Chesapeake Bay Pollutant Reduction Plan

Williamsport Area Joint MS4s Permit
Lycoming County, Pennsylvania

April 1, 2015

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and
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Williamsport Area Joint MS4s
Chesapeake Bay Pollutant Reduction Plan
NPDES Permit No. PAI134808

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PROFESSIONAL ENGINEER CERTIFICATION (from PA DEP Form 3800-FM-BPNPSM0493)

I, being a Registered Professional Engineer in Pennsylvania, do hereby certify to the best of my knowledge and belief, that the Chesapeake Bay Pollutant Reduction Plan is designed to achieve pollutant reductions consistent with the goals in the Chesapeake Bay Watershed Implementation Plan.

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Phone Number	Date
PE077510	9/30/2015
License No.	License Expiration Date

Signature

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LIST OF ACRONYMS

BMP	Best Management Practice
CBP	Chesapeake Bay Program
CBPRP	Chesapeake Bay Pollutant Reduction Plan
CWA	Clean Water Act
DEP	Department of Environmental Protection
EPA	Environmental Protection Agency (United States)
ESC	Erosion and Sediment Control
GI	Green Infrastructure
GIS	Geographic Information System
HU	Hydrologic Unit
HUC	Hydrologic Unit Code
IP	Individual Permit
Joint MS4s	(Also referred to as the Williamsport Area Joint MS4s): Lycoming Township, Montoursville Borough, Fairfield Township, Hepburn Township, Loyalsock Township, Old Lycoming Township, City of Williamsport, and Pennsylvania College of Technology
LID	Low Impact Development
LCCD	Lycoming County Conservation District
MCM	Minimum Control Measure
MS4	Municipal Separate Storm Sewer System
MS4 Coalition	(Also referred to as the Lycoming County MS4 Coalition): Lycoming Township, Montoursville Borough, Fairfield Township, Hepburn Township, Loyalsock Township, Old Lycoming Township, City of Williamsport, Duboistown Borough and South Williamsport Borough and Pennsylvania College of Technology
NPDES	National Pollutant Discharge Elimination System
OWS	Oil/Water Separator
O&M	Operations and Maintenance
PA	Pennsylvania
PCSM	Post Construction Stormwater Management
POC	Pollutants of Concern

PRP	Pollutant Reduction Plan
SWPPP	Storm Water Pollution Prevention Plan
SWMP	Storm Water Management Program
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
UA	Urbanized Area
UNT	Unnamed Tributary
USGS	United States Geological Survey
WIP	Watershed Implementation Plan
WLA	Waste Load Allocation

Executive Summary

The National Pollutant Discharge Elimination System (NPDES) Individual Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s) requires that a Chesapeake Bay Pollutant Reduction Plan (CBPRP) be developed and implemented for all regulated areas that drain to receiving waters flowing to the Chesapeake Bay.

This report describes the Joint MS4s existing Best Management Practices (BMPs), proposes methods for future pollutant reduction, and discusses plan implementation.

The Joint MS4s are comprised of eight entities that share a joint permit within Lycoming County, which is located within the Susquehanna River Basin. These entities include Fairfield Township, Hepburn Township, Loyalsock Township, Lycoming Township, Montoursville Borough, Old Lycoming Township, Pennsylvania College of Technology, and the City of Williamsport. These entities are serviced by six HUC 12 tributaries of the West Branch Susquehanna River: Loyalsock Creek, Lycoming Creek, Mill Creek, Millers Run, Quenshukeny Run, and Wolf Run. The West Branch Susquehanna River collects from the six tributaries and ultimately discharges to the Chesapeake Bay.

No pollutant loads or reductions were calculated explicitly for BMPs in the permit area, because no Total Maximum Daily Loads (TMDL) exists for the receiving waterways within the permit boundary. Strategies are presented that will reduce pollutant discharges to the Bay from BMPs within the Joint MS4s' jurisdiction. Because there are no TMDLs present and therefore no specific reduction goals, a Watershed Implementation Plan (WIP) is not required.

The Joint MS4s are planning to install or improve structural and non-structural BMPs throughout the permit area. Structural BMP installations and improvements include basin naturalizations, open space restorations, rain gardens, infiltration and extended detention basins, underground detention storage, and infiltration trenches. Non-structural BMP improvements include riparian forest buffer mapping and BMP incorporation into local plans and ordinances. Other improvements include typical BMPs, which take advantage of stormwater treatment opportunities that are commonly seen throughout the permit area, and are not necessarily site-specific. These include riparian buffer restoration and open space restoration. BMPs installed after 2005 were also included in this pollutant reduction plan. In addition to BMPs currently planned, multiple opportunities for potential future improvement and pollutant reduction are identified in this study. These opportunities focus on BMPs that might be feasible at specific sites throughout the permit area, and are documented here and suggested for future study.

The implementation schedule of all planned BMPs is discussed in this report. This schedule includes information such as the type and location of each BMP, pollutant removal efficiencies, and the permit year in the current permit cycle that the BMP is expected to be implemented.

When implemented, this CBPRP will ensure overall compliance with all MCMs in the MS4 Permit. As such, the plan and schedule within this CBPRP effectively address the deficiencies documented by PA DEP during its inspections in Summer 2014, and should be considered the Joint Permittees' corrective action plan in response to DEP's inspection reports.

1 Introduction

This Chesapeake Bay Pollutant Reduction Plan (CBPRP) presents the Williamsport Area Joint MS4s' plan to meet the requirement outlined in Part C.3 of their Individual Permit (IP) under the National Pollutant Discharge Elimination System (NPDES) IP for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s). This document has been developed in response to their first IP, which became effective on April 1, 2014. The CBPRP will be implemented by participating entities within the Joint MS4s.

1.1 Background

The Williamsport Area Joint MS4s are located in Central Pennsylvania (PA), and currently consist of seven municipalities and one institution of higher education within Lycoming County, including Fairfield Township, Hepburn Township, Loyalsock Township, Lycoming Township, Montoursville Borough, Old Lycoming Township, Pennsylvania College of Technology, and the City of Williamsport. These entities have land types ranging from urban environments to farmland, all of which ultimately drain to the Susquehanna River and then the Chesapeake Bay. **Figure 1-1** below illustrates their general location in the Chesapeake Bay.

In December 1999, the NPDES program was expanded to include provisions for discharges from small MS4s. The second regulatory phase, Stormwater Phase II (64 Fed. Reg. 68722), extended the requirements for NPDES permits to stormwater discharges from small MS4s located wholly or partially in urbanized areas (UAs), as defined by the U.S. Census Bureau or designated by the NPDES permitting authority; and stormwater discharges from small construction activities disturbing between one and five acres of land area. Among the eight joint permittees listed above, five were issued prior MS4 Phase II permits, while three (Fairfield, Hepburn, and Lycoming townships) have not previously been issued MS4 permits.

On March 7, 2014, the Joint MS4s were issued an IP. The current permit (PAI134808) coverage is effective from April 1, 2014, through March 31, 2019. This IP authorizes stormwater discharges subject to the provisions of the Clean Water Act (CWA), 33U S.C. Sections 1251 et seq., Pennsylvania's Clean Streams Law, as amended, 35 P.S. Sections 691.1 et seq., and 25 PA Code Chapter 92a. The permit requires development and submittal of a CBPRP to the Pennsylvania Department of Environmental Protection (PA DEP) within one year of permit coverage.

