# LONDONDERRY TOWNSHIP

Dauphin County, Pennsylvania

## Chesapeake Bay Pollutant Reduction Plan

September 2017

HRG Project No. R001068.0436

HRG
Herbert, Rowland & Grubic, Inc.
Engineering & Related Services
AN EMPLOYEE-OWNED COMPANY

# Chesapeake Bay Pollutant Reduction Plan

LONDONDERRY TOWNSHIP

DAUPHIN COUNTY, PENNSYLVANIA

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# INTRODUCTION

Londonderry Township discharges stormwater to surface waters 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 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 Discharge Elimination System (NPDES) Stormwater Discharges from Small Municipal Separate Storm Sewer Systems Pollutant Reduction Plan (PRP) Instructions[2] .

| General Information | |
|---|---|
| **Permittee Name:** Londonderry Township | **NPDES Permit No.:** PAG133547 |
| **Mailing Address:** 783 S Geyers Church Road | **Effective Date:** 5/1/13 |
| **City, State Zip:** Middletown, PA 17057 | **Expiration Date:** 4/30/18 |
| **MS4 Contact Person:** Tyler Erb | **Renewal Due Date:** 11/1/17 |
| **Title:** Township MS4 Coordinator | **Municipality:** Londonderry Township |
| **Phone:** 717-944-1803 | **County:** Dauphin |
| **Email:** terb@londonderrypa.org | **Consultant Name**: Herbert, Rowland & Grubic, Inc. |
| **Co-Permittees (if applicable):** N/A | **Consultant Contact:** Erin Letavic, P.E.<br>369 East Park Drive<br>Harrisburg, PA 17109<br>(717) 564-1121<br>eletavic@hrg-inc.com |

Londonderry Township is a small MS4 Community currently in its second permit term. The Township is approximately 15-percent developed and has 2,112.7 acres of Urbanized Area (UA) according to the United States Census Bureaus' 2010 census.

Londonderry Township is located in the Conewago Creek, Swatara Creek-Susquehanna River, and Laurel Run-Susquehanna River HUC-12 watersheds. The Conewago Creek and Swatara Creek-Susquehanna River watersheds have been classified as impaired by PADEP. The Pollutant Reduction Plan (PRP) requirements for these impaired watersheds are included within this CBPRP.

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

# SECTION A: PUBLIC PARTICIPATION

A complete copy of this CBPRP was made available for the public to review at the Londonderry Township municipal office from August 1, 2017 to August 31, 2017. The availability of the document was publicized on the Township website for 30 days and published in *The Patriot News* 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. Copies of the public notice as posted on the Township website and published in *The Patriot News* are included in Appendix A.

Written comments were accepted for 30 days following the publication date of the public notice, however no public comments were received. Therefore, no public comment documentation is included in Appendix A. Additionally, as no public comments were received, a record of consideration is also not included within this report.

The information contained in this report was presented to the public during the regularly scheduled Londonderry Township Board of Supervisor's meeting held on August 7, 2017. Comments and questions regarding the CBPRP were received during the public presentation. A copy of CBPRP presentation and the meeting minutes are included in Appendix A.

# SECTION B: MAPPING

The Londonderry Township CBPRP Planning Area Map depicts the Township's regulated outfalls and it's contributing Municipal Separate Storm Sewer System (MS4) as required under MCM #3, BMPs 2 and 3 of the PAG-13. In addition to the MS4 infrastructure (inlets, pipes, outfalls, existing BMPs), the MS4 Map also shows the CBPRP planning areas, UA boundary, impaired streams (color-coded by impairment) watersheds boundaries, and proposed BMP locations.

The Township's Land Use Map was developed using the most recent National Land Cover Database[3]. The majority of the Township is agricultural or undeveloped. The portions of the Township that are developed are generally located along the major transportation thoroughfares. Small pockets of development are also located in the northwestern and southeastern portions of the municipality. The area of high-intensity development located on the island in the Susquehanna River is the Three Mile Island (TMI) nuclear generation station. TMI is not included within the Township UA boundary.

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

# SECTION C: POLLUTANTS OF CONCERN

The pollutants of concern for Londonderry 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**

| Planning Are (Watershed) | Impaired Downstream Water | Pollutants of Concern |
|---|---|---|
| **CBPRP** | Chesapeake Bay Nutrients/ Sediment | Appendix D - Nutrients, Siltation (4a) |
| **Conewago Creek-Susquehanna River** | Unnamed Tributaries to Conewago Creek; Conewago Creek; Lynch Run | Appendix E - Nutrients, Organic Enrichment/Low D.O.; Siltation, Suspended Solids (4a) |
| **Swatara Creek-Susquehanna River** | Unnamed Tributaries to Swatara Creek; Iron Run | Appendix E - Nutrients, Organic Enrichment/Low D.O.; Siltation, Suspended Solids (4a) |

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

# SECTION D: DETERMINE EXISTING LOADING FOR POLLUTANTS OF CONCERN

## D.1 Parsed Area Calculation

In order to calculate the actual pollutant loads applicable to the Londonderry 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 through the parsing process[5].

Therefore, the following areas were removed from the CBPRP and PRP planning areas:

- **PennDOT Roadways/PA Turnpike** – The estimated pollutant load from stormwater runoff generated by PennDOT roadways and the portion of the Pennsylvania Turnpike located within the Township was parsed from the existing pollutant base load, as PennDOT and the Turnpike Commission maintain their own MS4 permits to account for stormwater runoff generated from their facilities.
- **Direct Discharge Areas** – Direct discharge areas are areas in which stormwater runoff does not enter the MS4. As a significant portion of Londonderry Township's municipal boundaries are waterways, the Conewago Creek to the south, and the Swatara Creek and Susquehanna River to the west, there are multiple areas throughout the Township that drain directly to one of these waterways or their tributaries. These areas were removed from the Township planning areas.

A summary of parsed area removed from the Township planning areas is shown in Tables 2A – C. Parsed areas are shown on the CBPRP 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** | 2,113 |
| **Parsed Areas (PennDOT Roadways)** | - 135 |
| **Parsed Areas (Direct Drainage)** | - 752 |
| **Adjusted Planning Area** | **1,226** |

**Table 2B. Parsed Area Summary – Conewago Creek Planning Area**

| Planning Area | Urbanized Area (acres) |
|---|---|
| **Conewago Creek Watershed** | 839 |
| **Parsed Areas (PennDOT Roadways)** | - 90 |
| **Parsed Areas (Direct Drainage)** | - 277 |
| **Adjusted Planning Area** | **472** |

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

**Table 2C. Parsed Area Summary – Swatara Creek Planning Area**

| Planning Area | Urbanized Area (acres) |
|---|---|
| **Swatara Creek Watershed** | 1,105 |
| **Parsed Areas (PennDOT Roadways)** | - 41 |
| **Parsed Areas (Direct Drainage)** | - 475 |
| **Adjusted Planning Area** | 589 |

## 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 - C was multiplied by the percent pervious and impervious land use values for Londonderry Township listed in the Statewide MS4 Land Cover Estimates guidance document from PADEP[7]. This calculation determined the acres of impervious and pervious land within each planning area. The impervious and pervious acreages were then multiplied by the Developed Land Loading Rates for Dauphin County[8] to determine the total existing pollutant load attributed to the Township. The existing pollutant loading was determined for the CBPRP planning area as well as for each impaired watershed (PRP planning areas).

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. Therefore, only the TSS pollutant loading was calculated (Table 3). Detailed pollutant load calculations are provided in Appendix D.

**Table 3. Pollutant Loading for Londonderry Township Planning Areas**

| Planning Area | UA (acres) | Regulated Pollutant Load TSS (lbs/yr) |
|---|---|---|
| **Swatara Creek PRP** | 589 | 279,375 |
| **Conewago Creek PRP** | 472 | 254,202 |
| **CBPRP** | 1,226 | 638,308 |

As the Swatara Creek and Conewago Creek PRP 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.

[6] PADEP PRP Instructions - Attachment C "Chesapeake Bay PRP Example Using DEP Simplified Method"
[7] PADEP - Statewide MS4 Land Cover Estimates
[8] PADEP - PRP Instructions, Attachment B: Developed Land Loading Rates for PA Counties (rev. 3/2017)

## D.3 Existing Pollutant Loading Adjustment for Previously Implemented BMPs

Londonderry Township contains various BMPs that have been installed previously and continue to function as designed. These existing BMPs treat over 100 acres of UA and are being claimed as credit towards reducing the existing baseline pollutant loading. The municipally-owned BMPs are maintained by public works staff and the Township MS4 Environmental Coordinator and are inspected monthly. Privately owned BMPs located within the Township are maintained in accordance with O&M agreements recorded with the land development plan. These BMPs are inspected annually by the Township MS4 Environmental Coordinator.

