Section 5: Criteria and Standards for New Development and Redevelopment in the Wissahickon Creek Watershed

This section provides a summary of the model stormwater management ordinance for the Wissahickon 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 recently completed ordinance for the Poquessing Creek Watershed
- The approved ordinance for the Pennypack Creek Watershed
- Discussions with representatives from Philadelphia 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.

The objective of the model ordinance is to minimize the hydrologic and water quality impacts of future development and redevelopment in the watershed. Twenty one stream segments in the Wissahickon Creek Watershed have been included on Pennsylvania's 303(d) list due to siltation impairments. Most of these impairments can be attributed to urban runoff.[1] While adoption and enforcement of the ordinance would address the impacts of future development and redevelopment, the improvements in Section 6 are also recommended to address the current level of impairment by reducing stormwater flows and runoff volumes.

The municipalities should note that language could be added to the stormwater ordinance when it is adopted that would encourage or permit the municipality to study and collect data on existing components of the stormwater management system, such as detention basins, culverts and bridges, and their impact on stormwater flows. This could be required of a developer for these components of the stormwater management system that are affected by a proposed development. Additional requirements could be added to the ordinance that would enable the municipality to monitor and inspect private stormwater facilities and other constructed portions of the stormwater management system. This information could prove useful in identifying potential impairments and in developing a stormwater management program that reduces runoff and improves water quality.

Funding for such activities is always an issue. The municipality can include language on fees in the stormwater ordinance. This may be desirable, especially if the municipality is considering developing a stormwater authority or user-fee program. The municipalities should consider establishing a stable funding source by the method most suitable to the municipality to provide the funds needed to monitor and improve existing stormwater facilities and other components of the stormwater management system.

[1] *Comprehensive Characterization Report for the Pennypack Creek Watershed –Philadelphia Water Department, 2009.*

5.1 Model Ordinance Summary

The standards and criteria included in the model ordinance apply to regulated activities defined in Article I and vary based on the county of jurisdiction. The standards pertain to the following areas of potential impact as defined in Tables 106.1 of the Ordinance:

- Site Design and Drainage Plan Requirements
- Groundwater Recharge
- Water Volume Control
- Stream Bank Erosion (Channel Protection)
- Peak Rate Control

Article I, Section 103 requires that all legal water quality requirements under state law, including regulations at 25 Pennsylvania Code Chapter 93.4.a requiring protection and maintenance of "existing uses" and maintenance of the level of water quality to support those uses in all streams, and the protection and maintenance of water quality in "special protection" streams, be met.

Applicability and Exemptions (Article I, Sections 105 and 106) for Regulated Activities defined in Section 105 of the Ordinance are based on the area of earth disturbance and the area of impervious cover included in the project. The exemption thresholds vary by county. Exemptions may be denied by municipalities based on identified downstream problem areas, based on High Quality, or Exceptional Value stream designations, or based on known source water protection areas.

Article II, Section 202 of the Ordinance defines terms used in the Ordinance provisions.

Article III specifies stormwater management site plan requirements that must be addressed prior to issuance of land development plans, building or occupancy permits or land disturbance. Plan contents, including stormwater management and erosion and sedimentation plans, and submission requirements are specified.

Article IV contains the stormwater management criteria and provides additional details on the scope of application of these standards to regulated activities. Requirements for determining design storms, for groundwater recharge, water volume control, streambank erosion control, and peak runoff rate control, including acceptable calculation methodologies for determining runoff peaks and volumes, are provided.

Articles V thru IX cover inspections, fees and expenses, maintenance responsibilities, prohibitions, and enforcement and penalties, respectively.

The following two sections highlight the Applicability and Exemptions, and Stormwater Management Criteria provisions of the Ordinance.

5.2 Applicability and Exemptions

The following tables were taken from Section 106 of the ordinance and summarize its applicability to the Montgomery and Philadelphia counties portions of the watershed.

Table 5.2.A Exemptions for the Montgomery County Portion of the Watershed

Article or Section	Type of Project	Proposed New Impervious Cover						
		< 1000 sq. ft.			≥ 1000 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	Exempt	Not Exempt	Not Exempt	Not Exempt	Not Exempt	Not Exempt	Not Exempt
Section 404 Nonstructural Project Design	Development and Redevelopment	Exempt	Not Exempt	Not Exempt	Not Exempt	Not Exempt	Not Exempt	Not Exempt
Section 405 Groundwater Recharge	Development and Redevelopment	Exempt	Not Exempt	Not Exempt	Not Exempt	Not Exempt	Not Exempt	Not Exempt
Section 406 Water Volume Control Requirements	Development and Redevelopment	Exempt	Not Exempt	Not Exempt	Not Exempt	Not Exempt	Not Exempt	Not Exempt
Section 407 Stream Bank Erosion Requirements	Development	Exempt	Not Exempt	Not Exempt	Not Exempt	Not Exempt	Not Exempt	Not Exempt
	Redevelopment		Exempt		Exempt	Exempt		
Section 408 Stormwater Peak Rate Control and Management Districts	Development and Redevelopment	Exempt	Exempt	Not Exempt	Exempt	Exempt	Not Exempt	Not Exempt
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)						

Notes:
Exempt – Exempt unless a determination is made by the municipality that the project is subject to Section 106.C.
Not Exempt – Not exempt. All provisions apply.
*Not exempt, but if a municipality has adopted the ordinance for the Small Project SWM Site Plan for Residential Development in Appendix B of the ordinance, such a plan may be submitted in lieu of the SWM Site Plan for residential development.