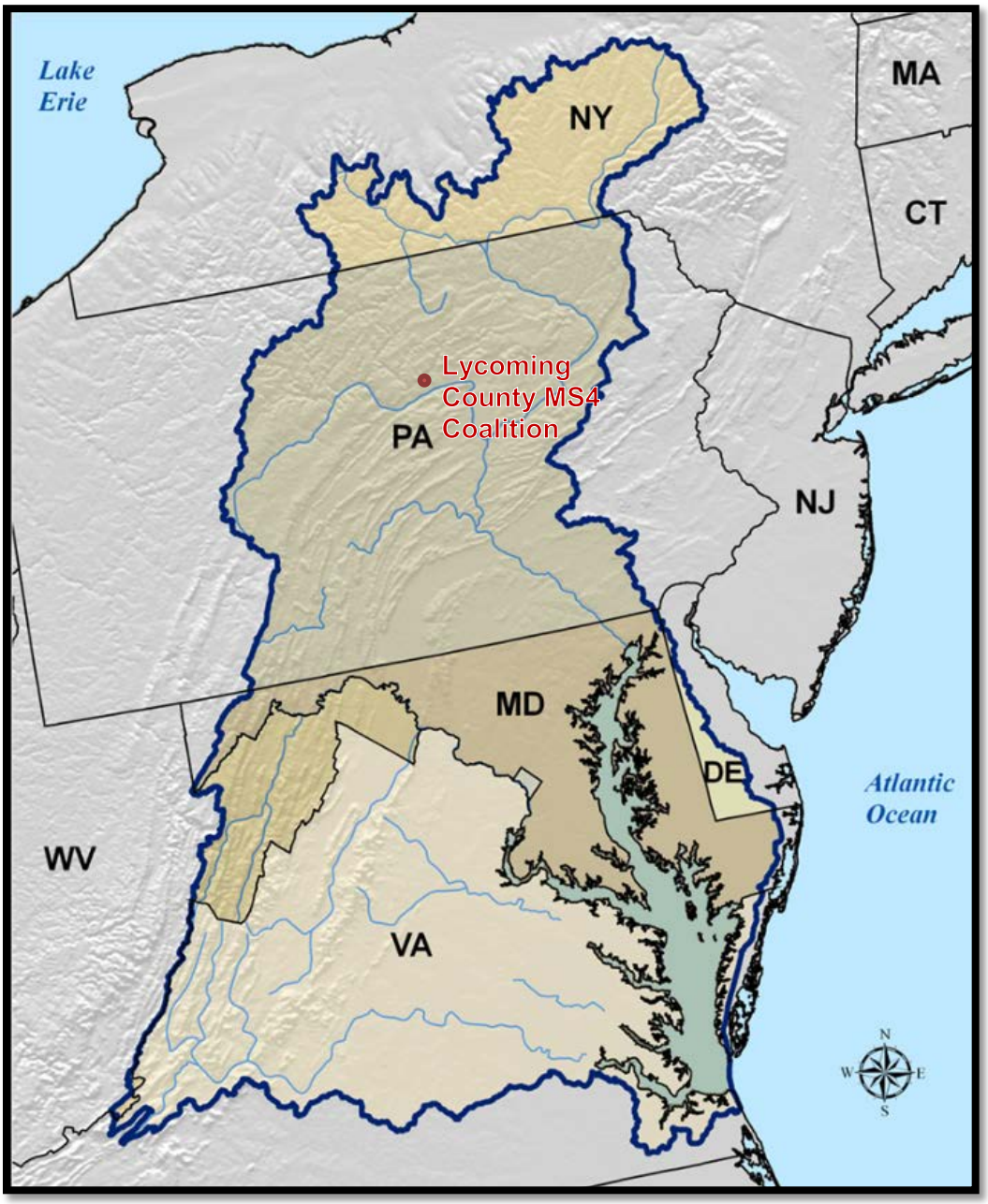

Figure 1-1 Chesapeake Bay Watershed
(Source: Chesapeake Bay Watershed Program)

1.2 Authorization, Scope and Purpose

The U.S. Environmental Protection Agency (EPA) is leading a major initiative to establish and oversee achievement of a strict "pollution diet" to restore the Chesapeake Bay and its network of local rivers, streams, and creeks. Despite significant and very costly efforts, the Bay fails to comply with the water quality standards established by the CWA. Because of this, Executive Order (EO) 13508, *Chesapeake Bay Protection and Restoration*, was issued in 2009 to intensify Bay cleanup efforts and improve CWA compliance. In addition, EPA developed the Chesapeake Bay Total Maximum Daily Load (TMDL) for three pollutants of concern (POC) as the first major step in restoring the Bay. The POCs of concern are total nitrogen (TN), total phosphorus (TP), and total suspended solids (TSS).

In response to the requirements of the EO, eight Lycoming County entities (the Joint MS4s) joined together to obtain joint permit coverage and to generate a Pollutant Reduction Plan (PRP). Lycoming County and the Joint MS4s retained Michael Baker Jr., Inc. to provide engineering services to prepare a CBPRP on their behalf.

The Joint MS4s' NPDES MS4 IP requires that a CBPRP be developed and implemented for all regulated areas that drain to receiving waters flowing to the Bay. The IP requires that the CBPRP be submitted to PA DEP for approval within 12 months of the effective date of the IP, which in this case is April 1, 2015.

PA DEP has developed Form 3800-FM-BPNPSM0493 ("Municipal Separate Storm Sewer System (MS4) TMDL Plan / Chesapeake Bay Pollutant Reduction Plan") for MS4 permittees who discharge into waters that are covered by an EPA-approved TMDL and waste load allocation (WLA) and/or are within the Chesapeake Bay Watershed. Because the Joint MS4s are not currently covered by a WLA, only the CBPRP section of the form is applicable. The completed MS4 TMDL Plan / CBPRP Form, including a list of the Planned BMPs and corresponding BMP Implementation Schedule, can be found in **Appendix C BMP Implementation Schedule**.

This CBPRP addresses the following topics as required by the MS4 TMDL/CBPRP Form:

- Description of the drainage area of the MS4 that discharges to the Chesapeake Bay Watershed;
- Identification of areas where municipal infrastructure upgrades are planned;
- Evaluation of the suitability of green infrastructure (GI), low impact development (LID) or environmental site design (ESD) BMPs;
- The control measures which will be implemented in the MS4s to reduce pollutants.

The purpose of this CBPRP is to develop a plan and schedule to implement BMPs to reduce nitrogen, phosphorus, and sediment associated with existing stormwater discharges from the Williamsport Area Joint MS4s. When implemented, this CBPRP will ensure overall compliance with all MCMs in the MS4 Permit. As such, the plan and schedule within this CBPRP effectively address the deficiencies documented by PA DEP during its inspections

in Summer 2014, and should be considered the Joint Permittees' corrective action plan in response to DEP's inspection reports.

Although some waterways draining from the permit area have been categorized as impaired, there are no published TMDLs for sediment loading or nutrients and no WLA assigned to the MS4 area. Therefore, a MS4 TMDL Plan is not required.

The Joint MS4s have been proactively working toward reducing pollutant discharges by implementing BMPs such as street sweeping, LID stormwater controls, and erosion and sediment control requirements.

Since the Williamsport Area Joint MS4s are comprised of multiple municipalities (and one institution of higher education located within and discharging to those municipalities' MS4s), the permittee has the authority to adopt ordinances. In addition, all development and re-development inside the MS4 boundaries must meet local, state, and federal requirements for erosion and sediment control and stormwater management. This includes conservation district erosion and sediment control requirements, PA stormwater regulations, and NPDES permits for construction site runoff.

Lycoming County published a Model Stormwater Ordinance as part of the County Stormwater Management Plan in September 2010. All municipalities have adopted a Stormwater Management plan.

Each municipality currently has an established Zoning Ordinance, which provides guidelines about, among other things, minimizing danger to public health by protecting water supply and natural drainage. Relevant information such as open space requirements and mapping is included.