The pollutant loading reduction for existing BMPs (Table 4) were calculated in terms of pounds per year using PADEP's standard BMP Effectiveness Values[9]. Additional information on existing BMPs is provided in Appendix D. The locations of existing BMPs are shown on the CBPRP Planning Area Map (Appendix B).

**Table 4: Adjusted Baseline Load Summary**

| Planning Area | Pollutant Load TSS (lbs/yr) | Installed BMP Reduction TSS (lbs/yr) | Adjusted Pollutant Load TSS (lbs/yr) |
|---|---|---|---|
| **CBPRP** | 638,308 | 93,436 | 544,872 |
| **Swatara Creek PRP** | 279,375 | 58,191 | 221,184 |
| **Conewago Creek PRP** | 254,202 | 35,246 | 218,956 |

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

# SECTION E: BMPS TO ACHIEVE THE REQUIRED POLLUTANT LOADING REDUCTIONS

## E.1 Required Pollutant Reduction Calculation

Londonderry 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 total nitrogen (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 achieved10 . 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** | 1,226 | 54,487 |

In addition to meeting the PAG-13 General Permit, Appendix D requirements listed in Table 5, two watersheds within Londonderry Township, Swatara Creek and Conewago, 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 CBPRP 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) |
|---|---|---|
| **Swatara Creek PRP** | 589 | 22,118 |
| **Conewago Creek PRP** | 472 | 21,896 |

As stated previously, the load reduction requirements for each impaired watershed planning areas 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 (54,487 lbs/yr), at least 41-percent (22,118 lbs/yr) must be achieved within the Swatara Creek planning area, and 40-percent (21,896 lb/yr) must be achieved within the Conewago Creek planning area. The remaining 19-percent (10,473 lb/yr) may be achieved anywhere within the CBPRP planning area.

[10] PADEP – PRP Instruction, Document #3800-PM-BCW0100k (rev. 3/2017)

## 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 municipal staff, in-field site assessments, and public outreach meetings.

A summary of the type and scale of BMP projects included in the pollutant reduction strategy is listed in Table 7. The pollutant loading reductions for each proposed BMP were calculated in terms of pounds per year using PADEP's standard BMP Effectiveness Values[11]. Complete calculations for the anticipated pollutant load reductions for each BMPs listed below is provided in Appendix E.

**Table 7: Londonderry Township Proposed BMP Summary**

| Proj Site | BMP ID | BMP Type | Planning Area | Length (ft) | Drainage Area (acres) | Load Reduction TSS (lbs/yr) |
|---|---|---|---|---|---|---|
| **Former Davis Greenhouse** | BMP-1 | Bioswale A Restoration | CBPRP/ Conewago Creek | 350 | 8.0 | 3,658 |
| | | Bioswale B Restoration | | 350 | 10.0 | 4,572 |
| | | Conewago Creek Stream Restoration | CBPRP/ Conewago Creek | 1,000 | n/a | 44,880 |
| **Township Fire Station** | BMP-2 | Detention Basin Retrofit | CBPRP/ Swatara Creek | 100 | 2.5 | 1,157 |
| **Hills of Waterford** | BMP-3 | Detention Basin Retrofit | CBPRP/Swatara Creek | 130 | 6.5 | 3,009 |
| **Total** | | | | | | **57,276** |

## E.3 BMP Project Descriptions

Londonderry Township has an active environmental department that works closely with the public works department, investigates and responds to citizen stormwater concerns, and conducts regular inspections of the Township MS4, existing BMPs, and streams. Therefore, it is anticipated that during the permit term, the MS4 Environmental Coordinator may discover other opportunities to implement BMPs elsewhere in the Township. When this occurs, the potential projects will be evaluated in terms of cost, pollutant load reduction potential, and ease of implementation. If it is determined that a different BMP project will achieve the pollutant load reduction requirements outlined in Section E.1, in a more cost-effective manner or otherwise provide additional benefit to the Township, the Township may opt to replace the BMP projects listed below with the new project. If this occurs, site plans, design details, and pollutant load reduction calculations for each newly proposed project will be documented in the Annual Status Reports.

The following BMP strategy outlines the type and scale of BMPs that are required to meet the Township's pollutant load reduction goal. The proposed BMP projects described below are conceptual and have not been fully designed. These projects are intended for planning purposes only. The proposed projects have been evaluated in terms of preliminary feasibility and estimated pollutant load reductions in order to meet the goals of this plan.

[11] PADEP Document 38-99-PM-BCW0100M, NPDES Stormwater Discharges from Small MS4s, BMP Effectiveness Values (5/2015)

**Former Davis Greenhouse Bioswale** - The Township is exploring the possibility of working with the land owners or purchasing the land previously operated as the Davis Greenhouse. This site is located in the southeastern portion of the Township between Hoffer Road and the Conewago Creek. In addition to bordering the Conewago Creek, this site also contains two small unnamed tributary streams which have been partially filled in. This project proposes to retrofit the former tributary streams into bioswales. The bioswales will utilize the existing natural drainage pathways at the site. From the site topography, it is estimated that the bioswale on the west side of the site (proposed Bioswale A) will receive drainage from approximately 8 acres and the bioswale on the east side of the site (proposed Bioswale B) will received drainage from approximately 10 acres.

The existing channels will be retrofitted into bioswales through the addition of amended soil media (compost/soil mix) to facilitate infiltration, and lined with an assortment of native plantings to assist in the filtration of pollutants. The bioswales will be designed to infiltrate the anticipated runoff volume from the 2-year storm. As the majority of annual precipitation comes from frequent, small rain events, the bioswales are anticipated to provide significant water quality improvement by infiltrating and filtering nearly all of this runoff. During heavier storm events that exceed the bioswale's infiltration capacity, the bioswales improve water quality by infiltrating the "first flush" of storm water runoff. The first flush is the initial surface runoff of a rainstorm which generally has a higher concentration of pollutants when compared to runoff from the remainder of the storm. After the initial runoff is trapped by the bioswale for infiltration, the bioswale plantings will provide some filtration for any additional runoff conveyed by the bioswale to the Conewago Creek rather than infiltrated.

**Former Davis Greenhouse/Conewago Creek Stream Restoratio**n – The approximately 3,000-foot stretch of the Conewago Creek that stretches from East Harrisburg Pike (Rt 230) east to the municipal boundary will be evaluated to determine the best locations stream restoration. It is anticipated that several sections of the stream, totaling approximately 1,000 feet, will be restored. The stream restoration will include both structural repairs (as needed), in-stream stream calming measures (rock vanes, wing deflectors, etc.) to decrease water velocity and direct stream flow away from eroding streambanks. The structures will be constructed of natural materials such as rock, root wads, and logs. If needed, additional plantings will be added to areas in which the existing riparian buffer is in poor condition. Buffer rehabilitation will include the removal and replacement of dead and diseased vegetation, as well as the addition of new plantings to provide further streambank stabilization. The exact number and locations for structural and in-stream structures, and riparian planting areas will be determined during engineering design of the project. The Township anticipates partnering with neighboring municipalities and private property owners to complete this project.

**Basin Retrofits** – Two existing detention basins in the Swatara Creek PRP Planning Area are proposed for basin retrofits, the Londonderry Township Fire Station basin, and the Hills of Waterford residential community basin. As currently constructed, these detention basins receive, temporarily hold, and discharges stormwater at a controlled rate. While this can provide rate and volume control, the basins offer only a limited water quality benefit. The only water quality benefit is realized through minimal infiltration. This project proposes to retrofit the existing basins with bioretention features to transform the basins from a simple catch, store, and release ponds into a BMPs which will provide infiltration and improved sediment and nutrient removal capabilities. These benefits are achieved by extending the storage time by modifying the structure, improving soil conditions to allow for greater infiltration rates, and naturalizing the basins with native and/or wetland plant species.

The extent and nature of the retrofits will rely on the results of future engineering investigations, however for modeling purposes, the load reduction attributed to the basin retrofits were calculated by applying the standard bioretention removal efficiency to only the portion of the stormwater runoff not currently being treated by the basins. 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.

