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July 2017

CHESAPEAKE BAY POLLUTANT REDUCTION PLAN FOR GREENE TOWNSHIP

PREPARED FOR:
GREENE TOWNSHIP

FRANKLIN COUNTY, PENNSYLVANIA

HRG Project No. R005840.0426

CHESAPEAKE BAY POLLUTION REDUCTION PLAN
FOR
GREENE TOWNSHIP,
FRANKLIN COUNTY, PENNSYLVANIA

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Introduction

Greene Township discharges stormwater to surface waters located within the Chesapeake Bay watershed and is therefore regulated by a PAG-13 General Permit, Appendix D (nutrients and sediment in stormwater discharges to waters in the Chesapeake Bay watershed). The Township also has watershed impairments regulated by PAG-13 General Permit, Appendix E (nutrients and/or sediment in stormwater discharges to impaired waterways). This Chesapeake Bay Pollutant Reduction Plan (CBPRP) was developed in accordance with both PAG-13 requirements and documents how the Township intends to achieve the pollutant reduction requirements listed in the Pennsylvania Department of Environmental Protection (PADEP) Municipal MS4 Requirements Table[1].

This document was prepared following the guidance provided in the PADEP National Pollutant Discharges Elimination System (NPDES) Stormwater Discharges from Small Municipal Separate Storm Sewer Systems Pollutant Reduction Plan (PRP) Instructions[2]. Notwithstanding that the prevailing guidance is associated with the General Permit, the Township is required to operate under an Individual Permit, to be issued upon review by PADEP, which is anticipated to include similar conditions to those included in the General Permit. The Township is required to operate under an Individual Permit because a portion of the municipality drains to a high quality watershed (Cold Spring Run).

GENERAL INFORMATION	
Permittee Name: Greene Township	**NPDES Permit No.:** to be determined upon approval
Mailing Address: 1145 Garver Lane P.O. Box 215	**Effective Date:** March 16, 2018
City, State, Zip: Scotland, PA 17254	**Expiration Date:** March 16, 2023
MS4 Contact Person: Gregory Lambert P.E.	**Renewal Due Date:** Sept 16, 2022
Title: Township Engineer	**Municipality:** Greene Township
Phone: (717) 263-9160	**County:** Franklin
Email: glambert@greenetwp.us	**Consultant Name:** Herbert, Rowland & Grubic, Inc.
Co-Permittees (if applicable): N/A	**Consultant Contact:** Erin Letavic, P.E. 369 East Park Drive Harrisburg, PA 17109 (717)564-1121

Greene Township is a small MS4 community that will be starting its first permit term in March 2018. The Township land use is mainly agricultural with small pockets of low and medium-density developments clustered around major thoroughfares. According to the United States Census Bureau's 2010 census 22% of the Township (7,998.1 acres) is classified as urbanized area (UA). A majority of the remaining portion of the Township is agricultural land with over 6,000 acres identified as Agricultural Security Areas.

[1] PADEP, MS4 Requirements Table (Municipal) (rev. 5/9/2017)
[2] PADEP PRP Instructions; Document # 3800-PM-BCW0100k (rev. 3/2017)

The majority of Greene Township's UA is located within the Mountain Creek-Conococheague Creek HUC-12 watershed. Smaller areas of UA are also located within the Rowe Run and Rocky Spring Branch watersheds. All of these watersheds have been classified as impaired by PADEP, therefore the Pollution Reduction Plan (PRP) requirements for these impaired watersheds are included as part of this CBPRP.

Section A: Public Participation

A complete copy of this CBPRP was made available for the public to review at the Greene Township municipal office from August 1, 2017 to August 31, 2017. The availability of the document was publicized in *The Chambersburg Public Opinion* on August 1, 2017. The published public notice contained a brief description of the plan, the dates and locations at which the plan was available for review by the public, and the length of time provided for the receipt of comments.

The final version of this plan will include a copy of the public notice and copies of all public comments and the responses issued to each comment (Appendix A). Public comments will be accepted for 30 days following the publication date of the public notice.

The information contained in this report was presented to the public during the regularly scheduled Greene Township Board of Supervisor's meeting held on August 8, 2017. Comments and questions regarding the CBPRP were received during the public presentation. A copy of the meeting minutes for the meeting at which the CBPRP was presented will be included in Appendix A of the final version of this plan.

Section B: Mapping

The Greene Township Planning Area Map depicts the Township's Municipal Separate Storm Sewer System (MS4), as required under MCM #3, BMPs 2 and 3 of the PAG-13 Notice of Intent (NOI). At this time, the extent of the MS4 mapped by the Township is limited to outfall locations. It is anticipated that additional mapping of the Township MS4 will be complete during the course of the five-year permit term. The MS4 Map also shows the CBPRP planning area, UA, impaired watersheds, existing BMPs locations, and proposed BMP locations.

The Township's Land Use Map was developed using the most recent National Land Cover Database[3]. The Township is largely agricultural with some pockets of low and medium density development.

[3] Multi-Resolution Land Characteristics (MRLC) Consortium, *National Land Cover Database 2011* (NLCD 2011)

Section C: Pollutants of Concern

The pollutants of concern for Greene Township were determined by referencing the PADEP MS4 Municipal Requirements Table[4] (Table 1). The applicable section of this table is included for reference in Appendix C.

Table 1. Pollutants of Concern by Watershed Planning Area

Planning Area (Watershed)	Impaired Downstream Water	Pollutants of Concern
CBPRP	Chesapeake Bay Nutrients/Sediment	Appendix D - Nutrients, Siltation (4a)
Rowe Run PRP	Rowe Run	Appendix E – Organic Enrichment, Low D.O. Siltation (5)
Rocky Spring Branch PRP	Rocky Spring Branch	Appendix E - Siltation (5)
	Back Creek	Appendix E - Siltation (5)
Mountain Creek – Conococheague Creek PRP	Unnamed Tributaries to Conococheague Creek	Appendix E – Nutrients, Siltation (5)

[4] PADEP, MS4 Requirements Table (Municipal) (rev. 5/9/2017)

Section D: Determine Existing Loading for Pollutants of Concern

D.1 Parsed Area Calculation, CBPRP Planning Area

In order to calculate the actual pollutant loads applicable to the Greene Township MS4, the PRP Instructions allow areas that do not drain to the MS4 and areas that are already covered by an NPDES permit to be removed from the planning area[5] through the parsing process.

The following areas were parsed from the CBPRP and PRP planning areas:

- PennDOT Roadways – The impervious area attributed to state roadways located within the Township was parsed from the existing pollutant base load, as PennDOT maintains their own MS4 permit to account for stormwater runoff generated from their system.
- Military Installation – The Letterkenny Army Depot is located along the western border of the municipality. As a federal facility, the Army Depot maintains their own MS4 permit to account for stormwater generation from their facility.
- Superfund Site – Although the Cumberland Valley Business Park and adjacent properties are currently privately owned, these properties were at one time part of the Letterkenny Army Depot and are located within the Letterkenny Army Depot, Property Disposal Office (PDO) Area superfund site. The Letterkenny Army Depot PDO Area is currently registered as an Active National Priorities List (NPL) superfund site by the EPA. As NPL sites are operated under a federal permits from the EPA, the Letterkenny PDO Area was removed from the Township planning areas.
- Private Communities – Two private communities located within the Township, the Menno Haven retirement community and Lutheran Social Services Village at Luther Ridge, were parsed from the CBPRP planning area. These facilities maintain their own private stormwater collection systems that do not connect to the Township MS4.
- General Permit for Stormwater Associated with Industrial Activity (PAG-03) – The Township contains three industrial properties already covered by existing NPDES PAG-03 permits. The UA associated with two of these properties was parsed from the Township planning areas. The area associated with the third PAG-03 property is located within the Letterkenny Army Depot PDO and had already been parsed from the Township planning area.
- General Permit for Concentrated Animal Feeding Operations (PAG-12) – One concentrated animal feeding operation covered by an existing NPDES PAG-12 permit was parsed from Township planning area. This facility is located partially outside of the UA, only the facility UA area was parsed.
- Direct Discharge Areas – Direct discharge areas are areas in which stormwater runoff does not enter the MS4. There are several areas of wooded or agricultural land, included within the Township UA that is undeveloped and does not drain to the Township MS4. These areas drain

[5] PADEP - PRP Instructions, Attachment A: Parsing Guidelines for MS4s in Pollutant Reduction Plans (rev. 3/2017)

directly to the Conococheague Creek or one of its tributaries and were therefore removed from Township planning areas.

A summary of parsed area removed from the Township planning areas is shown in Tables 2A - 2D. Parsed areas are shown on the Planning Area Map (Appendix B) and supporting calculations for the pollutant loads associated with each parsed area are included in Appendix D.