In addition to Zoning Ordinances, Subdivision and Land Development Ordinances (SALDOs) are also adopted by MS4 entities, which give uniform standards and procedures for the regulation and control of subdivision and land development within each entity. These regulations include guidance for easements or rights-of-way for drainage facilities and utilities.

Contact information for Coalition entities pertaining to this CBPRP are provided in **Table 1-1**.

Table 1-1 Coalition Points of Contact

Coalition Entity	Name	Title	Phone Number	E-Mail
*Fairfield Township	Ron Springman	Township Secretary	570-433-4212	ronbuck1@comcast.net
Hepburn Township	Joe Hamm	Supervisor	570-337-4678	joseph.d.hamm@gmail.com
Loyalsock Township	Bill Burdett	Township Manager	570-323-6151	bill@loyalsocktownship.org
*Lycoming Township	Kelly McGarvey	Secretary	570-988-2929	lycomingtwp@verizon.net
*Montoursville Borough	Ginny Gardner	Secretary	570-368-2486	ginnygardner@comcast.net
Old Lycoming Township	Kathie Hunter	Zoning Officer	570-322-6906 x217	kathie.hunter@oldlycomingtwp.org
Pennsylvania College of Technology	John Charnego	Environmental Specialist	570-327-4514 x3006	jcharneg@pct.edu
City of Williamsport	John J. Grado	City Engineer	570-327-7516	cddirector@cityofwilliamsport.org

*Fairfield, Lycoming, and Montoursville are also represented by their Municipal Engineer, Todd Pysher, available at 570-547-6122 or trpysher@windstream.net.

2 MS4 Area

There is currently a wide range of land uses within each of the Joint MS4 municipalities. Overall, Lycoming County is a large rural landscape with a developing network of urban communities along the Susquehanna River corridor. The majority of the County's land area is forested and mountainous, and is managed by public agencies and private landowners. **Map E-1** shows the municipal boundaries within the MS4 area.

Lycoming County had an estimated 2013 population of 116,754, making Lycoming the most populated county in the Pennsylvania Wilds region, which consists of Lycoming, Clearfield, Clinton, Cameron, Warren, McKean, Jefferson, Potter, Tioga, Clarion, Elk, and Forest Counties. Much of Lycoming County's population can be attributed to the City of Williamsport, which has a population of approximately 29,349. [The City of Williamsport's population includes students of the Pennsylvania College of Technology who reside in the City, to the extent that U.S. Census methodology captures this information.]

Population for the other Coalition municipalities is:

- Fairfield Township 2,792
- Hepburn Township, 2,762
- Loyalsock Township, 11,026
- Lycoming Township, 1,478
- Montoursville Borough, 4,615
- Old Lycoming Township, 4,938

Please see **Table 2-1** for population densities of the MS4 entities. Note that density figures are calculated for the entire municipality and not just the urbanized area subject to MS4 regulations. As expected, the City of Williamsport has the highest population density at nearly 3,000 people per square mile.

Lycoming County is the largest county in Pennsylvania in land area. It lies entirely within the Susquehanna River Basin, one of four major drainage basins in PA. The County's most populated watershed is the West Branch of the Susquehanna River, which flows through the County for a distance of 38 miles. Thus, the most heavily populated areas of the County can be found along its southern extent, trailing the river.

The West Branch Susquehanna is the largest of six major sub-basins of the Susquehanna River, which is the largest tributary of the Chesapeake Bay. The West Branch Susquehanna River sub-basin drains an area approximately 6,992 square miles in extent. Agriculture and urban land uses predominate in the eastern and southern areas. The entire sub-basin supports a population of nearly 400,000, with major population centers in Lock Haven, State College, and Williamsport. **Map E-1** shows the watershed boundaries within the MS4 area, and each watershed is further described in **Section 2.1 Receiving Waters**.

Because of the continued urban development throughout the County, there is an increasing amount of impervious area within the regulated MS4 permit area. Impervious cover has been calculated for the Joint MS4s by considering only land cover categorized as Developed, Medium and High Intensity (50- 100% impervious). The impervious cover of the Joint MS4 area is approximately 2,695 acres, which equates to 18.6 percent. **Map E-2** presents the National Landcover Database information within the Joint MS4 area along with the relative percentages of land cover by type. Lycoming County is currently collecting more detailed land cover data which will enable the Joint MS4s to provide an even more accurate impervious land calculation in the future. There are 3,734 acres of land within the Joint MS4 area classified as Developed, Low Intensity (20-49% impervious), which is approximately 25 percent of the land cover in the defined area.

The Pennsylvania College of Technology has the highest percent of impervious cover at 61percent, with the City of Williamsport, which includes Pennsylvania College of Technology, having just over 31 percent impervious cover. Hepburn Township has the least impervious cover at just over 3 percent, along with the second-lowest population density.

Table 2-1 Population Density

MUNICIPALITY	HUC 12 WATERSHED(S)	RECEIVING STREAMS	IMPERVIOUS % (UA)	POPULATION DENSITY (PEOPLE/SQ. MILE)
Hepburn Township	Lycoming Creek	Bottle Run, Long Run, Lycoming Creek, UNT	3.31%	181.71
Fairfield Township	Wolf Run	Bennett's Run, Tules Run, Turkey Run, UNT	5.45%	410.59
Loyalsock Township	Lycoming Creek, Loyalsock Creek, Millers Run, Mill Creek	Bottle Run, Long Run, Lycoming Creek, Mill Creek, Loyalsock Creek, Bull Run, Grafius Run, Lycoming Creek, Millers Run, UNT	8.88%	868.19
Lycoming Township	Lycoming Creek	Bottle Run, Long Run, Lycoming Creek, UNT	10.82%	99.19
Old Lycoming Township	Lycoming Creek, Quenshukeny Run	Bottle Run, Long Run, Lycoming Creek, Daugherty Run, Fox Hollow Run, UNT	12.01%	676.44
Montoursville Borough	Loyalsock Creek, Wolf Run	Mill Creek, Loyalsock Creek, Bennett's Run, Tules Run, Turkey Run	18.85%	1,025.56
City of Williamsport	Lycoming Creek, Millers Run, Quenshukeny Run	Bottle Run, Long Run, Lycoming Creek, Bull Run, Grafius Run, Lycoming Creek, Daugherty Run, Fox Hollow Run, UNT	*31.18%	2,998.06
Pennsylvania College of Technology	Millers Run, Quenshukeny Run	Bull Run, Grafius Run, Lycoming Creek, Daugherty Run, Fox Hollow Run, UNT	*61.00%	N/A

*The impervious percentage calculation for the City of Williamsport includes all land area associated with the Pennsylvania College of Technology MS4, which is entirely within the municipal boundaries of the City of Williamsport

2.1 Receiving Waters

Within the regulated MS4 permit area there are six HUC 12 receiving watersheds that service MS4s from each municipality and ultimately drain to the Lower West Branch Susquehanna (HUC 8), which is classified as a Warm Water Fishes (WWF) and Migratory Fishes (MF) waterway. The entire MS4 Permit area drains to this waterbody via tributaries or infiltration. HUC 12 watersheds of the Lower West Branch Susquehanna River that drain the Joint MS4s area include Loyalsock Creek, Lycoming Creek, Mill Creek, Millers Run, Quenshukeny Run, and Wolf Run.

LOYALSOCK CREEK

Five townships comprise the bulk of population in this watershed: Upper Fairfield Township, Eldred Township, Gamble Township, Plunketts Creek Township, and Cascade Township. Loyalsock Creek begins in the western edge of Wyoming County and flows for 60 miles until it reaches its mouth at the West Branch Susquehanna River in Montoursville Borough. It drains a region 494 square miles in area.

Loyalsock Creek primarily services parts of Montoursville Borough, and is classified as a MF and a Trout Stocking Fishery (TSF) waterway. This waterway currently has Mercury impairment.