Table 8: BMP Implementation Schedule

| Proj Site | BMP ID | BMP Type | Permitting & Engineering Design (Permit Year) | Construction/Reporting (Permit Year) |
|---|---|---|---|---|
| **Former Davis Greenhouse** | BMP-1 | Bioswale A Restoration | 1 | 2/3 |
| | | Bioswale B Restoration | | |
| | | Conewago Creek Stream Restoration | | |
| **Township Fire Station** | BMP-2 | Detention Basin Retrofit | 1 | 1 |
| **Hills of Waterford** | BMP-3 | Detention Basin Retrofit | 3 | 4 |

## E.4 BMP Project Location Evaluation

Only two of the proposed BMP projects are located within the Swatara Creek Watershed. It is understood that this does not meet the Swatara Creek PRP planning area pollutant load reduction requirement. However, during evaluation of the impaired streams located within the Swatara Creek PRP planning area, it was not feasible to develop projects within the UA drainage area to these streams that would provide a meaningful benefit to the streams. The portion of the impaired unnamed tributary to the Swatara Creek located just north of the Turnpike, has already been restored by the PA Turnpike Commission during a recently completed stream/wetland restoration project (Ex-10). Only a small fraction of the Township UA drains to Iron Run, the other impaired stream within the Swatara Creek PRP Planning area. The approximately 300 feet of Iron Run within the Township UA is not in need of stream restoration. As both the Conewago Creek and Swatara Creek watersheds drain to the same downstream waterway (Susquehanna River), the downstream waters will received the same amount of sediment reduction benefit regardless of which watershed the BMP projects are located within Londonderry Township.

# SECTION F: 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)

Once implemented, the BMPs outlined in this plan will be operated and maintained by Township Staff and inspected regularly by the Township MS4 Coordinator to ensure that they continue to produce the expected pollutant reductions. The O&M activities will be reported in the Annual MS4 Status Reports submitted in accordance with the General Permit.

The O&M activities and schedule for each BMP will be developed during the design phase. A general summary of the O&M activities involved with each BMP type and the frequency at which O&M activities will occur are as follows:

- Stream 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 plantings 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 promote 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.

### Bioretention BMPs and Retrofits

Operation and maintenance requirements for the bioretention projects include:

- 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

**Notice of Public Participation & Public Meeting Notice Published on Township Website**
(https://www.londonderrypa.org/announcements.php)

**Notice of Public Participation & Public Meeting Notice from Patriot News (August 1, 2017)**

5066436

PA MEDIA GROUP

## Order Confirmation

**Ad Order Number 0008285865**

| Customer | Payor Customer | |
|---|---|---|
| **LONDONDERRY TOWNSHIP** | **LONDONDERRY TOWNSHIP** | |
| *Account:*29434 | *Account:* 29434 | *PO Number* |
| LONDONDERRY TOWNSHIP | LONDONDERRY TOWNSHIP | |
| 783 S GEYERS CHURCH RD, | 783 S GEYERS CHURCH RD, | *Sales Rep.* Marianna Aldridge |
| MIDDLETOWN PA 17057 USA | MIDDLETOWN PA 17057 USA | *Order Taker* Marianna Aldridge |
| (717)944-1803 | (717)944-1803 | *Order Source* Phone |
| | | *Special Pricing* |
| FAX:7179442405 | | |
| ltaylor@hrg-inc.com | | |

| | | | |
|---|---|---|---|
| *Tear Sheets* | 0 | *Net Amount* | $144.03 |
| *Proofs* | 0 | *Tax Amount* | $0.00 |
| *Affidavits* | 1 | *Total Amount* | $144.03 |
| *Blind Box* | | *Payment Method* | Invoice |
| *Promo Type* | | *Payment Amount* | $0.00 |
| *Materials* | | *Amount Due* | $144.03 |
| *Invoice Text* | | | |

### Ad Schedule

| | | | |
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| *# Inserts* | 1 | *POS/Sub-Class* | Meeting Notices |
| *Cost* | $136.53 | *AdNumber* | 0008285865-01 |
| *Ad Type* | PA CLS Legal Liner | *Ad Size* | 1 X 29 li |
| *Pick Up #* | | *Ad Attributes* | |
| *External Ad #* | | *Color* | <NONE> |
| *Production Method* | AdBooker | *Production Notes* | |

*Run Dates* 08/01/2017 *Sort Text* NOTIC2500OFPUBLICPARTICIPATIONANDPUBLICMEETINGFORCHESAPEAKEBAYPOLLUTANTREDUCTIONPLANLO

| | | | |
|---|---|---|---|
| *Product* | PennLive.com | *Placement/Class* | Main Legals |
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| *Ad Type* | PA CLS Legal Liner | *Ad Size* | 1 X 29 li |
| *Pick Up #* | | *Ad Attributes* | |
| *External Ad #* | | *Color* | <NONE> |
| *Production Method* | AdBooker | *Production Notes* | |

*Run Dates* 08/01/2017 *Sort Text* NOTIC2500OFPUBLICPARTICIPATIONANDPUBLICMEETINGFORCHESAPEAKEBAYPOLLUTANTREDUCTIONPLANLO

0008285865-01

**Ad Content Proof**

**NOTICE OF PUBLIC PARTICIPATION AND PUBLIC MEETING FOR CHESAPEAKE BAY POLLUTANT REDUCTION PLAN**

Londonderry Township hereby gives notice of the 30-day public comment period for its National Pollutant Discharge Elimination (NPDES) Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4) Pollutant Reduction Plan (PRP). Best management practices (BMPs) are proposed in the Plan to satisfy PRP requirements for the Chesapeake Bay and local stream impairments. The plan is available on the municipal website (http://londonderrypa.org) and a hard copy is available at the municipal office. The public is invited to review this document and provide written comments. The 30-day public comment period begins August 1, 2017 and ends August 31, 2017. The Plan will be discussed during the regularly scheduled municipal meeting on August 7, 2017 starting at 7 PM, at the municipal building.

**LONDONDERRY TOWNSHIP BOARD OF SUPERVISORS**
**REGULAR MEETING MINUTES**
August 7, 2017
7:00 P.M.

**http://www.facebook.com/londonderrytownship**
**www.londonderrypa.org**

The Londonderry Township Board of Supervisors held their regularly scheduled meeting on Monday, August 7, 2017, at the Municipal Building, 783 S. Geyers Church Road, Middletown, Pennsylvania beginning at 7:00 p.m.

**PRESENT:** Ronald Kopp, Chairman
Anna Dale, Member
Michael Geyer, Member
Bart Shellenhamer, Member
Jeff Burkhart, Code/Zoning Officer
Andrew Kenworthy, Engineer
Jim Diamond, Solicitor

**ABSENT:** Mel Hershey, Vice Chairman
Mike Johnson
Sam Risteff

**ATTENDEES:** Andy Brandt
Tyler Erb
Jamie Eberl, HRG
Jason Maron
Joe Sheehan
Mr. & Mrs. Winters

**Salute the Flag**

**Citizens Input** – None

**Approval of Minutes** – July 3, 2017
Moved by Shellenhamer, seconded by Dale, the minutes of July 3, 2017 be approved. Motion carried.

**Manager's Report** – Steve Letavic
The Manager requested approval of the following Resolution:

**RESOLUTION 2017-6**
**FOR THE YEAR 2017**

**A RESOLUTION OF LONDONDERRY TOWNSHIP BOARD OF SUPERVISORS SUPPORTING THE APPLICATIONS OF LOCAL SHARE MUNICIPAL GRANTS FOR THE PURPOSES OF APPLYING FOR ADDITIONAL FUNDING TO APPLY TOWARDS THE EXTENSION OF A WATERLINE FROM NEWBERRY ROAD TO IRON MINE ROAD AND FOR IMPROVEMENETS TO THE RUGBY FIELD AT SUNSET PARK.**

Moved by Geyer, seconded by Dale the Resolution be approved. Motion carried.

The Manager requested approval of the following Resolution:

**RESOLUTION 2017-7**
**FOR THE YEAR 2017**

**A RESOLUTION OF LONDONDERRY TOWNSHIP BOARD OF SUPERVISORS SUPPORTING PENNSYLVANIA'S FIVE NUCLEAR ENERGY PLANTS**

Moved by Shellenhamer, seconded by Dale the Resolution be approved. Motion carried.

**Treasurer's Report**
The Manager requested approval to pay the following expenditures for the month of July:

| | |
|---|---|
| GENERAL FUND | $ 178,488.57 |
| GOLF COURSE FUND | $ 136,509.81 |
| LIQUID FUELS | $ 1,653.34 |
| ESCROW | -0- |
| LVFC | -0- |
| DEBT SERVICE | $ 51,671.35 |
| TOTAL | $ 368,323.07 |

Moved by Dale, seconded by Geyer the expenditures for July 2017 be approved. Motion carried.

