

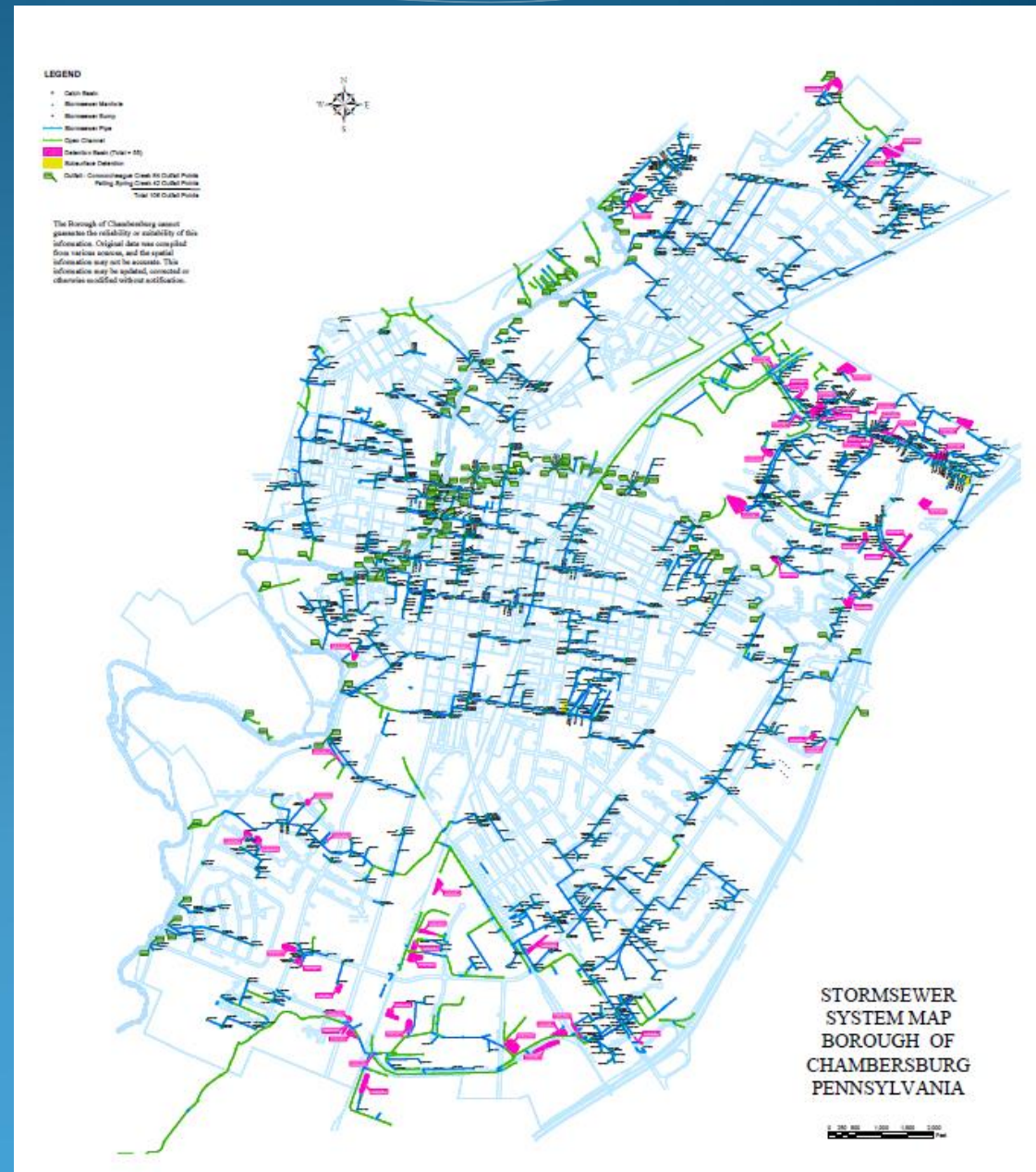
Chesapeake Bay Pollutant Reduction Plan

Town Council

July 28, 2014

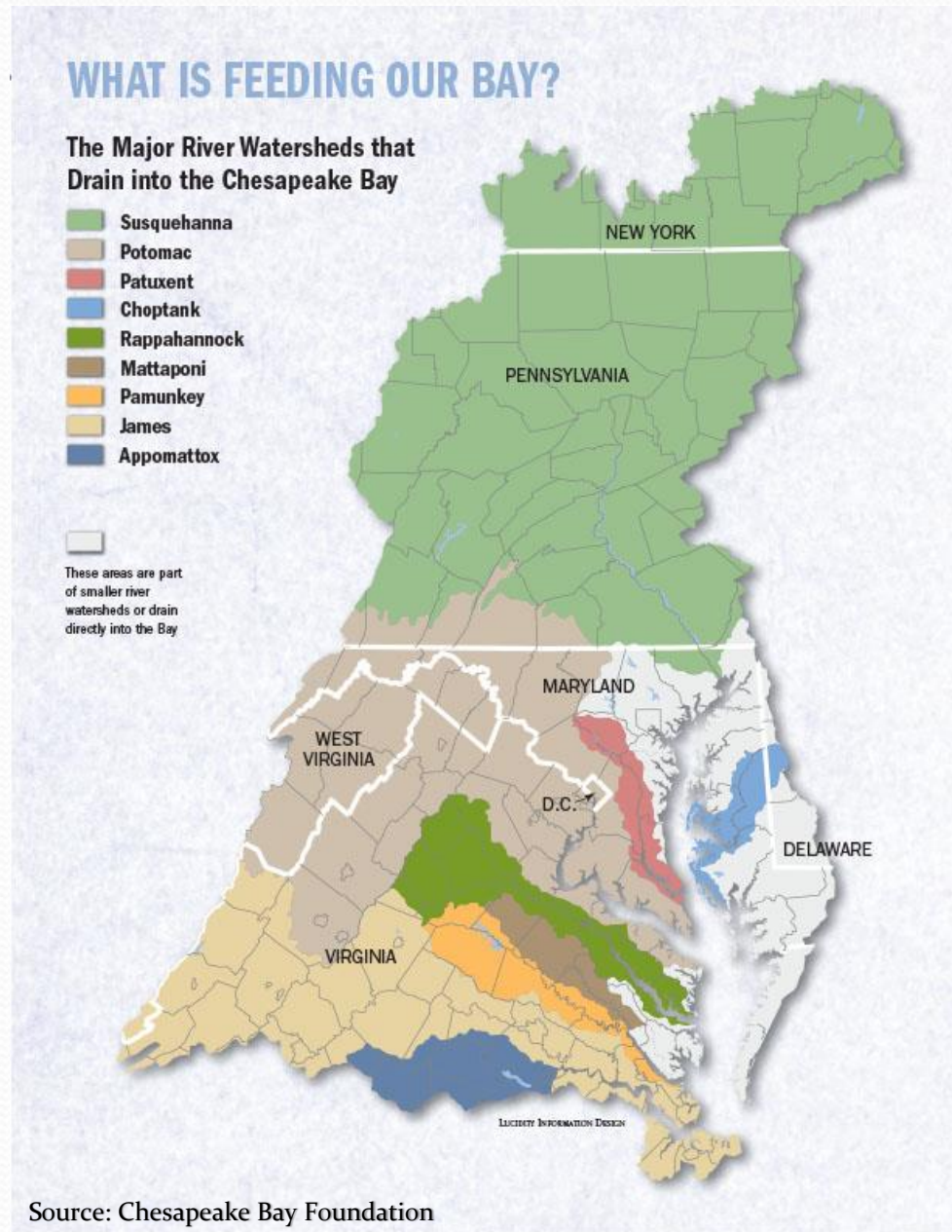
MS4: MUNICIPAL SEPARATE STORM SEWER SYSTEM

- Chambersburg MS4 Permit commenced on August 1, 2013 and will expire on July 31, 2018.
- The Borough regulates stormwater according to Stormwater Management Ordinance adopted by Town Council on June 20, 2004 and amended on July 14, 2014, as required by MS4 Permit.
- MS4 Permit also requires submission of a Chesapeake Bay Pollutant Reduction Plan to the Pennsylvania Department of Environmental Protection no later than August 1, 2014.



Plan Objective:

Implement Best Management Practices (BMPs) to produce tangible improvements to the quality of stormwater discharges in the Chesapeake Bay Watershed.



What is a Best Management Practice?

Activities, structures, facilities, designs, measures, procedures, and techniques used to control, maintain or improve the quantity and quality of surface runoff; to manage stormwater impacts from regulated activities; to meet state water quality requirements; to promote groundwater recharge; and to otherwise meet the purposes of this Ordinance.