LYCOMING CREEK

Next to the West Branch Susquehanna, the Lycoming Creek Watershed is the most densely populated watershed in the County. While the population of City of Williamsport has declined over the last 20 years, communities throughout the watershed have witnessed some new development. Sanitary sewer lines were extended north along Lycoming Creek Road, and a new limited-access highway was constructed, both signs that the County is focusing growth in this area.

Lycoming Creek services parts of the City of Williamsport, the majority of Old Lycoming, Lycoming and Hepburn Townships, and a portion of Loyalsock Township. It is classified as a WWF and MF waterway, and is not impaired.

MILL CREEK

Mill Creek is a tributary of the Lower West Branch Susquehanna River, and services parts of Loyalsock Township. It is classified as a TSF and MF waterway, with no impairments.

MILLERS RUN

The Millers Run Watershed receives drainage from parts of Loyalsock Township, the City of Williamsport, and the Pennsylvania College of Technology. Within this watershed is Millers Run, which drains a portion of Loyalsock Township. It is important to note that the City of Williamsport and Pennsylvania College of Technology do not drain to the waterbody named Millers Run. Millers Run is classified as a WWF and MF waterway, and is impaired with Metals and Toxic Inorganics. Loyalsock Township is currently employing BMP measures to

proactively improve the stormwater runoff draining to the waterway. For example, Loyalsock Senior High School currently has a rain garden and a detention basin implemented, which allow for greater detention and infiltration of stormwater before entering the run. Millers Run requires additional control measures to ensure that the discharges do not cause or contribute to its impairment. The Loyalsock Township Stormwater Ordinance requires that development in the Miller Run Watershed have more stringent stormwater management performance standards for two of the design storm events. For example, 1-year at 50% and 10-year at 75% of existing condition (pre-development) peak stormwater runoff rates. More information about these BMPs can be found in **Appendix B**.

In addition to Miller's Run, for which this HUC is named, there are other small tributaries which drain much of the land area included in the HUC including Grafius Run, Lycoming Creek, Bull Run, and unnamed tributaries. These streams and tributaries are not impaired.

QUENSHUKENY RUN

Quenshukeny Run is a tributary of the West Branch Susquehanna River, and services parts of the City of Williamsport, and parts of Old Lycoming Township. It is classified as a WWF and MF waterway, and is not impaired.

WOLF RUN

The Wolf Run HUC12 subwatershed is a part of the larger Wolf Run Watershed, and is a tributary of the West Branch Susquehanna River. It services Fairfield Township and parts of Montoursville Borough, and is classified as a WWF and MF waterway, with a designated Aquatic Life impairment.

Please see **Map E-1** for a map of municipal and watershed boundaries.

A total of 203 outfalls have been identified in the Joint MS4 area. Outfall inventory and related data will continue to be collected, and detailed information on drainage area will be available by year four of the permit cycle.

Table 2-2 provides a breakdown of the number of outfalls by Joint MS4 entity, in descending order by number of outfalls. Loyalsock Township and the City of Williamsport currently have the largest number of inventoried outfalls. **Map E-1** in **Appendix E** shows the locations of outfalls by municipality and watershed.

Table 2-2 MS4 Joint Outfalls located in the Urbanized Area (UA)

OUTFALL LOCATIONS	NUMBER OF OUTFALLS
Pennsylvania College of Technology	1 (Discharges into City of Williamsport MS4 System)
Lycoming Township	1
Montoursville Borough	6
Fairfield Township	9
Hepburn Township	17
Old Lycoming Township	36
City of Williamsport	56
Loyalsock Township	77

2.2 Planned Infrastructure and New Discharges

Generally, infrastructure improvements are the development of basic physical structures that impact the operation of a system. Examples of infrastructure items of interest for this permit include roads, pipes, and bridges. Because of the possibility of increased runoff, added impervious area, or changing drainage patterns, any planned infrastructure and new discharge items are of interest.

Any new construction within the MS4 area will have to follow current Stormwater and Zoning Ordinances. These ordinances provide guidance and requirements for new construction, in compliance with MCM #4 as described in detail in **Section 3**. Some of these requirements include implementing Erosion and Sediment Control (ESC) and Stormwater Management Plans, abiding by structural BMP design criteria, stream buffers, and utilizing pervious surfaces where practicable. At this time no major infrastructure is planned within the MS4 that would impact stormwater including roadway improvement projects or large scale drainage system upgrades

PA DEP expects municipalities with MS4 permits to comply with Pa. Code 23, Chapter 102, and the Williamsport Area Joint MS4s are committed to do so. Chapter 102 of the Code outlines requirements for erosion and sediment control and post-construction stormwater management. The regulations also require long-term operation and maintenance of the BMPs, including routine inspection, maintenance, and repair or replacement to ensure proper function.

3 Existing Best Management Practices (BMPs)

The Joint MS4s have implemented numerous structural and non-structural Best Management Practices (BMPs) throughout the permit area to treat stormwater runoff. A list containing all 61 structural BMPs can be found in **Appendix B-1** and includes rain gardens, infiltration basins, stream restoration, bioinfiltration, underground detention systems, and open space restoration. A list containing all non-structural BMPs can be found in **Appendix B-2**.

Existing BMPs are associated with the requirements of the Joint MS4s as discussed below. These programs and practices will continue to be implemented throughout this permit cycle.

3.1 MS4 Permit and Stormwater Management Plan

As part of the NPDES MS4 IP, it is required to develop and implement a Stormwater Management Program (SWMP). This program is described in the SWMP and presents the Joint MS4s' plan to meet the requirements of the MS4 IP. The plan addresses the six Minimum Control Measures (MCMs) of the MS4 program. A component of the plan is to develop and implement this CBPRP.

Typical Phase II MS4 activities at the Joint MS4s involve the establishment of BMPs, measureable goals, and responsible parties for all activities that impact stormwater discharges. As stated, deficiencies noted by PA DEP at the inspections of the Joint MS4s, conducted in Summer 2014, will be addressed within this permit cycle. A schedule of improvements is included in **Appendix C.** The six MCMs and corresponding BMPs of the Phase II MS4 permit include:

MCM #1: PUBLIC EDUCATION PROGRAM – to engage the public and create an awareness of the Lycoming County MS4 Coalition's efforts to protect the environment and be a "good neighbor."

- adhere to written Public Education and Outreach Plan,
- at least two distribution methods each permit year,
- monthly environmental discussion meetings (MS4 Coalition meetings),
- pollution prevention articles published in municipal and school newsletters,
- update County stormwater website as needed with DEP and EPA links,
- pollution prevention information posted on MS4 public bulletin boards,
- an outreach program with neighboring dischargers,
- local Watershed Association partnerships.

Improvements to this plan will be implemented during the current permit cycle (April 2014 to March 2019) to update the plan and address deficiencies amongst members.

MCM #2: PUBLIC INVOLVEMENT PROGRAM – to encourage residents to participate in local environmental programs and events.

- adhere to written Public Involvement and Participation Plan,
- storm drain marking program implementation when resources are available,
- public encouraged to attend and be involved in public meetings and MS4 events at least once per year,
- outfall screening and sampling done by local students, interns, field work coordinator, and local municipal engineer(s) when available.

Improvements to this plan will be implemented during the current permit cycle (April 2014 to March 2019) to update the plan and address deficiencies amongst members.

MCM # 3: ILLICIT DISCHARGE DETECTION AND ELIMINATION– to provide a chain of responsibility for identifying, documenting, and dealing with illicit discharges.

The Joint MS4s have:

- completed its storm sewer system mapping,
- developed an illicit discharge prohibition policy,
- developed an illicit discharge detection and elimination program.