**Code/Zoning** - Jeff Burkhart

Moved by Dale, seconded by Shellenhamer the entire $25,000.00 bond from Chatham Creek, LLC for work related to the Hills of Waterford be released. Motion carried.

Moved by Shellenhamer, seconded by Geyer the course route and temporary street closures for the 2017 Grape Strides Race – a 4 mile loop – beginning and ending at the Vineyard and Brewery at Hershey, 598 Schoolhouse Road, on October 28, 2017 at 10:30 a.m. be approved as presented.
The Board requested that the residents and churches in the affected area be notified prior to the race in order to avoid any conflict.
Motion carried.

Based upon information received from Grace Nguyen of Blakinger Thomas on behalf of Jon Landis, Alvin Horning and Shiloh Meadows LLC, the prospective purchasers of Geyers Mobile Home Park, the Board was informed that the group has decided against the purchase of Geyers Mobile Home Park. However, the current owner, Mr. Stauffer, contacted this office and asked what he should do at this time. The information that was submitted by the prospective purchasers will be provided to Mr. Stauffer and he intends to make a presentation to the Board, possibly at the next work session.

Jeff gave a brief update on the progress of several items of concern, i.e. stop signs, street lighting, street widths, as they pertain to the compliance agreement with Crestview Mobile Home Park.

Jeff reported on the progress made by the owner of Hi-Land Mobile Home Park. The playground equipment has been installed by Pine Creek Structures. In addition, it was noted that a first-class water treatment facility has been installed. A yearly permit will be forthcoming.

The Board questioned two zoning hearing signs: one posted on Route 230 and the other on Round Top Road.

Jeff responded that the sign on 230 across the creek from the property formerly owned by Dr. Swartz is owned by a gentleman who wishes to raise beef cattle. The property is a residential use which requires a special exception. It is believed that he meets the criteria for a special exception for keeping the farm animal.

The other sign is located at the intersection of Round Top Road and Waltonville Rd. and involves a request to establish a licensed massage parlor. The owner of the business does not live in the adjoining home, but wishes to operate her business in the small shop next to the home, which is next to a car repair shop and previously had been a landscape business and a small metal shop. Therefore, this is not a home occupation but is simply trading one non-conforming use for another non-conforming use.

**MS-4 Environmental Department** – Tyler Erb

Tyler reported that two workshops, which were part of a mini grant through DEP's Educational Series, have been completed and two more are scheduled for August 19th (Wildlife Corridors and Habitat Restoration) and August 26th (Green Cleaning).

Tyler also reported on the following:

Private BMPs – Inspections were completed on all private BMPs (Best Maintenance Practices). Working on confirming Love's Truck Stop's BMP matches what was originally designed. It will then be submitted to Jamie Ebrel from HRG for inclusion in the Annual Report.

Annual Report – The annual report was submitted to DEP.

Stream Walks – Stream walks will be starting next month. A "Notice of Intent to Enter" letter has been created and is currently displayed on the Londonderry Webpage as well as Facebook. In the beginning, I will be prioritizing urbanized areas, but I plan to walk all the streams in the Township.

Swatara Creek Buffer – Steve and I are working on a plan for reducing the maintenance of the buffer, considering meadow mixes, etc.

CBPRP (Chesapeake Bay Pollution Reduction Plan) – Tyler, along with Jamie Ebrel from HRG, gave a presentation on the Chesapeake Bay Pollution Reduction Plan. The Plan is currently on the web site for public comment until the end of August and dictates the requirements that Londonderry must meet for the next Permit Cycle.

**Public Works Report** – Andy Brandt
A report containing a list of work done in the month of July and work planned for the month of August was presented and is on file.

A discussion was held involving the water problems occurring in the area of Woodcrest/Londonderry Estates, Steinruck Road, Ridge Road and the Hills of Waterford and suggestions/comments were presented.

Chairman Kopp commended the Public Works Department for the work performed by the Department on Beagle Road. He wished to inform the Board that their efforts resulted in a substantial savings for the Township.

**Golf Course and Bar Grill Report**
The Manager explained that Sam and Mike could not be present this evening, but he would forward their reports to the Board.

**Engineer's Report** – Andrew Kenworthy
No report.

**Solicitor's Report** – Jim Diamond
No report.

**EMA Report** – Les Gilbert
No Report

**New Business** – None

**Old Business** – None

**Executive Session** – None

Supervisor Shellenhamer reported on the following:

(1) The TMI golf outing was held on Friday, August 4, 2017 at Sunset Golf Course. There were several (very good) comments made on the renovations and the condition of the course. In addition, TMI presented a $40,000 check to the Londonderry Volunteer Fire Company.
(2) Supervisor Shellenhamer stated he formulated a press release to PennLive and the Press and Journal regarding the Township's support for the continuance of the power plant.

Supervisor Geyer questioned whether there was anything that could be done regarding the intersection of Route 230 and S. Deodate Road. Apparently the trucks are following their GPS devices to Conewago Industrial Park and are making a wrong turn onto S. Deodate Road. The problem occurs when they attempt to make the turn from S. Deodate Road onto Route 230, causing major backup of traffic on the highway. It was suggested that a traffic study might be a possibility. It was also recommended that Steve, Jeff and Andrew work with PennDOT in an attempt to alleviate the situation by either the installation of signs or forbidding truck traffic on S. Deodate Road.

Moved by Shellenhamer, seconded by Dale to adjourn the meeting at 8:30 p.m. Motion carried.

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[ BUILDING RELATIONSHIPS.
DESIGNING SOLUTIONS. ]

# Londonderry Township
## Chesapeake Bay Pollutant Reduction Plan (CBPRP)

***August 7, 2017***

## 2018 PAG-13

NPDES (National Pollutant Discharge Elimination System) General Permit (PAG-13) for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s)

- Water Quality Permit
- Improved quality of local streams
- Quality ←→ Developed Land and Stormwater Controls

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## 2018 PAG-13

NPDES (National Pollutant Discharge Elimination System) General Permit (PAG-13) for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s)

Updated permit requires:

- ✓ Pollution Control Measures (PCMs)
- ✓ Updated list of authorized non-stormwater discharges
- ✓ Increased public involvement
- ✓ Clearer requirements requiring public access
- ✓ Pollutant Reduction Plans – Chesapeake Bay and locally impaired waters

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## Pollutant Reduction Plans

### 2018 PAG-13

**Appendix D**

- Estimate existing sediment (TSS), Total Phosphorus (TP), and Total Nitrogen (TN) loads to the Chesapeake Bay
- Identify BMPs to reduce pollutant loads by 10%, 5% and 3% respectively within 5 years*

**Appendix E**

- Estimate existing TSS, TP, TN loads to locally impaired waters
- Identify BMPs to reduce pollutant loads by 10%, 5% and 3% respectively within 5 years*

**Presumptive approach in which a 10% sediment reduction is assumed to also result in a 5% TP reduction and a 3% TN reduction.*

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[ BUILDING RELATIONSHIPS. DESIGNING SOLUTIONS. ]

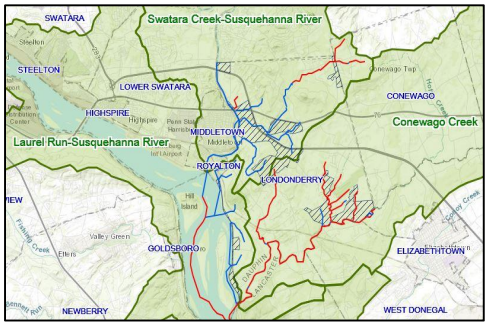
## Impaired Watershed Planning Areas

**Chesapeake Bay Watershed**

- Includes all Urbanized Area (UA) within Township (hatched area)

**Conewago Creek Watershed**

- Lynch Run (TSS)
- Conewago Creek (TSS, Nutrients)
- Unnamed Tribs to Conewago Creek (TSS, Nutrients)




**Swatara Creek – Susquehanna River Watershed**

- Iron Run (TSS)
- Unnamed Tributaries to Swatara Creek (TSS)

**Laurel Run – Susquehanna River Watershed**

- No local impairments

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[ BUILDING RELATIONSHIPS. DESIGNING SOLUTIONS. ]

## Existing Pollutant Loading, Baseline

- **Township UA** (2010 US Census)
  2,113 acres
- **UA Land Use** (PADEP)
  16% Impervious / 84 % Pervious
- **Dauphin County Developed Land Loading Rates** (PADEP)
  1,999.14 lbs/ac/yr (Impervious) / 299.62 lbs/ac/yr (Pervious)

**Baseline Pollutant Loading**

| Planning Area | UA (acres) | Pollutant Load TSS (lbs/yr) |
|---|---|---|
| CBPRP | 2,113 | 1,207,499 |
| Conewago Creek PRP | 839 | 479,582 |
| Swatara Creek PRP | 1,105 | 631,315 |

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## Existing Pollutant Loading

**Sediment (TSS)**

- Loose particles of clay, silt and sand
- Generated by natural weathering, accelerated erosion from development, and resuspension of previously eroded sediments stored in stream corridors.
- Excess TSS affects stream flows, degrades water quality, and negatively affects local and downstream habitats.