Table 2A. Parsed Area Summary - CBPRP Planning Area

Planning Area	**Urbanized Area** (acres)
CBPRP	7,998
Parsed Area (PennDOT Roadways)	- 126
Parsed Area (Military Facility)	- 371
Parsed Area (Superfund Site)	-819
Parsed Area (Private Properties)	- 193
Parsed Area (PAG-03)	- 6
Parsed Area (PAG-12)	- 78
Parsed Area (Direct Discharge)	- 844
Adjusted Planning Area	**5,561**

Table 2B. Parsed Area Summary – Rowe Run Planning Area

Planning Area	**Urbanized Area** (acres)
Rowe Run PRP	946
Parsed Area (PennDOT Roadways)	- 7
Parsed Area (Military Facility)	- 278
Parsed Area (Superfund Site)	- 335
Parsed Area (Direct Discharge)	- 95
Adjusted Planning Area	**231**

Table 2C. Parsed Area Summary - Rocky Spring Branch Planning Area

Planning Area	**Urbanized Area** (acres)
Rocky Spring Branch PRP	212
Parsed Area (Military Facility)	- 90
Parsed Area (Superfund Site)	- 105
Adjusted Planning Area	**17**

Table 2D. Parsed Area Summary - Mountain Creek/Conococheague Creek Planning Area

Planning Area	Urbanized Area (acres)
Mountain Creek/Conococheague Creek PRP	6,841
Parsed Area (PennDOT Roadways)	- 119
Parsed Area (Military Facility)	- 3
Parsed Area (Superfund Site)	- 380
Parsed Area (Private Communities)	- 193
Parsed Area (PAG-03)	- 6
Parsed Area (PAG-12)	- 78
Parsed Area (Direct Discharge)	- 749
Adjusted Planning Area	**5,313**

D.2 Existing Pollutant Load Calculation

The existing pollutant loadings were calculated using the Simplified Method[6]. In accordance with this method, the adjusted UA from Tables 2A - 2D was multiplied by the percent pervious and impervious land use values for Greene Township listed in the Statewide MS4 Land Cover Estimates[7] guidance document from PADEP. This calculation evaluates the acres of impervious and pervious land within the given planning area. The impervious and pervious acreages were then multiplied by the Developed Land Loading Rates for Franklin County[8] to determine the total existing pollutant load attributed to each planning area. The existing pollutant loading was determined for the CBPRP planning area as well as for each impaired watershed (PRP planning area).

As stated previously in Section C, the pollutants of concern are TSS, TN, and TP, however, it is presumed that within the overall Bay watershed, the TP and TN goals will be achieved when the permit-required sediment reduction is achieved[9]. Therefore, only the TSS pollutant loading was calculated (Table 3). Detailed pollutant load calculations are provided in Appendix D.

Table 3. Pollutant Loading for Greene Township

Planning Area	Urbanized Area (acres)	Regulated Pollutant Load **TSS** (lbs/yr)
Rowe Run	231	156,947
Rocky Spring Branch	17	12,376
Mountain Creek/Conococheague Creek	5,313	3,666,304
Greene Township CBPRP	5,561	3,835,627

[6] PADEP PRP Instructions, Attachment C: Chesapeake By PRP Exampled Using DEP Simplified Method (rev. 3/2017)
[7] PADEP - Statewide MS4 Land Cover Estimates
[8] PADEP - PRP Instructions, Attachment B: Developed Land Loading Rates for PA Counties (rev. 3/2017)
[9] PADEP - PRP Instructions, Document # 3800-PM-BCW0100k (rev. 3/2017)

As the Rowe Run, Rocky Spring Branch, and Mountain Creek/Conococheague Creek planning areas are located within the overall CBPRP planning area, the pollutant loads associated with these impaired watershed planning areas are a portion of, and not in addition to, the CBPRP planning area pollutant load.

D.3 Existing Pollutant Loading Adjustment for Previously Implemented BMPs

Greene Township contains two existing BMPs, pervious paving at Shiloh Village subdivision and stream restoration associated with the removal of the Siloam Dam (Conococheague Creek). Both existing BMPs are located within the Mountain Creek/Conococheague Creek planning area and are shown on the Planning Area Map (Appendix B). Additional information for these BMPs is included in Appendix D. No existing BMPs area located in the Rowe Run or Rocky Spring Branch planning areas that meet the requirements to claim existing pollutant reduction credit.

The Siloam Dam removal and stream restoration project was completed just outside the UA boundary, therefore in order to include the baseline reduction from this existing BMP project, the planning area was expanded by approximately three acres to include the dam removal project site. The pollutant loading reduction for existing BMPs was calculated using the Simplified Method in terms of pounds per year using PADEP's standard BMP Effectiveness Values[10].

Table 4: Adjusted Baseline Load Summary

Planning Area	**Adjustment**	**UA** (acres)	**Pollutant Load TSS** (lbs/yr)
Mountain Creek/ Conococheague Creek	Initial Planning Area	5,313	3,666,304
	Additional Planning Area	+ 3	+ 704
	Existing BMP Reduction	--	- 87,973
	Adjusted Baseline	**5,316**	**3,579,035**
CBPRP	Initial Planning Area	5,561	3,835,627
	Additional Planning Area	+ 3	+ 704
	Existing BMP Reduction	--	- 87,973
	Adjusted Baseline	**5,564**	**3,748,358**

[10] PADEP Document 3899-PM-BCW0100M, NPDES Stormwater Discharges from Small MS4s, BMP Effectiveness Values (5/2015)

Section E: BMPs to Achieve the Required Pollutant Load Reductions

E.1 Required Pollutant Load Reduction Calculation

Greene Township discharges stormwater to surface water located within the Chesapeake Bay watershed and is, therefore, regulated by PAG-13 General Permit, Appendix D (nutrients and sediment in stormwater discharges to waters in the Chesapeake Bay watershed). The pollutants of concern for Appendix D are TSS, TP, and TN with required loading reductions of 10-percent, 5-percent, and 3-percent, respectively. However, as stated previously, it is presumed that within the overall Bay watershed, the TP and TN goals will be achieved when a 10-percent reduction in sediment is achieved[11]. Therefore, only the required 10-percent TSS reduction is calculated herein as a requirement for planning area load reductions (Table 5). The pollutant load reduction requirements listed below take into account adjustments to baseline loading from the parsed areas and existing BMPs discussed in Section D.

Table 5: Required Pollutant Load Reduction Goals – CBPRP Planning Area

Planning Area	**UA** (acres)	**Required Load Reduction TSS** (lbs/yr)
CBPRP	5,564	374,836

In addition to meeting the PAG-13 General Permit, Appendix D requirements listed in Table 5, three watersheds within Greene Township, Rowe Run, Rocky Spring Branch, and Mountain Creek/Conococheague Creek, have impairments regulated by PAG-13 General Permit, Appendix E (nutrients and/or sediment in stormwater discharges to impaired waterways). Appendix E siltation impairments require a minimum 10-percent reduction in sediment load. The pollutant load reduction requirements in pounds per year for Appendix E watersheds are shown in Table 6. The pollutant load reduction requirements listed below take into account adjustments to baseline loading from the parsed areas and existing BMPs discussed in Section D. The planning areas associated with each of these impaired waters are shown on the Planning Area Map (Appendix B).

Table 6: Required Pollutant Load Reduction Goals – PRP Planning Areas

Planning Area	**UA** (acres)	**Required Load Reduction TSS** (lbs/yr)
Rowe Run	231	15,695
Rocky Spring Branch	17	1,238
Mountain Creek/ Conococheague Creek	5,316	357,904

[11] PADEP - PRP Instructions, Document # 3800-PM-BCW0100k (rev. 3/2017)

As stated previously, the load reduction requirements for each impaired watershed planning area are included as a portion of, and not in addition to, the CBPRP pollutant load reduction. Of the total CBPRP planning area required sediment load reduction (374,836 lbs/yr), 95-percent (357,904 lbs/yr) is to be achieved within the Mountain Creek/Conococheague Creek watershed, 4-percent (15,695 lbs) is to be achieved with the Rocky Spring Branch watershed and 1-percent (1,238 lbs) is to be achieved within the Rowe Run watershed planning area. However, there is currently no MS4 mapped within the Rowe Run and Rocky Spring Branch watersheds and only a relatively small amount of UA available for BMPs projects in either planning area. Therefore no BMP projects are proposed for these watersheds at this time.

It is anticipated that additional MS4 mapping will occur during the first years of the permit term. If this additional mapping determines MS4 infrastructure is present within the Rowe Run and Rocky Spring Branch planning areas, additional BMP projects sites may be developed within these planning areas. Any additional MS4 mapping and revised projects sites will be included in the Annual Status Reports.

E.2 Proposed BMPs

The following section outlines the BMP implementation strategy developed to achieve the required pollutant load reduction goals stated in Section E.1. The proposed BMPs were determined through discussions with the public works employees and municipal staff, in-field site assessments, and public outreach meetings.