Written Illicit Discharge Detection and Elimination plans will be published by all municipalities within the Joint MS4s within the current permit cycle. The updates to existing plans will be implemented as needed during the remaining years of the current permit cycle (April 2015 to March 2019) to address deficiencies amongst members. Proper documentation of outfall inspection and stormwater sampling and monitoring will be recorded using available standard PADEP forms. The Joint MS4s will explore volunteer opportunities from local college students and interns.

MCM #4: CONSTRUCTION SITE RUNOFF CONTROL – to maintain a policy that addresses all construction related runoff situations. For construction related issues, the Joint MS4s are:

- documenting the construction permitting process,
- developing/refining construction contract specifications,
- working with the Lycoming County Conservation District (LCCD),
- implementing a construction inspection program.

Improvements to this policy will be implemented during the current permit cycle (April 2014 to March 2019). The plan improvements will update the plan and address deficiencies amongst members, including information specifying how public comments will be recorded and addressed.

A focus on Millers Run has been ongoing. Loyalsock Township enforced E&S controls during recent construction projects.

MCM #5: POST CONSTRUCTION RUNOFF CONTROL – to maintain a policy that addresses all post construction related runoff situations. The Joint MS4s have:

- developed a Post Construction Stormwater Management Policy and standards,
- implemented a post construction inspection program.

Improvements to this policy will be implemented during the current permit cycle (April 2014 to March 2019) to update the plan and address deficiencies amongst coalition members. All coalition members have adopted a stormwater management plan using the model ordinance as a guide. In the second permit year, the municipal stormwater ordinances will be compared to the MS4 Ordinance checklist provided by PADEP. A BMP tracking system will be developed to manage BMP information and inspection records.

A focus on Millers Run has been ongoing. Loyalsock Township has a more stringent stormwater ordinance requiring reductions in the 1-year and 10-year post-construction stormwater runoff rates.

MCM #6: GOOD HOUSEKEEPING – to guide and train all regular employees at the Joint MS4s in pollution prevention and good housekeeping techniques. The Joint MS4s are:

- maintaining storm drains,
- completing winter road and grounds maintenance,
- using practices that incorporate good housekeeping techniques,
- performing parking lot and street sweeping to remove debris on an as-needed basis,
- completing periodic inspections to assess the cleanliness of municipal parking lots and streets during the year,
- identifying good housekeeping and pollution prevention measures in their Pollution Prevention / Good Housekeeping Plan.

A written Operation and Maintenance plan addressing housekeeping and employee training will be published and adopted by the Joint MS4s. Updates to existing written procedures will be implemented during the current permit cycle (April 2014 to March 2019)to address deficiencies amongst members. In the second permit year (April 2015 to March 2016), the Lycoming County Planning Department will coordinate with the MS4 Coalition to establish collaborative and annual training that will satisfy PADEP's training requirements.

A focus on Millers Run has been ongoing. Loyalsock Township performs street sweeping nine times per year as well as additional leaf collections in the Miller's Run drainage area. Over half a mile of stormwater pipes have been cleaned and over 1,000 feet of new storm pipe has been installed that drain to Millers Run.

4 Pollutant Reduction Potential

The following section discusses green infrastructure (GI) and Low Impact Development (LID) within the Joint MS4s, along with planned BMP implementation and the installation of infrastructure improvements. If issues develop regarding the implementation of any of the planned BMPs, the Joint MS4s may substitute an equivalent BMP which will be documented in the next CBPRP update. Every effort will be made to achieve reductions in the appropriate permit years, and BMPs will be implemented by the Joint MS4s to the maximum extent practicable.

4.1 Evaluation of GI and LID

LID is a holistic approach that incorporates site-specific ecosystem and watershed-based considerations for planning and design. The goal of LID is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to the source. Although LID is a relatively new concept in stormwater management, mimicry or restoration of natural systems is the basis for implementation. LID stormwater practices were pioneered as a response to the need to solve a variety of water quality problems that were evident in increasingly urbanized and built environments. Research has shown that a decentralized LID approach to stormwater management offers superior alternatives compared to conventional stormwater management controls.

EPA defines GI as "an approach that communities can choose to maintain healthy waters, provide multiple environmental benefits and support sustainable communities." GI uses vegetation and soil to manage rainwater and is an affordable solution to providing stormwater and air quality management.

Future BMPs will have a focus placed on GI and LID practices instead of the typical stormwater management facilities because of the Joint MS4s' focus on using environmentally sustainable solutions to stormwater management and the municipalities' ordinances. Furthermore, non-LID practices tend to have reduced pollutant reduction efficiency and are, therefore, a less cost-effective option for implementation activities. The types of recommended GI and LID BMPs for the Joint MS4s include bioretention facilities, constructed wetlands, dry swales, grass channels, land use conversions, vegetated filter strips, and rain gardens.

Lycoming County is located in karst terrain, characterized by subterranean layers of limestone. The highly variable subsurface characteristics at the installation make it difficult to determine the feasibility of structural BMPs without conducting a geotechnical investigation at a proposed site. In addition, soils within parts of the MS4 permit area are rated as Urban. Due to soil compaction under buildings, infiltration into the existing soils cannot be relied upon in more urbanized areas without soil excavation and/or amendments. As such, LID and GI practices will be investigated on a site-by-site basis.

4.2 BMP Selection and Implementation

BMPs were selected that provide maximum pollutant reduction potential. The following process was utilized to select the BMPs with the highest value and plan for future implementation.

4.2.1 Opportunity Assessment Identified BMPs

A desktop review of all existing and proposed BMPs within the MS4 area was completed to determine the facilities with the highest value. A detailed prioritization methodology description is provided in **Appendix D**. After determining preliminary rankings for all BMPs, a field study was conducted by engineers employed by Michael Baker Jr. in February 2015. Approximately the top 50% of the BMPs analyzed were visited to determine the applicability of crediting them and to verify the accuracy of the data.

Each structural BMP was evaluated on its ability to provide the greatest value toward restoring the Chesapeake Bay, and a prioritization score was assigned to each BMP on four evaluation criteria:

- Benefits of the BMP which includes the size of area treated, and the BMP's effectiveness.
- Environmental need of the surrounding area, which includes the type of existing land serviced by the BMP and water quality considerations of the receiving stream
- Constraints of the land surrounding the BMP, including available space, land ownership, and public support.
- Cost of the BMP, including design, construction, maintenance, and funding options.

4.2.2 Planned BMPs

Based on the BMP ranking criteria given above, all of the existing structural BMPs present in the permit area were ranked for effectiveness. The BMPs that received the top 20 priority scores based on the ranking system were further evaluated based on location within the MS4s and feasibility of implementation. The ten highest-priority BMPs are listed in **Table 4-1**.

These highest-priority existing BMPs are planned for continued upkeep, resulting in an ongoing pollutant reduction. Additional improvements are also possible, including basin retrofits and naturalization. While many of these BMPs are at least partially constructed and are available for retrofit, the Indian Park Restoration (MT11) has not yet been implemented, but will be constructed within this permit cycle. The flood buyout initiative (C3) is existing, but has not yet been completed, with some properties having already been acquired, demolished and converted to open/green space. At existing and future flood buyout sites, there is potential for additional vegetation and possibly tree planting.