Source: Code of the Borough of Chambersburg
Chapter 251: Stormwater Management

**Pennsylvania Stormwater
Best Management Practices
Manual**

Chapter 3

**Stormwater Management Principles
and Recommended Control Guidelines**



Chapter 5 Non-Structural BMPs

5.1 Introduction.....1

5.2 Non-Structural Best Management Practices.....1

5.3 Non-Structural BMPs and Stormwater Methodological Issues.....3

5.4 Protect Sensitive and Special Value Resources

 BMP 5.4.1 Protect Sensitive/Special Value Features.....7

 BMP 5.4.2 Protect/Conserve/Enhance Riparian Areas.....13

 BMP 5.4.3 Protect/Utilize Natural Flow Pathways in Overall Stormwater Planning and Design.....21

5.5 Cluster and Concentrate

 BMP 5.5.1 Cluster Uses at Each Site; Build on the Smallest Area Possible.....29

 BMP 5.5.2 Concentrate Uses Area wide through Smart Growth Practices.....37

5.6 Minimize Disturbance and Minimize Maintenance

 BMP 5.6.1 Minimize Total Disturbed Area – Grading.....49

 BMP 5.6.2 Minimize Soil Compaction in Disturbed Areas.....57

 BMP 5.6.3 Re-Vegetate and Re-Forest Disturbed Areas, Using Native Species.....63

5.7 Reduce Impervious Cover

 BMP 5.7.1 Reduce Street Imperviousness.....71

 BMP 5.7.2 Reduce Parking Imperviousness.....77

5.8 Disconnect/Distribute/Decentralize

 BMP 5.8.1 Rooftop Disconnection.....85

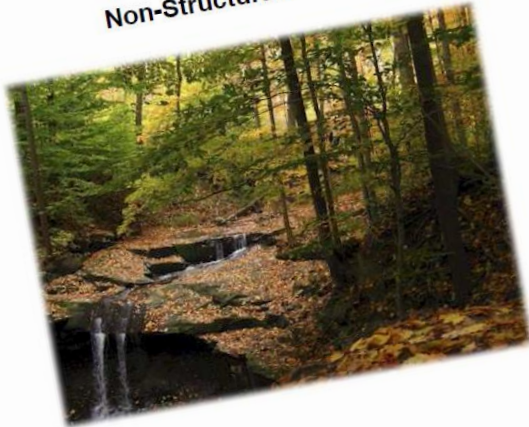
 BMP 5.8.2 Disconnection from Storm Sewers.....89

5.9 Source Control

 BMP 5.9.1 Streetsweeping.....95

**Pennsylvania Stormwater
Best Management Practices
Manual**

**Chapter 5
Non-Structural BMPs**



Chapter 6 Structural BMPs

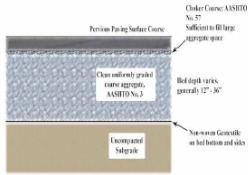
6.1	Introduction.....	1
6.2	Groupings of Structural BMPs.....	1
6.3	Manufactured Products.....	2
6.4	Volume/Peak Rate Reduction by Infiltration BMPs.....	5
	BMP 6.4.1 Pervious Pavement with Infiltration Bed.....	7
	BMP 6.4.2 Infiltration Basin.....	27
	BMP 6.4.3 Subsurface Infiltration Bed.....	33
	BMP 6.4.4 Infiltration Trench.....	41
	BMP 6.4.5 Rain Garden / Bioretention.....	49
	BMP 6.4.6 Dry Well / Seepage Pit.....	61
	BMP 6.4.7 Constructed Filter.....	71
	BMP 6.4.8 Vegetated Swale.....	83
	BMP 6.4.9 Vegetated Filter Strip.....	99
	BMP 6.4.10 Infiltration Berm & Retentive Grading.....	113
6.5	Volume/Peak Rate Reduction BMPs.....	123
	BMP 6.5.1 Vegetated Roof.....	125
	BMP 6.5.2 Runoff Capture & Reuse.....	139
6.6	Runoff Quality/Peak Rate BMPs.....	149
	BMP 6.6.1 Constructed Wetland.....	151
	BMP 6.6.2 Wet Pond/ Retention Basin.....	163
	BMP 6.6.3 Dry Extended Detention Basin.....	173
	BMP 6.6.4 Water Quality Filters & Hydrodynamic Devices.....	183
6.7	Restoration BMPs.....	189
	BMP 6.7.1 Riparian Buffer Restoration.....	191
	BMP 6.7.2 Landscape Restoration.....	211
	BMP 6.7.3 Soils Amendment & Restoration.....	221
	BMP 6.7.4 Floodplain Restoration.....	231
6.8	Other BMPs and Related Structural Measures.....	241
	BMP 6.8.1 Level Spreader.....	243
	BMP 6.8.2 Special Detention Areas – Parking Lot, Rooftop.....	253

**Pennsylvania Stormwater
Best Management Practices
Manual**

**Chapter 6
Structural BMPs**



BMP 6.4.1: Pervious Pavement with Infiltration Bed



Pervious pavement consists of a permeable surface course underlain by a uniformly-graded stone bed which provides temporary storage for peak rate control and promotes infiltration. The surface course may consist of porous asphalt, porous concrete, or various porous structural pavers laid on uncompacted soil.