The proposed strategy (Table 6) includes multiple BMP types including bioretention (rain gardens), stream restoration, riparian buffer plantings, and bioretention retrofits for existing detention facilities. The pollutant loading reduction for each proposed BMP was calculated in terms of pounds per year using PADEP's standard BMP Effectiveness Values[12]. Complete calculations for the anticipated pollutant load reductions for each of the BMPs listed below is provided in Appendix E.

[12] PADEP Document 3899-PM-BCW0100M, NPDES Stormwater Discharges from Small MS4s, BMP Effectiveness Values (5/2015)

Table 6: BMP Strategy Summary

Site	BMP ID	BMP Type	Location	Drainage Area (acres)	Length (ft)	Load Reduction TSS (lbs/yr)
Fayetteville Athletic Assoc. / Fayetteville Volunteer Fire Co.	BMP-1	Rain Garden	99 W Main St, Fayetteville	0.3	n/a	438
	BMP-2	Basin Retrofit		4.4	n/a	2,534
	BMP-3	Swale Retrofit		4.5	300	2,615
	BMP-4	Rain Garden		2.1	300	1,356
Winebrenner Theological Seminary/Scotland Community Assoc. Park/ Chambersburg Country Club	BMP-5	Stream Restoration	Chambersburg Country Club (Golf Course)	n/a	2,000	89,760
	BMP-6	Stream Restoration & Dam Removal	Scotland Community Asssoc. Park/ Winebrenner Theological Seminary	n/a	2,250	100,980
	BMP-7	Wetland Restoration		65	n/a	27,980
	BMP-8	Bioretention	Winebrenner Theological Seminary	5	n/a	2,870
	BMP-9	Bioretention		3	n/a	1,722
Greene Township Northwood Park	BMP-10	Stream Restoration	Conococheague Creek (2000 Philadelphia Ave)	n/a	1,500	67,320
	BMP-11	Riparian Buffer		16.5	825	9,470
Parklawns Memorial Gardens	BMP-12	Riparian Buffer	3218 Philadelphia Ave, Chambersburg	24	n/a	8,609
Camelot Meadows	BMP-13	Basin Retrofit	6210 Lincoln Way E Fayetteville	38	n/a	22,083
Chambersburg Mall	BMP-14	Swale Retrofit	3055 Black Gap Rd, Chambersburg,	10	n/a	5,811
Beacon Light Estates	BMP-15	Basin Retrofit	Cape Hatteras Dr at Woodstock Rd	15.5	n/a	9,008
Franklin Square Drive Community	BMP-16	Basin Retrofit	Benjamin Dr at Scotland Ave	40	n/a	23,245
Phillaman Run	BMP-17	Stream Restoration	White Church Rd	n/a	2,000	89,760
Total						**465,561**

E.3 BMP Project Descriptions

Unless otherwise noted, the proposed BMP projects described below have not been fully designed. The following projects descriptions are conceptual and intended for planning and implementation purposes only. The projects below will be implemented where feasible to achieve the sediment reduction goal. When designed, all proposed BMP projects will be in accordance with the Pennsylvania BMP Manual and all local ordinances and regulations, as well as any applicable DEP guidance documents. Proposed projects have been evaluated in terms of preliminary feasibility and estimated pollutant load reductions in order to meet the goals of this plan. It is anticipated that during plan implementation, proposed BMP projects may change or be replaced as additional information becomes available. Details for each proposed project will be documented in the Annual Status Reports.

Fayetteville Community Park – Fayetteville Community Park is located in the southwestern portion of the Township next to the Fayetteville Volunteer Fire Department. This park contains multiple recreation facilities, a pavilion, a large parking lot, and two existing BMPs (grass swale and detention basin). The BMPs proposed for this park are two rain gardens and bioretention retrofits for the existing swale and detention basin. One rain garden will be located adjacent to the pavilion which will allow the gutters of the pavilion to direct runoff to the rain garden. The second rain garden will be located to the west of the parking area. The parking area will be regrading to maximize the drainage area of this rain garden.

The rain gardens will be designed as excavated shallow surface depressions with amended soil media (a mixture of sand, soil, and organic material) and planted with specially selected native vegetation to treat and capture runoff. Similar features will be added to the upgrade, the existing swale and detention basin into a bioswale and bioretention basin. The existing BMPs will be excavated and pockets of amended soils will be added to promote filtration and infiltration of stormwater. Native plantings will be added to maximize runoff volume reduction and nutrient removal.

Winebrenner Theological/Chambersburg Country Club/Scotland Community Park Stream Restoration – The Winebrenner Theological Seminary, Chambersburg Country Club, and Scotland Community Park are three large adjacent properties located along the Conococheague Creek in the central part of the Township. The stretch of Conococheague Creek located on the Winebrenner Seminary property to the north of Scotland Community Park contains a low-head dam. When constructed, this dam backed up the creek, created a pond, and over time has trapped large amounts of fine sediment which have impacted the natural water and soil system. As this dam is obsolete, this project proposes to remove the dam, restore the natural flow of the creek, and reconnect the floodplain. Without the natural floodplains and wetlands, streams flows faster, adding to the erosion problem and removing great habitat for wildlife and plants. Therefore, after dam removal the project anticipates restoring an additional stretch of downstream Conococheague Creek streambank along the Winebrenner Seminary, Scotland Park and Chambersburg County Club properties. This stream restoration will include both structural repairs (as needed), in-stream stream calming measures (rock vanes, wing deflectors, etc.) to decrease water velocity, and riparian buffer plantings. The additional plantings will include the removal and replacement of dead and diseased vegetation, as well as the addition of new plantings. The exact number and locations for structural and in-stream structures, and proposed planting areas will be determined during engineering design of the project.

The project also proposed the installation of two bioretention basins to the east of the creek to intercept and treat overland flow from the lawn area of the Winebrenner Seminary before it reaches the creek. The bioretention basins will be designed as excavated shallow surface depressions with amended soil media (a mixture of sand, soil, and organic material) and planted with specially selected native vegetation.

Greene Township, Northwood Park – the Northwood Park was located in the south central portion of the Township between the Conococheague Creek and Philadelphia Avenue. The Township purchased the approximate nine-acre property after the homes in this area were damaged by floods. The mobile homes were subsequently removed and the property is maintained as a mowed lawn. The Township is considering future development of this park, but there are currently no planned developments. The BMPs proposed for this property are riparian buffer restoration and streambank stabilization. Implementation of streambank stabilization will repair and stabilize existing eroded areas and regrade the slope of any incised streambanks to reconnect the creek to the surrounding floodplain. This will prevent further degradation of disturbed streambanks and reduce the amount of sediment being washed downstream. In areas where streambanks are not in need of structural repair, stream calming measures (rock vanes, wing deflectors, etc.) will be implemented to direct stream flow away from eroding or newly stabilized streambanks. The structures will be constructed of natural materials such as rock, root wads, and logs. The exact number and locations for the proposed instream structures will be determined during engineering design of the project.

Once the streambanks have been repaired a 35-foot-wide vegetated buffer will planted along the streambank for vegetative stabilization. Vegetative stabilization relies on the root structures of established plantings to stabilize the streambank and provide scour protection. Additionally, the buffer will promote plant uptake of pollutant-laden runoff from neighboring residential areas in order to reduce the amount of nutrients and sediment reaching the creek. The combination of stream stabilization and riparian buffer plantings offers a relatively inexpensive means of stabilization and provides a naturalized appearance to the streambank.

Parklawns Memorial Gardens – The Parklawns Memorial Gardens cemetery is located between the Conococheague Creek and Philadelphia Ave. A vegetative buffer (more than 100-feet wide) is present along the majority of the Creek. However there is one section of approximately 350 feet where there is currently minimal vegetative buffer between the mowed lawn area of the cemetery and the Conococheague Creek. Surface runoff from the cemetery lawn area and residential area along Philadelphia Ave flow south through the proposed buffer site. The riparian buffer restoration will include the removal and replacement of dead and diseased vegetation as well as the addition of new plantings. Expanding the vegetative buffer will provide stabilization to the stream bank and provide filtration to reduce the amount of nutrient and sediments reaching the creek.

Basin Retrofits – Several locations have been identified throughout the Township in which significant drainage areas drain to existing detention facilities. As currently designed, the detention basins receive, temporarily hold, and discharge stormwater at a controlled rate. While they can provide rate and volume control, detention basins offer only limited water quality benefit. The only water quality benefit if realized through minimal infiltration. Retrofitting existing basins with bioretention features transform these simple catch, store, and release ponds into BMPs which provide infiltration and improved sediment and nutrient removal capabilities. These benefits are achieved by extending the storage time with structure

modifications, improving soil conditions to allow for greater infiltration rates, and naturalizing the basins with native and/or wetland plant species.