Table 4-1 Priority BMPs

BMP ID	DESCRIPTION	BMP TYPE	BMP LOCATION	RECEIVING STREAM(S)	HUC 12 RECEIVING WATERSHED(S)
LST3	Detention and Infiltration Basin at Loyalsock Senior High School.	Infiltration Basin	Loyalsock Township	Millers Run	Millers Run
LST2	Rain garden at Loyalsock Senior High School.	Rain Garden	Loyalsock Township	Millers Run	Millers Run
LST14	Detention basin owned/maintained by Loyalsock Township School District, located at Schick Elementary school on Four Mile Drive.	Infiltration Basin	Loyalsock Township	Bull Run	Millers Run
LC3	Flood-prone properties were/will be acquired, cleared, and returned to open space as part of the flood mitigation initiative.	Open Space Restoration	Fairfield, Hepburn, Loyalsock, Lycoming, Old Lycoming Townships, and Montoursville Borough	Multiple	Lycoming Creek, Loyalsock Creek, Millers Run, Quenshukeny Run
WC4	Rain garden at Recycling Center.	Rain Garden	City of Williamsport	Lycoming Creek	Lycoming Creek
WC6	Detention basin at Laurel Run Circle.	Extended Detention Basin	City of Williamsport	Daugherty Run	Quenshukeny Run
OLT8	Relocated recycling facility at 1250 Princeton Avenue, with future BMP possibilities.	Rain Garden	Old Lycoming Township	Bottle Run	Lycoming Creek
PCT1	Infiltration trench at Dauphin Hall.	Infiltration Trench	PA College of Technology	Lower West Branch Susquehanna	Millers Run

BMP ID	DESCRIPTION	BMP TYPE	BMP LOCATION	RECEIVING STREAM(S)	HUC 12 RECEIVING WATERSHED(S)
PCT3	Inlet sumps located on the College campus outside of Dauphin Hall.	Underground Detention Storage	PA College of Technology	Lower West Branch Susquehanna	Millers Run
MB11	Wetland/stream restoration, educational programs and community plantings at Indian Park.	Wetland / Stream Restoration	Montoursville Borough	Mill Creek	Loyalsock Creek
PCT5	Oil/water separator for General Services Facility.	Oil/Water Separator	PA College of Technology	Lower West Branch Susquehanna	Quenshukeny Run

Priority BMP's listed in **Table 4-1** will reduce pollutant loads to the Chesapeake Bay Watershed from the MS4. A discussion of BMP function and pollutant reduction potential is provided below.

Rain gardens and Infiltration Basins: Rain gardens and Infiltration Basins are targeted toward capturing and treating stormwater runoff. The ponding depth typically is limited to 12" to provide rapid draw down within 72 hours for safety, although deeper applications may be allowed. The BMP footprint should generally provide a maximum impervious loading ratio in karst terrain of 3:1. Native vegetation with high pollutant resistance should be used. The subsurface bed can be made of a variety of material with high infiltration and storage capacity. To capitalize on the subsurface filtration and storage capacity, up to 6" of permanent storage should be provided. The subsurface media should be amended as needed to have an infiltration rate comparable to B-type soils. The internal water storage layer improves treatment of nitrogen by providing an anaerobic zone resulting in greater denitrification, volume reduction benefits by enhancing infiltration, thermal load reduction, and retrofit flexibility to overcome hydraulic head constraints and help avoid existing utilities.

These BMPs are especially desirable for stormwater runoff to impaired waters, such as Millers Run. Multiple rain gardens and infiltration basins are currently located on Loyalsock Township school grounds, which drain to Millers Run. These BMPs provide an ongoing pollutant reduction to Millers Run, and will continue to be maintained and inspected for improvement.

Extended Detention Basin: Extended detention basins differ from infiltration basins in that extended detention basins provide added storage volume to detain and drain storm water over a 24 hour period. This provides pollutant removal by allowing time for settling of pollutants.

Disconnection of Impervious Areas: This control measure involves disconnecting impervious areas from the regulated MS4 system. This includes disconnecting downspouts that discharge to the MS4 system and impervious areas that are directly connected and eventually flow to the MS4 system. For example, roof runoff travels through the downspout of a building and then is discharged to the paved parking lot. Runoff then travels across the parking lot to the storm drain system. This situation does not allow for the runoff to infiltrate or be treated by passing through a vegetated area.

There are existing directly connected downspouts within the MS4 area; however there is no current inventory of these downspouts. Disconnecting downspouts is a control measure that may be considered as part of the long range plan.

Infiltration Trench: This feature is composed of a continuously perforated pipe within a stone filled trench with a level bottom. Infiltration trenches are well suited to provide groundwater recharge and water quality benefits in a large variety of applications. The trench is typically no more than 3'- 8' wide and 6' deep. The trench size has a maximum drainage area three times the footprint of the trench to provide a maximum impervious loading ratio of 3:1. The trench should be placed on relatively flat grades and soils with suitable infiltration capabilities. The trench should be covered with at least 6" of topsoil and native vegetation. This feature was not proposed because alternatives were available, but this feature works well in combination with other BMPs beneath vegetated filters, to connect inlets, and to provide rooftop disconnection.

These BMPs are especially desirable for stormwater runoff to impaired waters, such as Millers Run. An infiltration trench is currently located at the PA College of Technology, which drains to West Branch Susquehanna River. These BMPs provide an ongoing pollutant reduction to Millers Run, and will continue to be maintained and inspected for improvement.

Open Space/Riparian Buffer Restoration: Open space restoration applies to land conversions and involves the removal of impervious surfaces (e.g. buildings) in favor of vegetation. The Bay program recognizes a change in the land use as a way of reducing pollutants off the landscape. In addition to open space restoration, riparian buffer restoration is an equally effective method of reducing pollutant discharge to waterways. Buffers create habitat, promote infiltration, and reduce pollution runoff by providing a minimum distance between the water resource and development. At locations of open space restoration associated with the flood-prone property buyout program, riparian buffer restoration is recommended. These sites will be investigated to determine the feasibility of revegetating the properties with native trees and shrubs. Access pathways to the water will be maintained at each location as needed.

Tree Planting: This control measure involves planting trees within the MS4 drainage area. After the trees are planted, it is important to establish a tree maintenance program and provide frequent care of the trees for the first three years.

Reforestation in general will be considered as a complementary practice to the installation of planned BMPs as well as during each annual assessment. However, larger individual areas

have also been identified within the MS4 permit area as feasible for reforestation, or possibly a complete land use change. The flood buyout program is applicable to this control measure.

In addition to reforestation, street tree plantings and tree plantings in public parks are highly recommended for urbanized areas. Special attention should be given to replacing street trees where they have been removed due to damage or disease. Urban street trees offer significant runoff reduction benefits because of canopy interception, evaporo-transpiration, and infiltration. Selection of tree species should be carefully done to match the appropriate tree with the site, focusing on native trees and trees with wildlife benefits, and trees that are disease-resistant. Where feasible given site constraints, larger tree species that have relatively greater stormwater benefit should be favored over smaller ornamental-style species that have more modest benefits. Additional benefits of street and park tree plantings include shade, aesthetic improvement to the community, and wildlife habitat. The Pennsylvania TreeVitalize program is a recommended source of funding, information and training for urban tree plantings.

Underground Detention Storage: This practice uses temporary underground storage to promote infiltration and is appropriate for high-permeability soils. The practice has high runoff reduction rates, but lower phosphorus and nitrogen removal benefits. The underground chamber may be outfitted with pipes to increase the storage volume. This practice is restricted on a large scale and should only be used for small drainage areas (250-20,000 square feet).

Basin Naturalization: This practice involves modifying a basin to be more naturalized, either by actively adding native vegetation to the basin, or simply by reducing or eliminating mowing and allowing an ecological succession to take place. Adding or allowing additional vegetation increases holding time in the basin, which provides greater pollutant removal efficiencies. Basin naturalization can also improve aesthetic value (particularly if native wildflowers are used) and provide habitats for birds and other wildlife, which in turn provides enjoyable wildlife viewing opportunities. In some cases, compacted soils may benefit from cultivation or amendment during planting to increase infiltration and also increase the plant survival rate. This BMP may also require some maintenance, such as weed/invasive species removal, but overall maintenance cost may be lower because of the reduced or eliminated mowing.