**Sediment Measurement - "lbs/yr"**

- Mass per unit area per unit time
- Model-based measure of water quality
- *Not a literal pounds removed*

**Chesapeake Bay (2011)**
Sediment transported after Hurricane Irene & T.S. Lee

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[ BUILDING RELATIONSHIPS. DESIGNING SOLUTIONS. ]

## Existing Pollutant Loading, Adjusted

**Parsed Areas**

**PennDOT / PA Turnpike**

**Direct Discharge Areas**
Areas that drain directly to a waterway without entering the Township MS4.

**Existing BMPs**

Previously installed structural BMPs located within the UA that provide water quality benefit.

**Adjusted Pollutant Loading**

| Planning Area | UA (acres) | Pollutant Load TSS (lbs/yr) | Pollutant Load Reduction Goal TSS (lbs/yr) |
|---|---|---|---|
| CBPRP | 1,226 | 544,872 | **54,487** |
| Conewago Creek PRP | 472 | 218,956 | **21,896** |
| Swatara Creek PRP | 589 | 221,184 | **22,118** |

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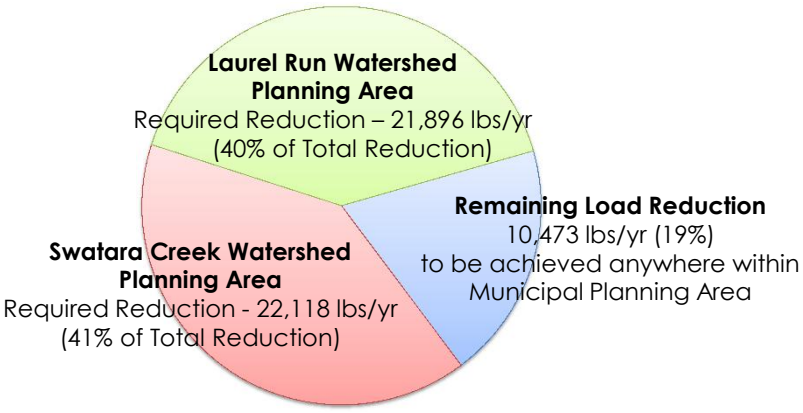
## Pollutant (TSS) Reduction Requirements

**Total Required Pollutant Load Reduction – 54,487 lbs/yr**

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## Pollutant Load Reduction Strategy

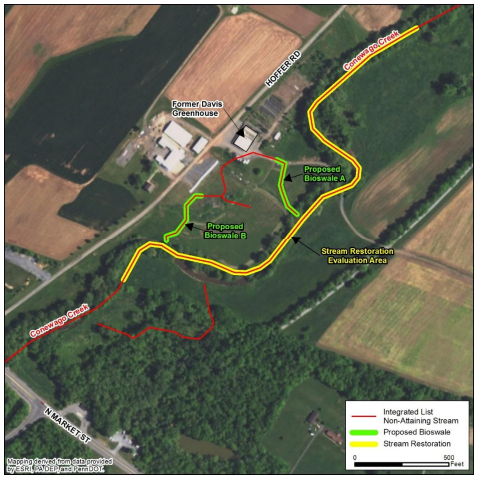
| Site | BMP Type | Planning Area | Drainage Area (acres) | Length (ft) | TSS Load Reduction (lbs/yr) |
|---|---|---|---|---|---|
| Former Davis Greenhouse | Bioswale A | CBPRP/ Conewago Creek | 8 | 350 | 3,658 |
| | Bioswale B | | 10 | 350 | 4,572 |
| | Stream Restoration (Conewago Creek) | | n/a | 1,000 | 44,880 |
| Township Fire Station | Detention Basin Retrofit | CBPRP/ Swatara Creek | 1 | n/a | 1,157 |
| Hills of Waterford | Detention Basin Retrofit | CBPRP/ Swatara Creek | 1 | n/a | 3,009 |
| **Total (Conewago Creek Planning Area)** | | | | | **53,110** |
| **Total (Laurel Run Planning Area)** | | | | | **4,166** |
| **Total (CBPRP Planning Area)** | | | | | **57,276** |

## Proposed BMPs
### Former Davis Greenhouse Site

**Bioswales (2)** – shallow trenches with amended soil media to facilitate infiltration, native plantings for additional filtration

**Stream Restoration (1,000 ft)** – Evaluate 3,000 ft stretch of Conewago Creek for restoration sites

- **Structural repairs** - stabilization of eroded areas
- **In-stream measures** - calming measures (rock vanes, wing deflectors) to decrease velocity
- **Riparian Buffer Improvements** - removal of invasive species, installation of native plantings

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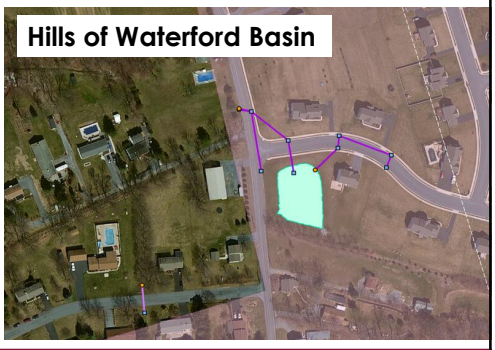
## Proposed BMPs
### Detention Basin Retrofits

**Stormwater Detention Basins** – designed to temporarily detain runoff and discharge at a controlled rate, offers limited water quality benefit.

**Basin Retrofit** – addition of amended soil media (sand, soil, and organic material mix) and native vegetation to existing detention basin promotes infiltration and increases the basins ability to treat runoff and improve water quality.

## Timeline

- **Public comment period** — **Aug 1-31, 2017**
- **Revise report** — **Sept 1-14 2017**
- **Submit report** — **Sept 15, 2017**
- **Implementation**
  - **Start in 2018 when permit is approved**
  - **Complete in 2023 (5 years)**
  - **Preliminary cost estimate: $290,000**

## Questions?

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**Public Comments Received & Record of Consideration**

N/A – No public comments were received during the comment period

# APPENDIX B

Mapping


1,200 0 1,200 Feet

Mapping derived from data provided by Londonderry Township, PA DEP, PennDOT, US Census, and USGS.

| 7/28/2017 | PM: EGL | GIS: BLS | QA: MDW | R001068.0488 |
|---|---|---|---|---|


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- Proposed BMP
- Existing BMP
- Storm Observation Point
- Storm Outfall
- Storm Inlet
- Storm Manhole
- Storm Culvert
- Storm Gravity Main
- Storm Open Drain
- Storm Virtual Drainline
- Storm Basin
- Local Roads
- State Road
- Sediment Impaired Stream
- Non-Impaired Stream
- Municipal Boundary
- Watershed (HUC-12)
- Urbanized Area (2010)
- Parsed Areas