The following basins are proposed for retrofits:

Camelot Meadows - This existing basin is adjacent to the Camelot Meadows residential development on Lincoln Way East in Fayetteville. A small tributary stream collects and conveys stormwater runoff to the basin from approximately 38-acres of residential and agricultural area located to the south of the basin.

Chambersburg Mall - Stormwater from the Chambersburg Mall (10 acres) is directed to a large rock-lined swale located to the northwest of the mall along the main mall entrance driveway.

Beacon Light Estates - The existing basin at the intersection of Woodstock Road and Cape Hatteras Drive serves as the main stormwater management facility for the Beacon Light Estates subdivision (approximately 15-acre drainage area).

Franklin Square Drive - The existing basin located along Scotland Avenue to the west of Benjamin Avenue serves as the main stormwater management facility for the Franklin Square Drive residential development (40 acres).

While the extent and nature of the retrofits will rely on the results of future engineering investigations, each basin retrofit will reduce the quantity, and increase the quality, of the stormwater runoff reaching the Conococheague Creek. For modeling purposes, the load reduction attributed to each basin retrofit was calculated by applying the standard bioretention removal efficiency to only the portion of the stormwater runoff not currently being treated by the basin. Therefore the pollutant load reduction attributed to a basin retrofit is slightly lower than the pollutant load reduction of a similarly sized new bioretention basin.

Phillaman Run Stream Restoration – This proposed project will implement streambank stabilization measures along approximately 2,000 feet of Phillaman Run. Stream restoration will include the repair and stabilization of existing eroded areas and regrading the slope of incised streambanks to reconnect the stream to the surrounding floodplain. This will prevent further degradation of disturbed streambanks and reduce the amount of sediment being washed downstream. In areas where streambanks are not in need of structural repair, stream calming measures (rock vanes, wing deflectors, etc.) may be implemented to direct stream flow away from eroding or newly stabilized streambanks. These structures will be constructed of natural materials such as rock, root wads, and logs. The exact number and locations for the proposed in-stream structures will be determined during the engineering design phase of the project. Where needed, stream stabilization may also include improvements to the vegetated buffer surrounding the stream. Riparian buffer enhancement will include removal of invasive species, brush, and debris as well as the installation of additional native plantings.

Section F: Identify Funding Mechanisms

Funding for the design and construction of the BMPs proposed herein will be funded through a variety of sources including the Township's General Fund, available grants, and public donation of materials and manpower.

Section G: BMP Operations and Maintenance (O&M)

Stream Restoration/Riparian Restoration

Operation and maintenance requirements for the streambank stabilization and buffer restoration projects include:

- Ensure disturbed areas are kept free of foot and/or vehicular traffic until full stabilization has occurred.
- Regular watering of plantings during the first growing season. Planting in the fall may reduce the need for additional watering.
- Conduct monthly site visits to ensure plantings are healthy and sufficiently watered, weeds are properly managed, sufficient mulch is in place until site is stabilized and planting have become established.
- Conduct monthly site visits to ensure all disturbed earth remains stabilized and erosion or cutting of the streambank has not taken place. Any destabilized earth or active streambank erosion shall be repaired immediately upon discovery.
- Conduct annual inspections once streambank is stabilized and plants have become established.
- Immediately upon notice; repair any rills, gullies, or streambank cutting that may occur.
- Remove weeds and invasive plant species during each growing season. Naturally growing native vegetation should be left intact to promoted stabilization of the streambank and surrounding area.
- Replace mulch as needed.
- Remove accumulated trash and debris weekly.
- Remove and replace dead and diseased plantings annually.
- Keep machinery and vehicles away from stabilized areas.

The contractor shall be responsible for the operation and maintenance of the streambank restoration and buffer project(s) until all features of the project have been successfully constructed to the specifications and design standards set forth by the Township Engineer. The Contractor shall remain responsible for operation and maintenance of the streambank restoration and buffer project(s) until 70% permanent stabilization has been achieved.

Once construction of the project(s) is complete and stabilization has occurred, the Township shall be responsible for long term implementation of all Operation and Maintenance procedures to ensure the streambank stabilization and buffer improvements remain operationally functional and physically consistent with the original design.

Wetland Restoration

Operation and maintenance requirements for the wetland restoration projects include:

- During the first growing season, vegetation should be inspected every 2 to 3 weeks.
- During the first 2 years, inspected at least 4 times per year and after major storm events (greater than 2 inches in 24 hours). Inspections should access the vegetation, erosion, flow channelization, bank stability, inlet/outlet conditions, and sediment/debris accumulations.
- Wetland and buffer vegetation may require support including: watering, weeding, mulching replanting during the first years of establishment.
- Undesirable species should be removed and desirable replacements planted if necessary.
- Once established, properly designed and installed constructed wetlands should require little maintenance. They should be inspected at least semiannually and after major storms as well as rapid ice breakups.
- Vegetation should maintain at least an 85 percent cover of the emergent vegetation. Annual harvesting of vegetation may increase the nutrient removal of the BMP; it should generally be done in the summer so that there is adequate regrowth before winter. Care should be taken to minimize disturbance, especially of bottom sediment, during harvesting.
- If the wetland is designed with a forebay, sediment should be removed from the forebay before it occupies 50 percent of the forebay (typically every 3 to 7 years).

The contractor shall be responsible for the operation and maintenance of the bioretention basin until all features of the project have been successfully constructed to the specifications and design standards set forth by the Township Engineer. The Contractor should provide a one-year 80% care and replacement warranty for all planting beginning after installation and inspection of all plants.

Once construction of the project(s) is complete, the Township shall be responsible for long term implementation of all Operation and Maintenance procedures to ensure the basin remains operationally functional and physically consistent with the original design.

Bioretention Areas/Bioretention Retrofits

Operation and maintenance requirements for the bioretention projects includes:

- Ensure disturbed areas are kept free of foot and/or vehicular traffic until full stabilization has occurred. Properly designed and installed Bioretention areas require some 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 be 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.

The contractor shall be responsible for the operation and maintenance of the bioretention basin until all features of the project have been successfully constructed to the specifications and design standards set forth by the Township Engineer. The Contractor should provide a one-year 80% care and replacement warranty for all planting beginning after installation and inspection of all plants.

Once construction of the project(s) is complete, the Township shall be responsible for long term implementation of all Operation and Maintenance procedures to ensure the basin remains operationally functional and physically consistent with the original design.

APPENDIX A

Public Participation Documentation

Page to be replaced with the following (as applicable):

Copy of the public notice from newspaper

Copies of all public comments and the responses issued to each comment

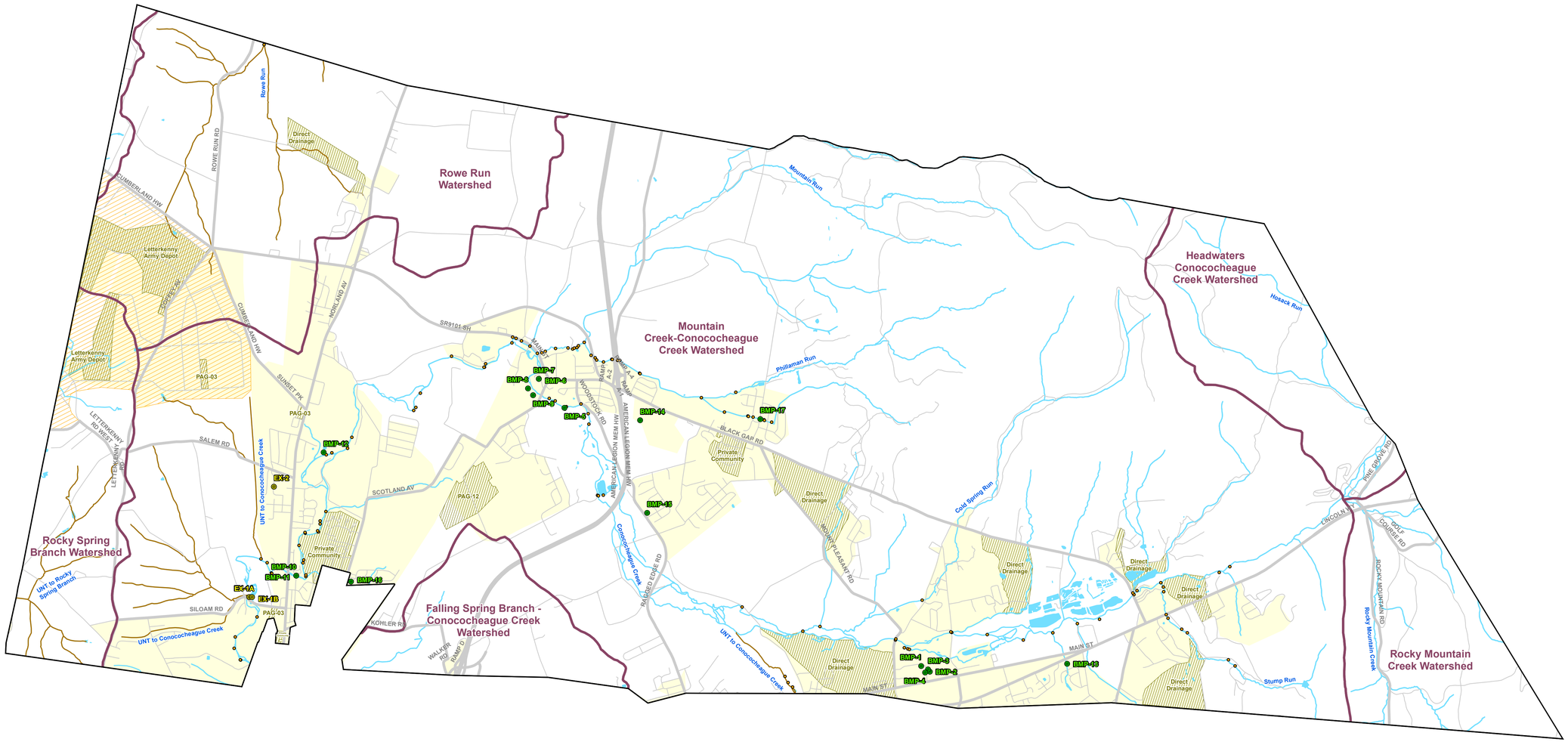
Meeting minutes for the meeting at which the CBPRP/PRPs were presented