Key Design Elements	Potential Applications
<ul style="list-style-type: none"> • Almost entirely for peak rate control • Water quality and quantity are not addressed • Short duration storage; rapid restoration of primary uses • Minimize safety risks, potential property damage, and user inconvenience • Emergency overflows • Maximum ponding depths • Flow control structures • Adequate surface slope to outlet 	Residential: Limited Commercial: Yes Ultra Urban: Yes Industrial: Yes Retrofit: Yes Highway/Road: Limited
	Stormwater Functions
	Volume Reduction: Medium Recharge: Medium Peak Rate Control: Medium Water Quality: Medium
	Water Quality Functions
	TSS: 85% TP: 85% NO3: 30%

Other Considerations

- Protocol 1. Site Evaluation and Soil Infiltration Testing and Protocol 2. Infiltration Systems Guidelines should be followed, see Appendix C

BMP 6.4.2: Infiltration Basin



An Infiltration Basin is a shallow impoundment that stores and infiltrates runoff over a level, uncompacted, (preferably undisturbed area) with relatively permeable soils.

Key Design Elements	Potential Applications
<ul style="list-style-type: none"> • Maintain a minimum 2-foot separation to bedrock and seasonally high water table, provide distributed infiltration area (5-1 impervious area to infiltration area - maximum), site on natural, uncompacted soils with acceptable infiltration capacity, and follow other guidelines described in Protocol 2: Infiltration Systems Guidelines • Uncompacted sub-grade • Infiltration Guidelines and Soil Testing Protocols apply • Preserve existing vegetation, if possible • Design to hold/infiltrate volume difference in 2-yr storm or 1.5" storm • Provide positive stormwater overflow through engineered outlet structure. • Do not install on recently placed fill (<5 years). • Allow 2 ft buffer between bed bottom and seasonal high groundwater table and 2 ft buffer for rock. • When possible, place on upland soils. • 	Residential: Yes Commercial: Yes Ultra Urban: Limited Industrial: Yes* Retrofit: Yes Highway/Road: Limited * Applicable with specific consideration to design.
	Stormwater Functions
	Volume Reduction: High Recharge: High Peak Rate Control: Med./High Water Quality: High
	Water Quality Functions
	TSS: 85% TP: 85% NO3: 30%

Other Considerations

- Protocol 1. Site Evaluation and Soil Infiltration Testing and Protocol 2. Infiltration Systems Guidelines should be followed, see Appendix C

BMP 6.4.8: Vegetated Swale



A Vegetated Swale is a broad, shallow, trapezoidal or parabolic channel, densely planted with a variety of trees, shrubs, and/or grasses. It is designed to attenuate and in some cases infiltrate runoff volume from adjacent impervious surfaces, allowing some pollutants to settle out in the process. In steeper slope situations, check dams may be used to further enhance attenuation and infiltration opportunities.

Key Design Elements	Potential Applications
<ul style="list-style-type: none"> • Plant dense, low-growing native vegetation that is water-resistant, drought and salt tolerant, providing substantial pollutant removal capabilities • Longitudinal slopes range from 1 to 6% • Side slopes range from 3:1 to 5:1 • Bottom width of 2 to 8 feet • Check-dams can provide limited detention storage, as well as enhanced volume control through infiltration. Care must be taken to prevent erosion around the dam • Convey the 10-year storm event with a minimum of 6 inches of freeboard • Designed for non-erosive velocities up to the 10-year storm event • Design to aesthetically fit into the landscape, where possible • Significantly slow the rate of runoff conveyance compared to pipes 	Residential: Commercial: Yes Ultra Urban: Limited Industrial: Yes Retrofit: Yes Highway/Road:
	Stormwater Functions
	Volume Reduction: Low/Med. Recharge: Low/Med. Peak Rate Control: Med./High Water Quality: Med./High
	Water Quality Functions
	TSS: 50% TP: 50% NO3: 20%

Other Considerations

- Protocol 1. Site Evaluation and Soil Infiltration Testing and Protocol 2. Infiltration Systems Guidelines should be followed whenever infiltration of runoff is desired, see Appendix C

PLAN PROJECTS	BMP
North Chambersburg Improvements Project	Reduce Street Imperviousness, Infiltration Trench, Vegetated Swale
South Street Project	Infiltration Trench
Pine Woods Park	Protect/Conserve/Enhance Riparian Areas and Riparian Buffer Restoration
Reduce Parking Lot Coverage	Reduce Parking Imperviousness
Planned Residential Development	Cluster Uses at Each Site; Build on the Smallest Area Possible
Land Use Permits for New Standalone Parking Lots or Driveways	Code Enforcement

Per Pennsylvania Department of Environmental Protection approval, projects will be implemented by July 31, 2018.

What's next?

The Chesapeake Bay Pollutant Reduction Plan will be submitted to the Pennsylvania Department of Environmental Protection by August 1, 2014.