# CBPRP Planning Area

## Londonderry Township
## Dauphin County, Pennsylvania

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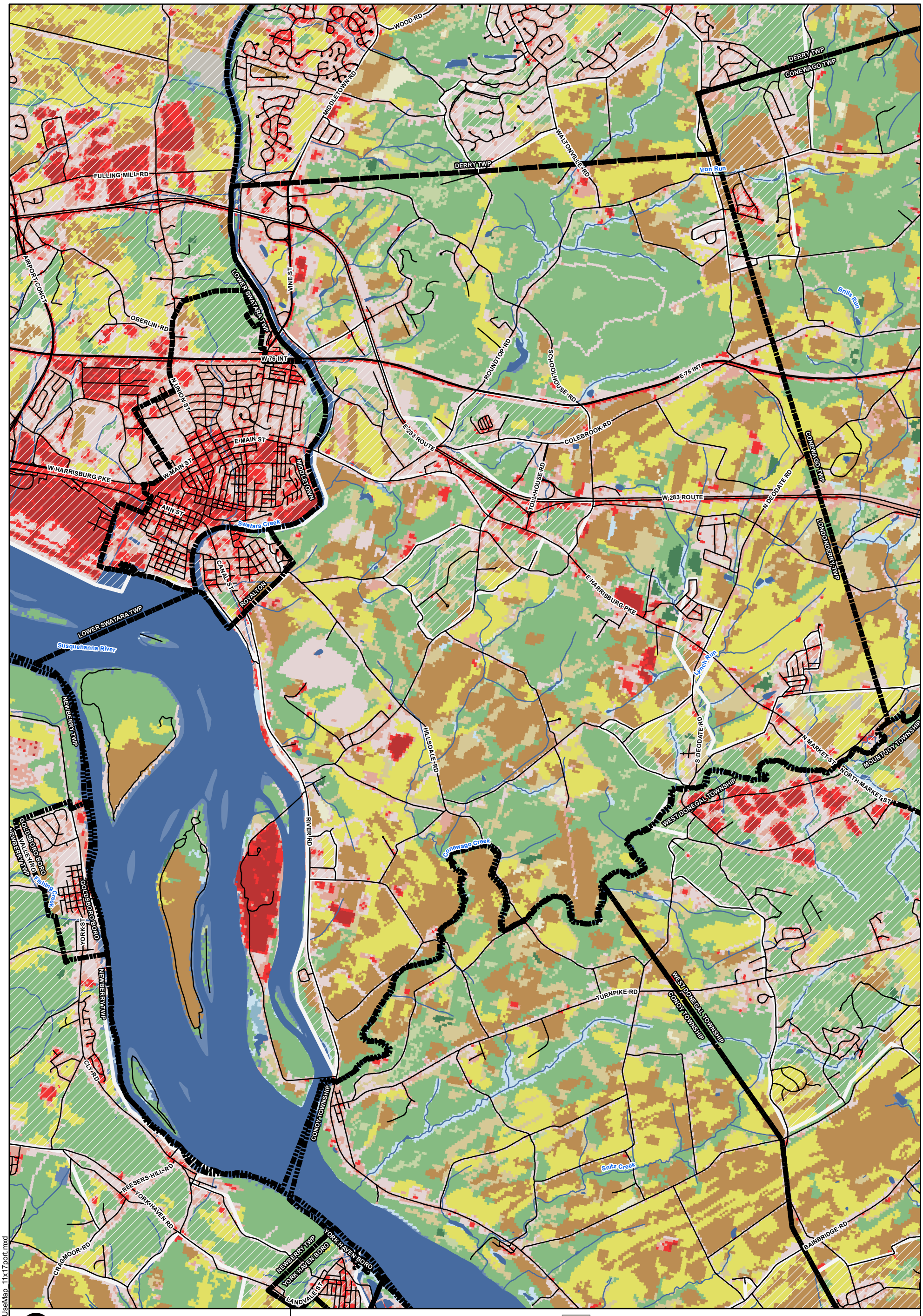


2,500 0 2,500 Feet

Mapping derived from data provided by Dauphin County, York County, Lancaster County, USGS, US Census, and MRLC.

| 5/5/2017 | PM: EGL | GIS: BLS/HMG | QA: HSH | R001068.0436 |
|---|---|---|---|---|


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- 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)

# Land Use Map

## Londonderry Township
## Dauphin County, Pennsylvania

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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 |
|---|---|---|---|---|---|---|
| **Dauphin County** | | | | | | |
| LONDONDERRY TWP | PAG133547 | No | | Unnamed Tributaries to Conewago Creek | Appendix E-Organic Enrichment/Low D.O. (4a) | Other Habitat Alterations (4c) |
| | | | | Unnamed Tributaries to Swatara Creek | Appendix E-Siltation (5) | |
| | | | | Iron Run | Appendix E-Siltation (5) | |
| | | | | Susquehanna River | Appendix C-PCB (5) | |
| | | | | Conewago Creek | Appendix E-Nutrients, Siltation, Suspended Solids (4a) | |
| | | | | Chesapeake Bay Nutrients/Sediment | Appendix D-Nutrients, Siltation (4a) | |
| | | | | Lynch Run | Appendix E-Siltation (4a) | Cause Unknown, Turbidity (4a) |
| LOWER PAXTON TWP | PAG133643 | Yes | TMDL Plan | Slotznick Run | | Cause Unknown (5) |
| | | | | Asylum Run | Appendix B-Pathogens (5) | Water/Flow Variability (4c) |
| | | | | Spring Creek | | Cause Unknown (5) |
| | | | | Susquehanna River | Appendix C-PCB (5) | |
| | | | | Paxton Creek TMDL | TMDL Plan-Siltation, Suspended Solids (4a) | |
| | | | | Paxton Creek | Appendix B-Pathogens (5) | Other Habitat Alterations, Water/Flow Variability (4c) |
| | | | | Nyes Run | Appendix B-Pathogens (5) | |
| | | | | Unnamed Tributaries to Nyes Run | | Flow Alterations, Other Habitat Alterations (4c) |
| | | | | Chesapeake Bay Nutrients/Sediment | Appendix D-Nutrients, Siltation (4a) | |
| LOWER SWATARA TWP | PAG133543 | No | | Susquehanna River | Appendix C-PCB (5) | |
| | | | | Chesapeake Bay Nutrients/Sediment | Appendix D-Nutrients, Siltation (4a) | |
| | | | | Burd Run | | Cause Unknown (5) |
| | | | | Unnamed Tributaries to Sherman Creek | Appendix E-Siltation (5) | Other Habitat Alterations (4c) |
| | | | | Unnamed Tributaries to Susquehanna River | Appendix E-Siltation (5) | Cause Unknown (5), Other Habitat Alterations (4c) |
| MIDDLE PAXTON TWP | PAG133688* | Yes | SP | Chesapeake Bay Nutrients/Sediment | Appendix D-Nutrients, Siltation (4a) | |
| | | | | Susquehanna River | Appendix C-PCB (5) | |
| MIDDLETOWN BORO | PAG133645 | No | | Unnamed Tributaries to Susquehanna River | Appendix E-Siltation (5) | Other Habitat Alterations (4c) |
| | | | | Unnamed Tributaries to Sherman Creek | Appendix E-Siltation (5) | Other Habitat Alterations (4c) |
| | | | | Susquehanna River | Appendix C-PCB (5) | |
| | | | | Chesapeake Bay Nutrients/Sediment | Appendix D-Nutrients, Siltation (4a) | |
| PAXTANG BORO | PAG133554 | No | | Susquehanna River | Appendix C-PCB (5) | |
| | | | | Unnamed Tributaries to Spring Creek | Appendix E-Siltation (5) | |
| | | | | Spring Creek | | Cause Unknown (5) |
| | | | | Chesapeake Bay Nutrients/Sediment | Appendix D-Nutrients, Siltation (4a) | |