A record of the incorporated changes as a result of public comment

APPENDIX B

Mapping

CBPRP Planning Area
Greene Township
Franklin County, Pennsylvania



- Existing BMP
- Proposed BMP
- Storm Outfall
- State Road
- Local Road
- Sediment Impaired Stream
- Non-Impaired Stream
- Parsed Areas
- Superfund Site
- Municipal Boundary
- USGS HUC12 Watershed
- Urbanized Area (2010)

NOTE: Back Creek is located downstream from Rocky Spring Branch, outside of the Greene Township municipal boundary.

2,500 0 2,500 Feet

Mapping derived from data provided by Franklin County, USGS, PennDOT, Greene Township, and US Census.

7/28/2017	PM: EGL	GIS: BLS	QA: HSH	R005840.0426

HRG Herbert Rowland & Grubic Inc
Engineering & Related Services
An Employee-Owned Company

369 East Park Drive
Harrisburg, PA 17111
717.564.1121 [phone]
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www.hrg-inc.com

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Land Use Map

Greene Township
Franklin County, Pennsylvania

- Road
- Municipal Boundary
- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Developed, Medium Intensity
- Developed, High Intensity
- Barren Land (Rock/Sand/Clay)
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Shrub/Scrub
- Grassland/Herbaceous
- Pasture/Hay
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands
- Urban Areas (2010)

5,500 0 5,500 Feet

Mapping derived from data provided by PennDOT, USGS, US Census, and MRLC.

5/5/2017	PM: EGL	GIS: BLS/ HMG	QA: HSH	R005840.0426

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APPENDIX C

PADEP Municipal MS4 Requirements Table

MS4 Name	NPDES ID	Individual Permit Required?	Reason	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)	Other Cause(s) of Impairment
Franklin County						
ANTRIM TWP	PAG133705	Yes	SP	Chesapeake Bay Nutrients/Sediment	Appendix D-Nutrients, Siltation (4a)	
				Unnamed Tributaries to Muddy Run	Appendix E-Organic Enrichment/Low D.O., Siltation (5)	Other Habitat Alterations (4c)
				Unnamed Tributaries to Conococheague Creek		Water/Flow Variability (4c)
CHAMBERSBURG BORO	PAG133704	No		Chesapeake Bay Nutrients/Sediment	Appendix D-Nutrients, Siltation (4a)	
				Unnamed Tributaries to Conococheague Creek		Oil and Grease (5), Water/Flow Variability (4c)
GREENCASTLE BORO		No		Unnamed Tributaries to Conococheague Creek		Water/Flow Variability (4c)
				Chesapeake Bay Nutrients/Sediment	Appendix D-Nutrients, Siltation (4a)	
GREENE TWP		Yes	SP	Rowe Run	Appendix E-Organic Enrichment/Low D.O., Siltation (4a)	
				Rocky Spring Branch	Appendix E-Siltation (5)	Turbidity (5)
				Chesapeake Bay Nutrients/Sediment	Appendix D-Nutrients, Siltation (4a)	
				Unnamed Tributaries to Conococheague Creek	Appendix E-Nutrients, Siltation (5)	
				Back Creek	Appendix E-Siltation (5)	Cause Unknown, Turbidity (5)
GUILFORD TWP		Yes	SP	Unnamed Tributaries to Conococheague Creek	Appendix E-Nutrients, Organic Enrichment/Low D.O., Siltation (5)	Other Habitat Alterations (4c)
				Chesapeake Bay Nutrients/Sediment	Appendix D-Nutrients, Siltation (4a)	
HAMILTON TWP		No		Rocky Spring Branch	Appendix E-Siltation (5)	Turbidity (5)
				Chesapeake Bay Nutrients/Sediment	Appendix D-Nutrients, Siltation (4a)	
				Unnamed Tributaries to Conococheague Creek		Oil and Grease (5), Water/Flow Variability (4c)
				Back Creek	Appendix E-Siltation (5)	Cause Unknown, Turbidity (5)
LETTERKENNY TWP		No		Back Creek	Appendix E-Siltation (5)	Cause Unknown, Turbidity (5)
				Chesapeake Bay Nutrients/Sediment	Appendix D-Nutrients, Siltation (4a)	
				Rocky Spring Branch	Appendix E-Siltation (5)	Turbidity (5)
ST THOMAS TWP		No		Chesapeake Bay Nutrients/Sediment	Appendix D-Nutrients, Siltation (4a)	
				Back Creek	Appendix E-Siltation (5)	

MS4 Name	Permit Number	HUC 12 Name	Impaired Downstream Waters or Applicable TMDL Name	Requirement(s)
Franklin County				
ANTRIM TWP	PAG133705	Muddy Run, Rockdale Run-Conococheague Creek	Chesapeake Bay Nutrients\Sediment, Unnamed Tributaries to Muddy Run	Appendix D-Siltation/Nutrients, Appendix E-Organic Enrichment/Low D.O., Siltation
		West Branch Marsh Run-Marsh Run	Chesapeake Bay Nutrients\Sediment	Appendix D-Siltation/Nutrients
CHAMBERSBURG BORO	PAG133704	Falling Spring Branch-Conococheague Creek, Mountain Creek-Conococheague Creek	Chesapeake Bay Nutrients\Sediment	Appendix D-Siltation/Nutrients
GREENCASTLE BORO		Muddy Run, Rockdale Run-Conococheague Creek	Chesapeake Bay Nutrients\Sediment	Appendix D-Siltation/Nutrients
GREENE TWP		Lehman Run-Muddy Run, Rowe Run, Trout Run-Conodoguinet Creek	Chesapeake Bay Nutrients\Sediment, Rowe Run	Appendix D-Siltation/Nutrients, Appendix E-Nutrients, Organic Enrichment/Low D.O., Siltation
		Dennis Creek-Back Creek, Rocky Spring Branch	Back Creek, Chesapeake Bay Nutrients\Sediment, Rocky Spring Branch	Appendix D-Siltation/Nutrients, Appendix E-Nutrients, Organic Enrichment/Low D.O., Siltation
		Falling Spring Branch-Conococheague Creek, Mountain Creek-Conococheague Creek	Chesapeake Bay Nutrients\Sediment, Unnamed Tributaries to Conococheague Creek	Appendix D-Siltation/Nutrients, Appendix E-Nutrients, Organic Enrichment/Low D.O., Siltation
GUILFORD TWP		Falling Spring Branch-Conococheague Creek, Mountain Creek-Conococheague Creek, Rockdale Run-Conococheague Creek	Chesapeake Bay Nutrients\Sediment, Unnamed Tributaries to Conococheague Creek	Appendix D-Siltation/Nutrients, Appendix E-Nutrients, Organic Enrichment/Low D.O., Siltation
HAMILTON TWP		Falling Spring Branch-Conococheague Creek, Mountain Creek-Conococheague Creek	Chesapeake Bay Nutrients\Sediment	Appendix D-Siltation/Nutrients
		Campbell Run-Back Creek, Dennis Creek-Back Creek, Rocky Spring Branch	Back Creek, Chesapeake Bay Nutrients\Sediment, Rocky Spring Branch	Appendix D-Siltation/Nutrients, Appendix E-Siltation
LETTERKENNY TWP		Dennis Creek-Back Creek, Rocky Spring Branch	Back Creek, Chesapeake Bay Nutrients\Sediment, Rocky Spring Branch	Appendix D-Siltation/Nutrients, Appendix E-Siltation
ST THOMAS TWP		Falling Spring Branch-Conococheague Creek	Chesapeake Bay Nutrients\Sediment	Appendix D-Siltation/Nutrients
		Campbell Run-Back Creek, Dennis Creek-Back Creek	Back Creek, Chesapeake Bay Nutrients\Sediment	Appendix D-Siltation/Nutrients, Appendix E-Siltation