Existing dry detention ponds are located throughout the MS4 permit area. Specifically, existing detention basins in Loyalsock Township, and the City of Williamsport, and possible future basins in Old Lycoming Township, could have potential for naturalization. The feasibility to increase the naturalization of the ponds will be investigated during the current permit cycle (April 2014 to March 2019).

Wetland/Stream Restoration: This control measure involves restoring and/or stabilizing degraded and eroded stream banks, or restoring a degraded wetland to a natural state to provide additional infiltration potential. These BMPs are especially desirable for stormwater

runoff to impaired waters, such as Millers Run. A wetland and stream restoration project is currently planned for Indian Park in the Borough of Montoursville. The restoration plan aims to improve overall water quality at the park and restore the ecology of the park's pond.

The feasibility to stabilize or restore other stream banks or wetlands will be investigated during future permit cycles.

Green Infrastructure: This control measure involves establishing green infrastructure within the MS4 drainage area. Examples include green roofs and pervious pavement surfaces.

Installing green roofs is not generally feasible in the MS4 area due to the high associated cost. However, private developers will be encouraged to consider this control measure with future development. Additionally, there are paved surfaces for the parking lots and the roads between the buildings. Montoursville Elementary School installed pervious pavement on their newer parking lot. In some areas, parking lots could implement permeable pavement surfaces. These options will be investigated for implementation during the future permit cycles.

Please see **Map E-3** for the location of all planned BMPs, **Appendix B** for additional BMP information, and **Appendix C** for the BMP implementation schedule.

4.3 Identification of Infrastructure Upgrades

The Joint MS4s will continue to investigate all opportunities to incorporate GI into any and all infrastructure upgrades.

Any upgrades or new construction within the Joint MS4s will be subject to the Stormwater Management Policies enacted within each municipality under the baseline Model Ordinance established by the County. The model ordinance requires "no net increase in stormwater runoff volume and sediment or nutrient loading from major renovation and construction projects."

These regulations should be sufficient to address the necessary stormwater management controls to be implemented during new and re-development projects.

4.4 Future BMPs to be Investigated

The following activities identify typical circumstances within the MS4 area that may have potential of becoming a pollutant reducing practice or activity. Below is additional information that defines these typical circumstances and options for treatment or mitigation of stormwater impacts, including any ancillary information that could be readily provided. Each BMP item is listed with its associated BMP ID for easy reference to the BMP list in **Appendix B-1**.

MONTOURSVILLE BOROUGH INFILTRATION BASIN AND REFORESTATION (#MB13)

The Borough currently owns 140.6 deeded acres of riparian land along Loyalsock Creek and the Susquehanna River, including an area located between the runway of the Williamsport Airport and the river, located off of Miller Street. The airport does not have stormwater runoff control, but drains directly into swamplands. This area could be utilized to capture runoff and improve the water quality of the runoff.

CITY OF WILLIAMSPORT RAIN GARDEN ON BASIN STREET (#WC11)

A potential BMP has been suggested where a concrete triangle is currently located at the intersection of Basin Street and Via Bella Street. The current concrete triangle could be retrofitted as a rain garden. In nearby traffic circles on Via Bella Street, private volunteers have planted flowers. Private maintenance for this potential project is suggested as well, due to the high visibility area (next to Panera Bread, Starbucks, and I-180.

CITY OF WILLIAMSPORT RAIN GARDEN NEAR BOWMAN FIELD (#WC12)

Currently, a re-design of the intersection of Oliver, Beeber, and West 4th Streets is being planned. Some type of median strip or traffic island is being designed, and this would be a good location for bio-infiltration, especially considering site topography conducive to collecting drainage from the roadway. This BMP can be coordinated with the current redesign of the intersection. This is another excellent location for public visibility due to its proximity to Historic Bowman Field (home of the Crosscutters minor league baseball team),

Memorial Park, and the Original Little League Field, which was just listed on the National Register of Historic Places.

LOYALSOCK TOWNSHIP REFORESTATION ON THE GOLDEN STRIP (#LST15)

In Loyalsock Township, reforestation has been suggested for a large area of land between the "Golden Strip" commercial strip mall zone and the levee/I-180 highway. This long, narrow swath of mowed land appears to receive a significant amount of stormwater runoff from the Golden Strip properties (such as T.J. Maxx Plaza, which are heavily impervious. This site has the potential to be converted into a vegetated infiltration area. Future investigation is needed to account for levee permitting requirements, because this area is part of the levee's Interior Ponding Area. The feasibility of obtaining vegetation from the Lycoming County Conservation District will be investigated. Care should also be taken so that any proposed plantings do not obscure existing business signage facing toward I-180, as this could create opposition to the BMP.

STREET TREE RESTORATION PROGRAM: MONTOURSVILLE BOROUGH & THE CITY OF WILLIAMSPORT REFORESTATION

Along the main streets in the town centers, there are many areas where street trees have not been planted or no longer exist. A gap analysis is recommended to determine the largest areas that are missing street trees and prioritize plantings. (For more information about this suggested BMP, see more discussion in Section 4.2.2.)

STRATEGIC ACTION: ENVIRONMENTAL PRIMER

According to the 2006 Lycoming County Comprehensive Plan, it development of a primer entitled "Beyond the Beauty: Environmental and Community Benefits of Forestland" was suggested to provide information on forest benefits to water quality, reduced flooding, and groundwater recharge. This recommendation should be revisited during the 2016 Lycoming County Comprehensive Plan Update process. Such a publication could be useful in promoting a variety of BMPs and actions by the public that would reduce stormwater pollution.

STRATEGIC ACTION: RIPARIAN FOREST BUFFER MAPPING

The County's Comprehensive Plan suggests a strategic action to identify and map riparian forest buffers, wetlands, and natural undeveloped water retention areas and encourage stream bank preservation programs. The progress of such mapping efforts should be revisited and evaluated as part of the 2016 Comprehensive Plan Update.

STRATEGIC ACTION: BMPS INTO ORDINANCES

Another suggested strategic action by the County's Comprehensive Plan is to incorporate BMPs into ordinances to protect water supply and water quality. For example, replace high-maintenance lawn requirements with allowances for seasonal meadow habitat. Progress of such ordinance updates should be evaluated as part of the 2016 Comprehensive Plan

Update, with a focus on the ordinances of the MS4 communities and the County ordinances, which often serve as a model.

5 Plan Implementation, Operation & Maintenance (O&M), and Reporting

The following section discusses the schedule to implement the BMPs necessary to meet the required pollutant load reduction, the corresponding operation and maintenance for the planned BMPs, and the required annual reporting of the CBPRP implementation updates.

5.1 Schedule of Implementation

The Planned BMP Implementation Schedule can be found as Table C-1 in **Appendix C**. The table includes a list of the planned BMPs, information such as type and location of the BMP, pollutant removal efficiency, and the permit year in current which the BMP is expected to be constructed.

5.2 Inspection, Operation, and Maintenance

The Joint MS4s will implement and maintain an operation and maintenance (O&M) program for these planned BMPs as well as all operations that could contribute to the discharge of the Bay Pollutants of Concern (POCs). The Joint MS4s will ensure that maintenance is performed in accordance with the operation and maintenance manual (if applicable) to maintain the BMPs in good working order.

The existing priority BMPs listed in this plan will be inspected annually to assess proper function and identify any deficiencies or necessary maintenance. Any issues will be documented, and maintenance/repair will be completed as required. Planned BMPs will follow the same inspection and maintenance program. The Joint MS4s have developed an inventory of Post-Construction Stormwater Management (PCSM) BMPs (**Appendix B**), which will be continually updated during the term of coverage under the IP as development projects are reviewed, approved, and constructed.