| MS4 Name | Permit Number | HUC 12 Name | Impaired Downstream Waters or Applicable TMDL Name | Requirement(s) |
|---|---|---|---|---|
| **Dauphin County** | | | | |
| CONEWAGO TWP | PAG133621 | Conewago Creek, Laurel Run-Susquehanna River | Chesapeake Bay Nutrients\Sediment, Conewago Creek | Appendix D-Siltation/Nutrients, Appendix E-Nutrients, Siltation, Suspended Solids |
| | | Conewago Creek | Conewago Creek | Appendix B-Pathogens |
| | | Spring Creek, Swatara Creek-Susquehanna River | Chesapeake Bay Nutrients\Sediment, Iron Run, Spring Creek | Appendix D-Siltation/Nutrients, Appendix E-Nutrients, Siltation, Suspended Solids |
| DAUPHIN BORO | PAG133550 | Cove Creek-Susquehanna River, Laurel Run-Susquehanna River | Susquehanna River | Appendix C-PCB |
| | | Cove Creek-Susquehanna River, Laurel Run-Susquehanna River, Stony Creek | Chesapeake Bay Nutrients\Sediment | Appendix D-Siltation/Nutrients |
| DERRY TWP | PAG133637 | Laurel Run-Susquehanna River | Chesapeake Bay Nutrients\Sediment, Susquehanna River | Appendix C-PCB, Appendix D-Siltation/Nutrients |
| | | Spring Creek, Swatara Creek-Susquehanna River | Chesapeake Bay Nutrients\Sediment, Iron Run, Spring Creek, Unnamed Tributaries to Swatara Creek | Appendix D-Siltation/Nutrients, Appendix E-Siltation |
| EAST HANOVER TWP | PAG133551 | Bow Creek-Swatara Creek, Manada Creek, Swatara Creek-Susquehanna | Bow Creek, Chesapeake Bay Nutrients\Sediment, Manada Creek, Raccoon Creek, Unnamed Tributaries to Bow Creek, Unnamed Tributaries to Manada Creek , Unnamed Tributaries to Raccoon Creek | Appendix B-Pathogens, Appendix D-Siltation/Nutrients, Appendix E-DO/BOD, Nutrients, Siltation |
| | | Bow Creek-Swatara Creek | Bow Creek, Raccoon Creek, Unnamed Tributaries to Bow Creek | Appendix C-Priority Organics, Appendix E-DO/BOD, Nutrients, Siltation |
| HARRISBURG CITY | PAI133524 | Laurel Run-Susquehanna River, Paxton Creek, Spring Creek | Asylum Run, Paxton Creek, Unnamed Tributaries to Spring Creek, Wildwood Lake | Appendix E-Nutrients, Siltation, Suspended Solids |
| | | Cove Creek-Susquehanna River, Laurel Run-Susquehanna River, Paxton Creek, Spring Creek | Asylum Run, Chesapeake Bay Nutrients\Sediment, Paxton Creek, Paxton Creek TMDL, Unnamed Tributaries to Spring Creek, Wildwood Lake | Appendix D-Siltation/Nutrients, Appendix E-Nutrients, Siltation, Suspended Solids, TMDL Plan-Siltation, Suspended Solids |
| | | | Asylum Run, Chesapeake Bay Nutrients\Sediment, Paxton Creek, Paxton Creek TMDL, Unnamed Tributaries to Spring Creek, Wildwood Lake | Appendix D-Siltation/Nutrients, Appendix E-Nutrients, Siltation, Suspended Solids, TMDL Plan-Siltation, Suspended Solids |
| | | Cove Creek-Susquehanna River, Laurel Run-Susquehanna River | Susquehanna River | Appendix C-PCB |
| | | Laurel Run-Susquehanna River, Paxton Creek | Asylum Run, Paxton Creek, Paxton Creek TMDL | Appendix B-Pathogens, TMDL Plan-Siltation, Suspended Solids |
| HIGHSPIRE BORO | PAG133544 | Laurel Run-Susquehanna River | Chesapeake Bay Nutrients\Sediment, Susquehanna River | Appendix C-PCB, Appendix D-Siltation/Nutrients |
| HUMMELSTOWN BORO | PAG133556 | Swatara Creek-Susquehanna River | Chesapeake Bay Nutrients\Sediment | Appendix D-Siltation/Nutrients |
| | | Laurel Run-Susquehanna River | Chesapeake Bay Nutrients\Sediment | Appendix D-Siltation/Nutrients |
| LONDONDERRY TWP | PAG133547 | Hartman Run-Susquehanna River | Chesapeake Bay Nutrients\Sediment, Susquehanna River | Appendix C-PCB, Appendix D-Siltation/Nutrients |
| | | Swatara Creek-Susquehanna River | Chesapeake Bay Nutrients\Sediment, Iron Run, Unnamed Tributaries to Swatara Creek | Appendix D-Siltation/Nutrients, Appendix E-Nutrients, Organic Enrichment/Low D.O., Siltation, Suspended Solids |
| | | Conewago Creek, Laurel Run-Susquehanna River | Chesapeake Bay Nutrients\Sediment, Conewago Creek, Lynch Run, Unnamed Tributaries to Conewago Creek | Appendix D-Siltation/Nutrients, Appendix E-Nutrients, Organic Enrichment/Low D.O., Siltation, Suspended Solids |
| | | Laurel Run-Susquehanna River | Susquehanna River | Appendix C-PCB |

# APPENDIX D

Existing Pollutant Load Reduction Calculations

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

| Planning Area | Urbanized Area* | | | | | Loading Rate TSS** (lb/ac/yr) | | Total Load TSS (lb/yr) |
|---|---|---|---|---|---|---|---|---|
| | UA (acres) | % Imperv. | % Pervious | Imperv. (acres) | Pervious (acres) | Imperv. | Pervious | |
| **Londonderry Twp. CBPRP** | 2,112.7 | 16% | 84% | 338.0 | 1,774.7 | 1999.14 | 299.62 | 1,207,499 |
| **Parsed Areas (State Roads)** | 134.5 | n/a | n/a | 58.3 | 76.2 | 1999.14 | 299.62 | 139,259 |
| **Parsed Areas (Direct Drainage)** | 752 | 16% | 84% | 120.4 | 631.9 | 1999.14 | 299.62 | 429,932 |
| **Existing BMPs** | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 93,436 |
| **Adjusted Baseline Total** | 1,226 | | | | | | | **544,872** |

*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, Conewago Creek PRP Planning Area

| Planning Area | Urbanized Area* | | | | | Loading Rate TSS** (lb/ac/yr) | | Total Load TSS (lb/yr) |
|---|---|---|---|---|---|---|---|---|
| | UA (acres) | % Imperv. | % Pervious | Imperv. (acres) | Pervious (acres) | Imperv. | Pervious | |
| **Conewago Creek** | 839.1 | 16% | 84% | 134.3 | 704.8 | 1999.14 | 299.62 | 479,582 |
| **Parsed Areas (State Roads)** | 90.3 | n/a | n/a | 23.6 | 66.7 | 1999.14 | 299.62 | 67,120 |
| **Parsed Areas (Direct Drainage)** | 276.9 | 16% | 84% | 44.3 | 232.6 | 1999.14 | 299.62 | 158,260 |
| **Existing BMPs** | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 35,246 |
| **Adjusted Baseline Total** | 472 | | | | | | | **218,956** |

*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, Swatara Creek PRP Planning Area

| Planning Area | Urbanized Area* | | | | | Loading Rate TSS ** (lbs/ac/yr) | | Total Load TSS (lb/yr) |
|---|---|---|---|---|---|---|---|---|
| | UA (acres) | % Imperv. | % Pervious | Imperv. (acres) | Pervious (acres) | Imperv. | Pervious | |
| **Swatara Creek** | 1104.6 | 16% | 84% | 176.7 | 927.8 | 1999.14 | 299.62 | 631,315 |
| **Parsed Areas (State Roads)** | 41 | n/a | n/a | 40.1 | 0.4 | 1999.14 | 299.62 | 80,269 |
| **Parsed Areas (Direct Drainage)** | 475 | 16% | 84% | 76.1 | 399.3 | 1999.14 | 299.62 | 271,672 |
| **Existing BMPs** | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 58,190 |
| **Adjusted Baseline Total** | 589 | | | | | | | **221,184** |

*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 –PennDOT/PA Turnpike, CBPRP Planning Area

| Parsed Area | UA Length (ft) | Roadway Width (ft) | Right-of-Way Width (ft) | UA (acres) | | Loading Rate TSS* (lb/ac/yr) | | Total Load TSS (lb/yr) |
|---|---|---|---|---|---|---|---|---|
| | | Imperv. | Pervious | Imperv. | Pervious | Imperv. | Pervious | |
| PA Turnpike | 4,140 | 96 | 100 | 9.1 | 9.5 | 1,995.1 | 299.62 | 21,051.2 |
| I-283 | 14,520 | 48 | 202 | 16.0 | 66.7 | 1,996.1 | 299.62 | 51,912.9 |
| E Harrisburg Pike | 16,437 | 24 | 0 | 9.1 | 0 | 1,997.1 | 299.62 | 18,086.5 |
| Deodate Road | 7,300 | 22 | 0 | 3.7 | 0 | 1,998.1 | 299.62 | 7,366.9 |
| River Road | 19,150 | 24 | 0 | 10.6 | 0 | 1,999.1 | 299.62 | 21,092.9 |
| Toll House Road | 1,128 | 60 | 0 | 1.6 | 0 | 1,999.1 | 299.62 | 3,106.1 |
| Colebrook Road | 8,530 | 20 | 0 | 3.9 | 0 | 1,999.1 | 299.62 | 7,829.5 |
| Roundtop Road | 2,700 | 20 | 0 | 1.2 | 0 | 1,999.1 | 299.62 | 2,478.3 |
| Schoolhouse Road | 1,110 | 23 | 0 | 0.6 | 0 | 1,999.1 | 299.62 | 1,171.7 |
| Vine St | 1,500 | 75 | 0 | 2.6 | 0 | 1,999.1 | 299.62 | 5,163.1 |
| **Total** | | | | | | | | **139,259** |