APPENDIX D

Existing Pollutant Loading Calculations

Appendix D – Table 1A: Existing Pollutant Load Calculation Summary, CBPRP Planning Area

Planning Area	Urbanized Area*					Loading Rate** TSS (lbs/ac/yr)		Total Load TSS (lbs/yr)
	UA (acres)	% Imperv.	% Pervious	Imperv. (acres)	Pervious (acres)	Imperv.	Pervious	
CBPRP	7,998.1	25%	75%	1,999.5	5,998.6	1944.85	308.31	5,738,197
Parsed Area (PennDOT Roadways)	125.6	100%	0%	125.6	0.0	1944.85	308.31	244,282
Parsed Area (Military Facility)	370.6	25%	75%	92.7	278.0	1944.85	308.31	265,885
Parsed Area (Superfund Site)	819.4	25%	75%	204.9	614.6	1944.85	308.31	587,874
Parsed Area (Private Properties)	192.9	25%	75%	48.2	144.7	1944.85	308.31	138,374
Parsed Area (PAG-03)	6.2	25%	75%	1.6	4.7	1944.85	308.31	4,455
Parsed Area (PAG-12)	78.0	25%	75%	19.5	58.5	1944.85	308.31	55,961
Parsed Area (Direct Discharge)	844.3	25%	75%	211.1	633.2	1944.85	308.31	605,739
Existing BMPs	n/a	n/a	n/a	n/a	n/a	n/a	n/a	87,973
Non UA Existing BMP Area	3	0%	100%	0.0	3.0	234.6	234.6	704
Adjusted Baseline	**5,564**							**3,748,358**

*PADEP - Statewide MS4 Land Cover Estimates
**PADEP PRP Instructions - Attachment B, Developed Land Loading Rates for PA Counties

Appendix D – Table 1B: Existing Pollutant Load Calculation Summary, Rowe Run Planning Area

Planning Area	Urbanized Area*					Loading Rate** TSS (lbs/ac/yr)		Total Load TSS (lbs/yr)
	UA (acres)	% Imperv.	% Pervious	Imperv. (acres)	Pervious (acres)	Imperv.	Pervious	
Rowe Run	945.8	25%	75%	236.5	709.4	1944.85	308.31	678,559
Parsed Area (PennDOT Roadways)	6.9	100%	0%	6.9	0.0	1944.85	308.31	13,447
Parsed Area (Military Facility)	277.9	25%	75%	69.5	208.4	1944.85	308.31	199,378
Parsed Area (Superfund Site)	335.5	25%	75%	83.9	251.6	1944.85	308.31	240,703
Parsed Area (Direct Discharge)	94.9	25%	75%	23.7	71.2	1944.85	308.31	68,086
Adjusted Baseline	**231**							**156,947**

*PADEP - Statewide MS4 Land Cover Estimates
**PADEP PRP Instructions - Attachment B, Developed Land Loading Rates for PA Counties

Appendix D – Table 1C: Existing Pollutant Load Calculation Summary, Rocky Spring Branch Planning Area

Planning Area	Urbanized Area*					Loading Rate** TSS (lbs/ac/yr)		Total Load TSS (lbs/yr)
	UA (acres)	% Imperv.	% Pervious	Imperv. (acres)	Pervious (acres)	Imperv.	Pervious	
Rocky Spring Branch	211.8	25%	75%	52.9	158.8	1944.85	308.31	151,919
Parsed Area Adjustment (Military Facility)	90.1	25%	75%	22.5	67.6	1944.85	308.31	64,642
Parsed Area Adjustment (Superfund Site)	104.4	25%	75%	26.1	78.3	1944.85	308.31	74,901
Adjusted Baseline Total	**17**							**12,376**

*PADEP - Statewide MS4 Land Cover Estimates

**PADEP PRP Instructions - Attachment B, Developed Land Loading Rates for PA Counties

Appendix D – Table 1D: Existing Pollutant Load Calculation Summary, Mountain Creek-Conococheague Creek Planning Area

Planning Area	Urbanized Area*					Loading Rate** TSS (lbs/ac/yr)		Total Load TSS (lbs/yr)
	UA (acres)	% Imperv.	% Pervious	Imperv. (acres)	Pervious (acres)	Imperv.	Pervious	
Mountain Creek-Conococheague Creek	6,840.6	25%	75%	1,710.1	5,130.4	1944.85	308.31	4,907,718
Parsed Area (PennDOT Roadways)	118.7	100%	0%	118.7	0.0	1944.85	308.31	230,835
Parsed Area (Military Facility)	2.6	25%	75%	0.7	2.0	1944.85	308.31	1,865
Parsed Area (Superfund Site)	379.5	25%	75%	94.9	284.6	1944.85	308.31	272,270
Parsed Area (Private Properties)	192.9	25%	75%	48.2	144.7	1944.85	308.31	138,374
Parsed Area (PAG-03)	6.2	25%	75%	1.6	4.7	1944.85	308.31	4,455
Parsed Area (PAG-12)	78.0	25%	75%	19.5	58.5	1944.85	308.31	55,961
Parsed Area (Direct Discharge)	749.4	25%	75%	187.4	562.1	1944.85	308.31	537,653
Existing BMPs	n/a	n/a	n/a	n/a	n/a	n/a	n/a	87,973
Non UA Existing BMP Area	3	0%	100%	0.0	3.0	234.6	234.6	704
Adjusted Baseline Total	**5,316**							**3,579,035**

*PADEP - Statewide MS4 Land Cover Estimates

**PADEP PRP Instructions - Attachment B, Developed Land Loading Rates for PA Counties

Appendix D – Table 2A: Parsed Area Load Reductions - State Roadways (PennDOT), CBPRP Planning Area

Parsed Areas (Roadway Name)	Urbanized Area							Loading Rate* TSS (lbs/ac/yr)		Total Load TSS (lbs/yr)
	UA (acres)	Length (ft)	Width (ft)	% Imperv.	% Perv.	Imperv. (acres)	Perv. (acres)	Imperv.	Perv.	
US-30 Lincoln Hwy E	13.95	12,150	50	100%	0%	13.9	0.0	1944.85	308.31	27,123
997 - Black Gap Rd	34.58	33,470	45	100%	0%	34.6	0.0	1944.85	308.31	67,246
E Main St	7.76	11,268	30	100%	0%	7.8	0.0	1944.85	308.31	15,093
Mt Alto Rd	0.85	1,240	30	100%	0%	0.9	0.0	1944.85	308.31	1,661
Mt Pleasant Rd	7.57	10,985	30	100%	0%	7.6	0.0	1944.85	308.31	14,714
Woodstock Rd	4.11	5,963	30	100%	0%	4.1	0.0	1944.85	308.31	7,987
Ragged Edge Rd	0.55	792	30	100%	0%	0.5	0.0	1944.85	308.31	1,061
Main St	5.58	8,095	30	100%	0%	5.6	0.0	1944.85	308.31	10,843
Scotland Rd	10.59	15,370	30	100%	0%	10.6	0.0	1944.85	308.31	20,587
Molly Pitcher Hwy	15.71	22,804	30	100%	0%	15.7	0.0	1944.85	308.31	30,544
Kohler Rd	0.48	700	30	100%	0%	0.5	0.0	1944.85	308.31	938
Siloam Rd	5.70	8,273	30	100%	0%	5.7	0.0	1944.85	308.31	11,081
Letterkenny Rd	1.31	1,898	30	100%	0%	1.3	0.0	1944.85	308.31	2,542
Salem Rd	1.28	1,856	30	100%	0%	1.3	0.0	1944.85	308.31	2,486
Sunset Pike	5.98	8,678	30	100%	0%	6.0	0.0	1944.85	308.31	11,624
I-81	9.64	4,200	100	100%	0%	9.6	0.0	1944.85	308.31	18,752
Total	**125.6**									**244,282**

*PADEP PRP Instructions - Attachment B, Developed Land Loading Rates for PA Counties

Appendix D – Table 2B: Parsed Area Load Reductions - State Roadways (PennDOT), Rowe Run Planning Area