Table 5.2.B Exemptions for the Philadelphia Portion of the Watershed

Guide to Applicable Stormwater Regulations in Philadelphia Portion of the Watershed		Earth Disturbance Associated with Development			
		0-4,999 sq. ft.	500-14,999 sq. ft.*	15,000 sq. ft.-1 acre	> 1 acre
Section 600.5(a) Water Quality Requirement	New Development	N/A**	Yes	Yes	Yes
	Redevelopment	N/A**	Yes (Alternate Criteria)	Yes	Yes
Section 600.5(b) Channel Protection Requirement	New Development	N/A**	Yes	Yes	Yes
	Redevelopment	N/A**	Yes (Alternate Criteria)	Exempt	Yes (Alternate Criteria)
Section 600.5(c) Flood Control Requirement	New Development	N/A**	Yes	Yes	Yes
	Redevelopment	N/A**	Yes (Alternate Criteria)	Yes (Alternate Criteria)	Yes (Alternate Criteria)
Section 600.6 Nonstructural Project Design Requirement	New Development	N/A**	Yes	Yes	Yes
	Redevelopment	N/A**	Yes (Alternate Criteria)	Yes	Yes
Section 600.8 Post-Construction Stormwater Management Plan Requirement	New Development	N/A**	Yes	Yes	Yes
	Redevelopment	N/A**	Yes (Alternate Criteria)	Yes	Yes

Yes (Alternate Criteria) – requirements of section may be waived depending on post-development site conditions (See Sections 600.3(a)(3), 600.5(b) and 600.5(c), in addition to Section 14-510 of the Philadelphia Code, for further details).

N/A - Not Applicable, development project is not subject to requirements of indicated Regulations section. Voluntary controls are encouraged.

Any local, state, or federal requirements still apply.

*-Applies to Impervious Ground Coverage Categories 1-4 administered by the Philadelphia City Planning Commission.

**– If the proposed development results in stormwater discharge that exceeds stormwater system capacity, causes a combined sewer overflow, or degrades receiving waters, the design specifications presented in these Regulations may be applied to proposed development activities as warranted to protect public health, safety, or property.

5.3 Stormwater Management Criteria

Article IV, Section 401 of the Ordinance sets forth General Requirements.

Sections 402, 403, and 404, pertain respectively to Permit Requirements of Other Governmental Entities, Erosion and Sediment Control During Regulated Earth Disturbance Activities, and Nonstructural Project Design.

Section 405.A.1 contains minimum requirements for Infiltration Best Management Practices (BMPs), and Section 405.A.2 establishes volume criteria for the infiltration facilities, which are computed differently for Montgomery and Philadelphia counties, as follows:

Montgomery County Portion 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.

The Re_v required shall be computed as:

$$\mathbf{Re_v = (1/12) * (I)}$$

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

An asterisk (*) in equations denotes multiplication.

Philadelphia County Portion of the Watershed

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

$$\mathbf{Re_v = (1/12) * (I)}$$

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

An asterisk (*) in equations denotes multiplication.

Section 405.B sets forth the required soils evaluations on project sites to determine the suitability of proposed infiltration facilities.

Section 406 states the Water Volume Control Requirements, which are excerpted from Section 303 of the Pennsylvania Model Stormwater Ordinance [2] *(Note: Montgomery and Philadelphia counties will follow different Water Volume Control requirements.)*

Montgomery County Portion of the Watershed:

The low impact development practices provided in the Pennsylvania 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.

A. The *Design Storm Method* (CG-1 in the BMP Manual) is applicable to any size of regulated activity. This method requires detailed modeling or calculations 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.

   2. For modeling purposes:
      a. Existing (predevelopment) non-forested pervious areas must be considered meadow.
      b. 20% of existing impervious area, when present, shall be considered meadow in the model for existing conditions.

B. The *Simplified Method* (CG-2 in the Pennsylvania 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. *(Note: An asterisk (*) in equations denotes multiplication.)*

      Volume (cubic feet) = (2/12) * Impervious Surfaces (square feet)

   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

[2] *Department of Environmental Protection, Bureau of Watershed Management, Document Number 363-03000-003, September 2, 2010.*

the surface waters of the Commonwealth. Removal options include reuse, evaporation, transpiration, and infiltration.

Volume (cubic feet) = (1/12) * Impervious Surfaces (square feet)

3. Wherever possible, infiltration facilities should be designed to accommodate infiltration of the entire permanently removed runoff; however, in all cases at least the first half (0.5) inch of the permanently removed runoff should be infiltrated.

4. Sites that qualify for this method are exempt from the requirements of Section 408, Peak Rate Controls.

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 Wissahickon Creek Watershed in Philadelphia County:

Water Volume Control (cubic feet) = (1/12) * (I)

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

Section 407 sets forth the requirements for the control of Stream Bank Erosion. Montgomery and Philadelphia counties will follow different requirements. If a municipality has adopted a riparian corridor ordinance or regulation, the more restrictive requirement shall apply.

Section 408 sets forth Stormwater Peak Rate Control Standards by Management Districts. The standards are shown Table 5.3.A below. Appendix A of the ordinance includes the map of the management districts as shown in Figure 5.3.A.

Section 409 specifies calculation methodologies that shall be used for the design of stormwater management facilities.

TABLE 5.3.A PEAK RATE CONTROL STANDARDS BY STORMWATER MANAGEMENT DISTRICT IN THE WISSAHICKON CREEK WATERSHED

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
C*	Conditional Direct Discharge District		

In District C, development sites that can discharge directly to the Wissahickon Creek Main Channel and to the Schuylkill River main channel without use of City infrastructure may do so without control of proposed conditions peak rate of runoff.

Projects that are required to obtain a NPDES Permit for stormwater discharges associated with construction activities are required to show no increase in peaks from existing conditions.

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 in Philadelphia County, the Predevelopment Condition shall be determined according to the procedures found in the Philadelphia Stormwater Guidance Manual.

Figure 5.3.A Proposed Peak Rate Control Management Districts