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

### Appendix D – Table 2B: Parsed Area Load Reductions –PennDOT, Conewago Creek PRP Planning Area

| Parsed Area | UA Length (ft) | Roadway Width (ft) | Right-of-Way Width (ft) | UA (acres) | | Loading Rate TSS* (lb/ac/yr) | | Total Load TSS (lb/yr) |
|---|---|---|---|---|---|---|---|---|
| | | Imperv. | Pervious | Imperv. | Pervious | Imperv. | Pervious | |
| I-283 | 14,520 | 48 | 200 | 16.0 | 66.7 | 1,996.1 | 299.62 | 51,912.9 |
| E Harrisburg Pike | 7,125 | 24 | 24 | 3.9 | 0 | 1,997.1 | 299.62 | 7,840.0 |
| Deodate Road | 7,300 | 22 | 14 | 3.7 | 0 | 1,998.1 | 299.62 | 7,366.9 |
| **Total** | | | | | | | | **67,120** |

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

### Appendix D – Table 2C: Parsed Area Load Reductions –PennDOT/PA Turnpike, Swatara Creek PRP Planning Area

| Parsed Area | UA Length (ft) | Roadway Width (ft) | Right-of-Way Width (ft) | UA (acres) | | Loading Rate TSS* (lb/ac/yr) | | Total Load TSS (lb/yr) |
|---|---|---|---|---|---|---|---|---|
| | | Imperv. | Pervious | Imperv. | Pervious | Imperv. | Pervious | |
| PA Turnpike | 4,140 | 96 | 100 | 9.1 | 0.2 | 1,995.1 | 299.62 | 18,269.6 |
| I-283 | 14,520 | 48 | 202 | 16.0 | 0.2 | 1,996.1 | 299.62 | 32,004.9 |
| E Harrisburg Pike | 9,312 | 24 | 0 | 5.1 | 0.0 | 1,997.1 | 299.62 | 10,246.5 |
| Toll House Road | 1,128 | 60 | 0 | 1.6 | 0.0 | 1,999.1 | 299.62 | 3,106.1 |
| Colebrook Road | 8,530 | 20 | 0 | 3.9 | 0.0 | 1,999.1 | 299.62 | 7,829.5 |
| Roundtop Road | 2,700 | 20 | 0 | 1.2 | 0.0 | 1,999.1 | 299.62 | 2,478.3 |
| Schoolhouse Road | 1,110 | 23 | 0 | 0.6 | 0.0 | 1,999.1 | 299.62 | 1,171.7 |
| Vine St | 1,500 | 75 | 0 | 2.6 | 0.0 | 1,999.1 | 299.62 | 5,163.1 |
| **Total** | | | | | | | | **80,269** |

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

### Appendix D – Table 3: Parsed Area Load Reductions – Direct Discharge Areas by Planning Area

| Planning Area | Urbanized Area | | | | | Loading Rate TSS* (lb/ac/yr) | | Total Load TSS (lb/yr) |
|---|---|---|---|---|---|---|---|---|
| | Direct Discharge Acres | % Imperv. | % Perv. | Imperv. (acres) | Perv. (acres) | Imperv. | Perv. | |
| **Conewago Creek PRP** | 276.9 | 16% | 84% | 44.3 | 232.6 | 1999.14 | 299.62 | 158,260 |
| **Swatara Creek PRP** | 53.4 | 16% | 84% | 76.1 | 399.3 | 1999.14 | 299.62 | 271,672 |
| **CBPRP** | 752.2 | 16% | 84% | 120.4 | 631.9 | 1999.14 | 299.62 | 429,932 |

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

## Appendix D – Table 4: Baseload Reduction for Previously Installed BMPs

| BMP ID | BMP Type | BMP Location | Planning Area | Size (acre) / length (ft) | Drainage Area (acres) | Urbanized Area* | | | | Loading Rate TSS** (lb/ac/yr) | | Pollutant Loading TSS (lb/yr) | BMP Efficiency | Load Reduction TSS (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | % Imperv. | % Pervious | Imperv. (acres) | Pervious (acres) | Imperv. | Pervious | | | |
| **Township-Owned/Maintained Properties** | | | | | | | | | | | | | | |
| **Ex-1** | Riparian Buffer (Only UA section) | Swatara Creek Buffer | Swatara Creek | 5.17 | 50 | 16% | 84% | 8.00 | 42.00 | 1999.1 | 299.62 | 28,577.2 | 50% | 14,289 |
| **Ex-2** | Rain Garden | Municipal Bldg. Rain Garden | Conewago Creek | 0.07 | 1.5 | 16% | 84% | 0.24 | 1.26 | 1999.1 | 299.62 | 857.3 | 90% | 772 |
| **Ex-3** | 7 Rain Barrels (all roof runoff) | Municipal Bldg. Rain Barrels | Conewago Creek | n/a | 0.11 | 100% | 0% | 0.11 | 0.00 | 1999.1 | 299.62 | 210.4 | 100% | 210 |
| **Private BMPs** | | | | | | | | | | | | | | |
| **Ex-4** | Lynch Run Stream Restoration | S Hertzer Run | Conewago Creek | 700 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 44.88 | 31,416 |
| | Lynch Run Buffer Restoration | S Hertzer Run | Conewago Creek | 0.48 | 5.5 | 16% | 84% | 0.88 | 4.62 | 1999.1 | 299.62 | 3,143.5 | 50% | 1,572 |
| **Ex-5** | Dry Detention Basin 1 | Love's Travel Stops | Swatara Creek | 0.5 | 3.91 | 16% | 84% | 0.63 | 3.28 | 1999.1 | 299.62 | 2,234.7 | 60% | 1,341 |
| **Ex-6** | Dry Detention Basin 2 | | | 0.12 | 2.05 | 16% | 84% | 0.33 | 1.72 | 1999.1 | 299.62 | 1,171.7 | 60% | 703 |
| **Ex-7** | Dry Detention Basin 3 | | | 0.06 | 1.56 | 16% | 84% | 0.25 | 1.31 | 1999.1 | 299.62 | 891.6 | 60% | 535 |
| **Ex-8** | Infiltration Trenches | Analytical Labs | Swatara Creek | 0.04 | 1.58 | 16% | 84% | 0.25 | 1.33 | 1999.1 | 299.62 | 903.0 | 80% | 722 |
| **Ex-9** | Dry Detention Basin | Gruber | Conewago Creek | 0.15 | 3.72 | 16% | 84% | 0.60 | 3.12 | 1999.1 | 299.62 | 2,126.1 | 60% | 1,276 |
| **Ex-10** | Stream Restoration | PA Turnpike | Swatara Creek | 625 | n/a | -- | -- | -- | -- | -- | -- | -- | 44.88 | 28,050 |
| | Wetland Mitigation | PA Turnpike | Swatara Creek | 2 | 36.6 | 16% | 84% | 5.86 | 30.74 | 1999.1 | 299.62 | 20,918.5 | 60% | 12,550 |
| **Total** | | | | | | | | | | | | | | **93,436** |

*PADEP - Statewide MS4 Land Cover Estimates

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

***PADEP - BMP Effectiveness Values

# APPENDIX E

Proposed BMP Pollutant Load Reduction Calculations

## Appendix E – Table 1: Proposed BMPs

| BMP ID | BMP Type | Planning Area | Lat | Long | Size (acre) / length (ft) | Drainage Area (acres) | Urbanized Area | | | | Loading Rate TSS (lb/ac/yr) | | Loading TSS (lb/yr) | BMP Efficiency*** | Load Reduction TSS (lb/yr) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | % Imperv. | % Pervious | Imperv. (acres) | Pervious (acres) | Imperv. | Pervious | | | |
| BMP-1 | Bioswale A Restoration | CBPRP/ Conewago Creek PRP | 40.16754 | -76.638351 | 800 | 8 | 16% | 84% | 1.28 | 6.72 | 1,999.1 | 299.62 | 4,572.3 | 80% | 3,658 |
| | Bioswale B Restoration | | | | 800 | 10 | 16% | 84% | 1.60 | 8.40 | 1,999.1 | 299.62 | 5,715.4 | 80% | 4,572 |
| | Conewago Creek Stream Restoration | | | | 1,000 | n/a | n/a | n/a | n/a | n/a | n/a | n/a | n/a | 44.88 lb/ft | 44,880 |
| BMP-2 | Basin Retrofit | CBPRP/ Swatara Creek | 40.190520 | -76.690816 | 0.05 | 2.5 | 16% | 84% | 0.40 | 2.10 | 1,999.1 | 299.62 | 1,428.9 | 90% | 1,157 |
| BMP-3 | Basin Retrofit | CBPRP/ Swatara Creek | 40.225107 | -76.657813 | 0.04 | 6.5 | 16% | 84% | 1.04 | 5.46 | 1,999.1 | 299.62 | 3,715.0 | 90% | 3,009 |
| **Total** | | | | | | | | | | | | | | | **57,276** |

*PADEP - Statewide MS4 Land Cover Estimates

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

***PADEP - BMP Effectiveness Value