (District C) only (see Section 408), the objective is not to attenuate the storms greater than the 2-year recurrence interval. This can be accomplished by configuring the outlet structure not to control the larger storms or by a bypass channel that diverts only the 2-year stormwater runoff into the basin or conversely, diverts flows in excess of the 2-year storm away from the basin.

Section 408 Peak rate Control - Management Districts



Peak rate Control by Stormwater Management district - TABLE V-3

District	Proposed Condition Design Storm		Existing Condition Design Storm
A	2-year	reduce to	1-year
	5-year		5-year
	10-year		10-year
	25-year		25-year
	50-year		50-year
	100-year		100-year
B	2-year	reduce to	1-year
	5-year		2-year
	10-year		5-year
	25-year		10-year
	50-year		25-year
	100-year		50-year

Next Steps and Timeline:

- DEP Approval of final plan (5/4/12)
- WPAC final review (5/21/12)
- NTM to incorporate final comments by (5/30/12)
- Plan Adoption by Phila. And Mont. Co.'s before June 30, 2012
- DEP Official Approval - July 2012
- Municipal Adoption of the ordinance (6 months later)