Parsed Areas	Urbanized Area							Loading Rate* TSS (lbs/ac/yr)		Total Load TSS (lbs/yr)
	UA (acres)	Length (ft)	Width (ft)	% Imperv.	% Pervious	Imperv. (acres)	Pervious (acres)	Imperv.	Pervious	
Sunset Pike	2.43	3,528	30	100%	0%	2.4	0.0	1944.85	308.31	4,726
997 - Black Gap Rd	2.72	2,630	45	100%	0%	2.7	0.0	1944.85	308.31	5,284
Molly Pitcher Hwy	1.77	2,566	30	100%	0%	1.8	0.0	1944.85	308.31	3,437
Total	**6.9**									**13,447**

*PADEP PRP Instructions - Attachment B, Developed Land Loading Rates for PA Counties

Appendix D – Table 2B: Parsed Area Load Reductions - State Roadways (PennDOT), Mountain Creek-Conococheague Creek Planning Areas

Parsed Areas	Urbanized Area							Loading Rate* TSS (lbs/ac/yr)		Total Load TSS (lbs/yr)
	UA (acres)	Length (ft)	Width (ft)	% Imperv.	% Perv.	Imperv. (acres)	Perv. (acres)	Imperv.	Perv.	
US-30 Lincoln Hwy E	13.95	12,150	50	100%	0%	13.9	0.0	1944.85	308.31	27,123
997 - Black Gap Rd	31.86	30,840	45	100%	0%	31.9	0.0	1944.85	308.31	61,962
E Main St	7.76	11,268	30	100%	0%	7.8	0.0	1944.85	308.31	15,093
Mt Alto Rd	0.85	1,240	30	100%	0%	0.9	0.0	1944.85	308.31	1,661
Mt Pleasant Rd	7.57	10,985	30	100%	0%	7.6	0.0	1944.85	308.31	14,714
Woodstock Rd	4.11	5,963	30	100%	0%	4.1	0.0	1944.85	308.31	7,987
Ragged Edge Rd	0.55	792	30	100%	0%	0.5	0.0	1944.85	308.31	1,061
Main St	5.58	8,095	30	100%	0%	5.6	0.0	1944.85	308.31	10,843
Scotland Rd	10.59	15,370	30	100%	0%	10.6	0.0	1944.85	308.31	20,587
Molly Pitcher Hwy	13.94	20,238	30	100%	0%	13.9	0.0	1944.85	308.31	27,107
Kohler Rd	0.48	700	30	100%	0%	0.5	0.0	1944.85	308.31	938
Siloam Rd	5.70	8,273	30	100%	0%	5.7	0.0	1944.85	308.31	11,081
Letterkenny Rd	1.31	1,898	30	100%	0%	1.3	0.0	1944.85	308.31	2,542
Salem Rd	1.28	1,856	30	100%	0%	1.3	0.0	1944.85	308.31	2,486
Sunset Pike	3.55	5,150	30	100%	0%	3.5	0.0	1944.85	308.31	6,898
I-81	9.64	4,200	100	100%	0%	9.6	0.0	1944.85	308.31	18,752
Total	**118.7**									**230,835**

*PADEP PRP Instructions - Attachment B, Developed Land Loading Rates for PA Counties

Appendix D - Table 3: Parsed Area Load Reductions - Private Properties, CBPRP & Mountain Creek-Conococheague Creek Planning Areas

Parsed Areas	Urbanized Area*							Loading Rate** TSS (lbs/ac/yr)		Total Load TSS (lbs/yr)
	UA (acres)	Length (ft)	Width (ft)	% Imperv.	% Perv.	Imperv. (acres)	Perv. (acres)	Imperv.	Perv.	
Menno Haven Retirement Community	143.7	n/a	n/a	25%	75%	35.9	107.8	1944.85	308.31	103,076
Lutheran Social Services Village at Luther Ridge	49.2	n/a	n/a	25%	75%	12.3	36.9	1944.85	308.31	35,298
Total	**192.9**									**138,374**

*PADEP - Statewide MS4 Land Cover Estimates

**PADEP PRP Instructions - Attachment B, Developed Land Loading Rates for PA Counties

Appendix D - Table 4: Parsed Area Load Reductions - PAG-03 Discharge of Stormwater Associated with Industrial Activities, CBPRP & Mountain Creek-Conococheague Creek Planning Areas

Site*	Permit Date	Site Address	Urbanized Area**					Loading Rate*** TSS (lbs/ac/yr)		Total Load TSS (lbs/yr)
			Acres	% Imperv.	% Perv.	Imperv. (acres)	Perv. (acres)	Imperv.	Perv.	
Hammaker East, Chambersburg	4/17/17	118 Siloam Rd Chambersburg, PA 17201-8901	2.55	25%	75%	0.6375	1.9125	1944.85	308.31	1,829
Volvo Construction Equipment LLC	1/16/15	1280 Superior Ave Chambersburg, PA 17201	7.38	25%	75%	1.845	5.535	1944.85	308.31	5,295
Rolling Frito Lay Sales Lp Chambersburg	4/18/14	99 Brim Blvd Chambersburg, PA 17201	3.66	25%	75%	0.915	2.745	1944.85	308.31	2,626
Total			**13.6**							**9,750**

Note – Volvo Construction Equipment LLC is included within the area parsed for the Letterkenny Army Depot PDO Site and was previously removed from the planning area.

*As listed on EFACTS (6/2017)
**PADEP - Statewide MS4 Land Cover Estimates
***PADEP PRP Instructions - Attachment B, Developed Land Loading Rates for PA Counties

Appendix D - Table 5: Parsed Area Load Reductions - PAG-12 PAG-12 Concentrated Animal Feed Operations, CBPRP & Mountain Creek-Conococheague Creek Planning Areas

Site*	Permit Date	Site Address	UA Area*					Loading Rate ** (TSS lbs/ac/yr)		Total Load TSS (lbs/yr)
			Acres	% Imperv.	% Perv.	Imperv. (acres)	Perv. (acres)	Imperv.	Perv.	
Burke Leah Farms	8/7/14	3099 Grand Point Rd Chambersburg, PA 17267	78	25%	75%	19.5	58.5	1944.85	308.31	55,961

*As listed on EFACTS (6/2017), only the portion of this site within the UA was removed from the planning area.
**PADEP - Statewide MS4 Land Cover Estimates
***PADEP PRP Instructions - Attachment B, Developed Land Loading Rates for PA Counties

Appendix D – Table 6A: Parsed Area Load Reductions – Direct Discharge Areas, CBPRP Planning Area

Parsed Areas	Urbanized Area							Loading Rate TSS (lbs/ac/yr)		Total Load TSS (lbs/yr)
	UA (acres)	Length (ft)	Width (ft)	% Imperv.	% Perv.	Imperv. (acres)	Perv. (acres)	Imperv.	Perv.	
DD-1 (Mt Cydonia Rd)	114.8	n/a	n/a	25%	75%	28.7	86.1	1944.85	308.31	82,363
DD-2 (Mt Union Rd)	61.5	n/a	n/a	25%	75%	15.4	46.1	1944.85	308.31	44,123
DD-3 (Houser Rd)	40.2	n/a	n/a	25%	75%	10.1	30.2	1944.85	308.31	28,841
DD-4 (Black Gap Rd)	108.9	n/a	n/a	25%	75%	27.2	81.7	1944.85	308.31	78,130
DD-5 (Mt Pleasant Rd)	247.2	n/a	n/a	25%	75%	61.8	185.4	1944.85	308.31	177,352
DD-6 (Shearer Rd)	176.8	n/a	n/a	25%	75%	44.2	132.6	1944.85	308.31	126.844
DD-7 (Wagoner Rd)	94.9	n/a	n/a	25%	75%	23.7	71.2	1944.85	308.31	68,086
Total	**844.3**									**605,739**

*PADEP - Statewide MS4 Land Cover Estimates
**PADEP PRP Instructions - Attachment B, Developed Land Loading Rates for PA Counties

Appendix D – Table 6B: Parsed Area Load Reductions – Direct Discharge Areas, Rowe Run Planning Area

Parsed Areas	Urbanized Area							Loading Rate TSS (lbs/ac/yr)		Total Load TSS (lbs/yr)
	UA (acres)	Length (ft)	Width (ft)	% Imperv.	% Perv.	Imperv. (acres)	Perv. (acres)	Imperv.	Perv.	
DD-7 Wagoner Rd	94.9	n/a	n/a	25%	75%	23.7	71.2	1944.85	308.31	68,086
Total	**94.9**									**68,086**

*PADEP - Statewide MS4 Land Cover Estimates
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Appendix D – Table 6C: Parsed Area Load Reductions – Direct Discharge Areas, Mountain Creek-Conococheague Creek Planning Area