Annual inspections will be completed and documented. The BMP inventory will be updated when inspections are completed and will include any maintenance required and corresponding actions.

As the planned BMPs are installed, they will be added to the Stormwater BMP inventory, and the corresponding fields for inspection and maintenance will be populated. The inspection and maintenance activities for the planned BMP types that are already included in the Stormwater BMP Inventory are expected to be identical to the ones currently listed.

The Joint MS4s will review their BMP O&M program annually and edit as necessary, with assists from the MS4 Planner. The primary source of the O&M information is the PA DEP's BMP Manual.

5.2.1 Planned BMP Maintenance Practices/Schedules

Bioretention/Rain Gardens: Properly designed and installed bioretention areas require periodic regular maintenance.

- While vegetation is being established, pruning and weeding may be required.
- Detritus may also need to be removed every year. Perennial plantings may be cut down at the end of the growing season.
- Mulch should be re-spread when erosion is evident and replenished as needed. Once every 2 to 3 years the entire area may require mulch replacement.
- Bioretention areas should be inspected at least two times per year for sediment buildup, erosion, vegetative conditions, etc.
- During periods of extended drought, bioretention areas may require watering.
- Trees and shrubs should be inspected twice per year to evaluate health.

Infiltration/Extended Detention Basins: Depending on the level of naturalization present in the basin, some maintenance might be required.

- Mowing should be done on an as-needed basis for non-naturalized basins.
- Overflow features should be inspected two times per year, and after major rainfall events, for trash buildup.
- Infiltration areas should be inspected twice per year for erosion, sediment buildup, and vegetation conditions.

Infiltration Trench: Depending on the level of naturalization present in the trench, some maintenance might be required. Proper maintenance activities ensure the functionality of trenches. The following inspection and maintenance activities are recommended:

Maintenance activities should be done annually. One annual wet weather inspection should occur 48-72 hours after a major storm event (>1- 2 inch rainfall depth).

- Inspect and correct erosion problems, damage to vegetation, and sediment and debris accumulation.
- Inspect vegetation on side slopes for erosion.
- Inspect for pools of standing water, dewater and discharge to an approved location and restore to design grade.
- Inspect for litter and remove any litter found.
- Inspect for uniformity in cross-section and longitudinal slope, correct as needed.
- Inspect swale inlet and outlet for signs of erosion or blockage.

Underground Detention Storage: These infiltration BMPs can accumulate trash and sediment easily from paved areas, but inspection and maintenance can be difficult because of the confined nature of the holding areas. It is suggested that trained professionals should be consulted for cleaning.

- ❖ Underground storage areas should be inspected twice per year for sediment and trash buildup, and cleaned out as necessary.
- ❖ Inlet grates and outlet structures should be inspected twice per year and after every major storm event.

Please see **Table 5-1** for a typical maintenance summary for vegetated infiltration BMPs.

Table 5-1 Vegetated Infiltration BMP Maintenance Summary

ACTIVITY	FREQUENCY	DESCRIPTION
Structural Inspection	1 x per year or more often	• Examine outlet structure and pretreatment area for blockage and to assess infiltration; • Check for clogging and for piping, conduct a wet weather assessment within 48-72 hours of a 1"- 2" rain event – water should be mostly or fully drawn down; • Conversely, also check if bed drains too fast – indicative of structural failure; • Look for broken underdrains or cleanouts, sinkholes in bed indicate short circuiting; • Repair erosion, reseed and/or re-mulch any areas where erosion is present (determine root cause and address).
Fertilizer and other Chemicals	N/A	• Use minimal or no fertilizers, including compost, and use only the minimum necessary amount of organic fertilizer to establish new plantings. • Properly store pesticides, herbicides, and inorganic fertilizer; • Mix in organic fertilizer/compost on slopes (banks) to address problem areas where bank vegetation is not readily establishing.
Clean Up	1 x per year or as required	• Remove trash and debris.
Mulch	1 x per year	• Replenish as judged appropriate, in large part for aesthetics.
Sediment	1 x per year	• Look for sediment in bed; • Check for sources of sediment in watershed and on slopes of BMP; • Pull soil cores and look for hydric indicators (if present, practice my not be draining properly).
Plants	1-2 x per year	• Water and care for plants intensively for the first year after installation; • Weeding and pruning, and reseeding of any bare areas that should be vegetated; • Mowing or other care specified in design – mowing or other care should not create erosion or other situations that would compromise BMP: • Ensure healthy, dense vegetative cover, particularly on slopes (banks) when/if vegetation is primary source of bank stability.

5.2.2 Parking Lot and Street Sweeping

Public works personnel from entities within the Joint MS4s currently perform parking lot and street sweeping to remove debris on an as-needed basis. This BMP will continue in the current manner and will be supplemented with periodic inspections to assess the cleanliness of the parking lots and streets during the year. Particular attention will be focused on inspections in late Fall and Spring (especially after snow melt) when rain events tend to be frequent and heavy.

Parking lot and street sweeping policy details, schedules, and procedures will all be outlined in the implemented Operations and Maintenance Program. Additional documentation of this activity in a basic inventory (along with all other activities and facilities operated or owned by the Joint MS4s) is also required.

5.2.3 Storm Drain System Maintenance

Public works personnel from entities within the Joint MS4s currently perform maintenance of the storm drain system on an as-needed basis as problems are observed. Under this BMP, the Joint MS4s will implement periodic inspections to evaluate the condition of the stormwater collection systems. Cleaning and maintenance will be performed, as needed, based on the results of the inspections. This BMP will be implemented to ensure that the storm drain system is not clogged by debris and that it is maintained in a manner that is structurally and operationally sound.

A training program will be implemented to ensure that all staff designated to perform the inspections and/or maintenance will be adequately prepared, with the overall goal of preventing or reducing the discharge of pollutants from the stormwater collection systems to the regulated MS4.

5.2.4 Good Housekeeping

Good housekeeping practices ensure a clean and orderly working area. Periodic clean-up of materials and debris that accumulate on the ground, as well as prompt clean-up of spilled materials, will minimize the potential for contamination of stormwater runoff.

Developing, implementing and maintaining a written Operation and Maintenance program, along with identifying and documenting all facilities and activities that are owned or operated by the Joint MS4s and have the potential for generating stormwater runoff to the regulated MS4, are both essential to developing good housekeeping standards. An employee training program is also a good practice to prevent or reduce the discharge of pollutants into the regulated MS4.

5.3 Annual Reporting

Updates on the status of the implementation of the CBPRP will be provided with the annual report. These reports will include a list of BMPs implemented and the associated pollutant

reductions. In addition, a narrative describing the progress in implementing the CBPRP will be submitted.

6 References

1. Clean Water Act, Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.), Amended November 27, 2002. http://www.epw.senate.gov/water.pdf

2. *EPA BMP Inspection and Maintenance Website. Accessed February, 2011.* *http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=91*

3. *Executive Order 13514 - Federal Leadership in Environmental, Energy, and Economic Performance,* October 5, 2009. http://www.whitehouse.gov/assets/documents/2009fedleader_eo_rel.pdf

4. *Executive Order 13508, Chesapeake Bay Protection and Restoration*, May 12, 2009. http://www.fedcenter.gov/Announcements/index.cfm?id=14104&pge_id=1854

5. NPDES Permit No.: PAI134808

6. *The Pennsylvania Code – Title 25 – Environmental Protection.* http://www.pacode.com/secure/data/025/025toc.html

7. *Pennsylvania Stormwater Best Management Practices (BMP) Manual*, December 30, 2006. Accessed Feb. 2014 http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-8305

8. The Low Impact Development Center, Inc. Accessed November 8, 2013. http://www.lowimpactdevelopment.org/links.htm