Parsed Areas	Urbanized Area*							Loading Rate** TSS (lbs/ac/yr)		Total Load TSS (lbs/yr)
	UA (acres)	Length (ft)	Width (ft)	% Imperv.	% Perv.	Imperv. (acres)	Perv. (acres)	Imperv.	Perv.	
DD-1 (Mt Cydonia Rd)	114.8	n/a	n/a	25%	75%	28.7	86.1	1944.85	308.31	82,363
DD-2 (Mt Union)	61.5	n/a	n/a	25%	75%	15.4	46.1	1944.85	308.31	44,123
DD-3 (Houser Rd)	40.2	n/a	n/a	25%	75%	10.1	30.2	1944.85	308.31	28,841
DD-4 (Black Gap Rd)	108.9	n/a	n/a	25%	75%	27.2	81.7	1944.85	308.31	78,130
DD-5 (Mt Pleasant Rd)	247.2	n/a	n/a	25%	75%	61.8	185.4	1944.85	308.31	177,352
DD-6 (Shearer Rd)	176.8	n/a	n/a	25%	75%	44.2	132.6	1944.85	308.31	126,844
Total	**749.4**									**537,653**

*PADEP - Statewide MS4 Land Cover Estimates
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Appendix D – Table 7: Baseload Reduction Documentation - Previously Installed BMPs

Map ID	BMP Type	Location	Lat	Long	Project Date	Plan Reference	Approx. Drainage Area (acres)	Project Area (acres)	Length (ft)	Drainage Area Characteristics				Loading Rate TSS** (lbs/ac/yr)		Total Load TSS (lbs/yr)	BMP Effectiveness ***	Pollutant Load Reduction TSS (lb/yr)
										% Imperv.	Imperv. (acres)	% Perv.	Perv. (acres)	Imperv.	Perv.			
Ex-1A	Stream Restoration	Siloam Dam (Conococheague Creek)	39.961425	-77.647829	2005	American Rivers Final Report, Project # 410021075	n/a	n/a	1,874.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	45.88	86,002
Ex-1B	Riparian Buffer Restoration		39.961286	-77.647410	2005		3.0	3.0	1,861.25	25%	0.75	75%	2.26	1944.85	308.31	2,161	50%	1,081
Ex-2	Porous Pavement	Salem Village	39.972448	-77.635835	2010	09-031*	3.4	1.0	n/a	25%	0.25	75%	2.55	1944.85	308.31	1,272	70%	891
Total																		**87.983**

*Plan on file in municipal office
**PADEP - Statewide MS4 Land Cover Estimates
***PADEP PRP Instructions - Attachment B, Developed Land Loading Rates for PA Counties

Ex-1 Siloam Dam Removal and Stream Restoration - The Siloam Dam was owned by the City of Chambersburg and located within Greene Township. The dam had not been used for decades and was considered a liability and an impediment to water quality and resident fish species. It was removed in 2005, and a local watershed group (Conococheague Watershed Alliance) has been monitoring the site and the downstream Wolf Lake dam (removed in 2006) to record pre- and post-removal changes in water quality and benthic life. The Conococheague Watershed Alliance has hosted annual clean-up events on the Conococheague through Chambersburg and are supporting additional instream habitat improvement and riparian restoration at each dam removal site (Siloam and Wolf Lake). For reporting purposes, the removal of both dams was combined into one project; Project Title: Conococheague Creek Dam Removals and Habitat Restoration. According to the Final Report from American Rivers documenting the dam removal and habitat restoration project, a combined total of 7,445 feet of riparian habitat and 3,749 feet of stream were restored for both projects. In order to determine the pollutant load allocation for each dam removal/stream restoration project it was assumed that an equal number of feet of streambank were restored at each site. Therefore the project length listed above for Ex-1A is half of the total stream restoration length reported by American Rivers (1,874.5 ft). Similarly, it was assumed that an equal length of riparian buffer was restored at each site. To calculate the area associated with the buffer restoration, the assumed length (one half of the total length reported by American Rivers, 1,861.25 ft) was multiplied by the assumed buffer width (35 ft on each side of the stream). The resulted in an estimation of 130,287 sq ft or approximately 3 acres.

Ex-2 Salem Village Porous Pavement - The pervious driveways of the Salem Village subdivision located along Roosevelt Drive were designed with pervious pavement driveways to allow stormwater runoff from the impervious areas of the community to infiltrate rather than entering the MS4. The maintenance program implemented after construction of the porous pavement included quarterly inspection and vacuum street sweeping on a quarterly basis at a minimum. The landowner of the development is responsible for implementation of the street sweeping program. Construction details and operation and maintenance information for this BMP are included on the Final Subdivision & Land Development Plan for Salem Road Village (project number 09-031) on file in the Greene Township municipal office.

APPENDIX E

Proposed BMP Pollutant Load Reduction Calculations

Appendix E – Table 1: Proposed BMPs

Site	BMP ID	BMP Type	Location	Lat	Long	Drainage Area (acres)	Length (ft)	Drainage Area Characteristics				Loading Rate TSS* (lbs/ac/yr)		Total Load TSS (lbs/yr)	BMP Effectiveness **	Pollutant Load Reduction TSS (lb/yr)
								% Imperv.	Imperv. (acres)	% Pervious	Pervious (acres)	Imperv.	Pervious			
Fayetteville Athletic Assoc./ Fayetteville Volunteer Fire Co.	BMP-1	Rain Garden	99 W Main St, Fayetteville	39.914415	-77.554724	0.25	n/a	25%	0.06	75%	0.19	1944.85	308.31	486	90%	438
	BMP-2	Pond Retrofit		39.913244	-77.553912	4.36	n/a	25%	1.09	75%	3.27	1944.85	308.31	3,128	90%	2,534
	BMP-3	Swale Retrofit		39.913628	-77.553984	4.50	300	25%	1.13	75%	3.38	1944.85	308.31	3,229	90%	2,615
	BMP-4	Rain Garden		39.913442	-77.554619	2.10	300	25%	0.53	75%	1.58	1944.85	308.31	1,507	90%	1,356
Winebrenner Theological Seminary/ Chambersburg Country Club / Scotland Community Assoc. Park	BMP-5	Stream Restoration	Chambersburg Country Club (Golf Course)	39.964361	-77.587276	n/a	2,000	n/a	n/a	n/a	n/a	n/a	n/a	n/a	44.88 lb/ft	89,760
	BMP-6	Stream Restoration & Dam Removal	Scotland Community Assoc. Park/ Winebrenner Theological Seminary	39.969101	-77.588855	n/a	2,250	n/a	n/a	n/a	n/a	n/a	n/a	n/a	44.88 lb/ft	100,980
	BMP-7	Wetland Restoration		39.969101	-77.588855	65	n/a	25%	16.25	75%	48.75	1944.85	308.31	46,634	60%	27,980
	BMP-8	Bioretention	Winebrenner Theological Seminary	39.968661	-77.591152	5.0	n/a	25%	1.25	75%	3.75	1944.85	308.31	3,587	80%	2,870
	BMP-9	Bioretention		39.967624	-77.590916	3.0	n/a	25%	0.75	75%	2.25	1944.85	308.31	2,152	80%	1,722
Former Northwood Mobile Home Park	BMP-10	Stream Restoration	Conococheague Creek (2000 Philadelphia Ave)	39.961135	-77.639314	n/a	1,500	n/a	n/a	n/a	n/a	n/a	n/a	n/a	44.88 lb/ft	67,320
	BMP-11	Non-mowed buffer		39.961135	-77.639314	16.5	825	25%	4.125	75%	12.375	1944.85	308.31	11,838	50%	9,470
Parklawns Memorial Gardens	BMP-12	Buffer	3218 Philadelphia Ce, Chambersburg	39.973411	-77.625946	24.0	n/a	25%	6	75%	18	1944.85	308.31	17,219	50%	8,609
Camelot Meadows	BMP-13	Basin Retrofit	6210 Lincoln Way E, Fayetteville	39.906102	-77.533215	38.0	n/a	25%	9.5	75%	28.5	1944.85	308.31	27,263	90%	22,083
Chambersburg Mall	BMP-14	Swale Retrofit	3055 Black Gap Rd, Chambersburg	39.958524	-77.577152	10.0	n/a	25%	2.5	75%	7.5	1944.85	308.31	7,174	90%	5,811
Beacon Light Estates	BMP-15	Basin Retrofit	Cape Hatteras Dr at Woodstock Rd	39.94769	-77.583158	15.5	n/a	25%	3.875	75%	11.625	1944.85	308.31	11,120	90%	9,008
Franklin Square Drive Residential Development	BMP-16	Basin Retrofit	Benjamin Dr at Scotland Ave	39.956833	-77.632697	40.0	n/a	25%	10	75%	30	1944.85	308.31	28,698	90%	23,245
Phillaman Run	BMP-17	Stream Restoration	White Church Rd	39.953320	-77.562151	n/a	2,000	n/a	n/a	n/a	n/a	n/a	n/a	m/a	44.88 lb/ft	89,760
Total																**465,561**

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